Social determinants of oral health

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Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ANOVA	Analysis of variance
ARIA	Accessibility/Remoteness Index of Australia
ASCO	Australian Standard Classification of Occupations
CATI	Computer-assisted Telephone Interview
CEJ	Cemento-enamel junction
DHALF	Dental Health and Lifestyle Factors questionnaire
DMF Teeth	Decayed, Missing and Filled Teeth
DSRU	Dental Statistics and Research Unit
IRSD	Index of Relative Socioeconomic Disadvantage
NDTIS	National Dental Telephone Interview Survey
OHIP	Oral Health Impact Profile
PAL	Primary approach letter
Quasi DMF	Self-assessed number of decayed, missing and filled teeth
SADS	South Australian Dental Service
SEIFA	Socio-Economic Indexes for Areas
SEP	Socioeconomic position
WHO	World Health Organization

Abstract

Despite the generally high standards of living enjoyed by most Australians, not all adults experience a high standard of oral health. Previous epidemiological research has documented marked differences in the distribution of oral health status between social groups in Australia. Typically, adults who face greater financial constraint have more untreated oral disease and more missing teeth compared to more advantaged adults. While the evidence for social inequality in adult oral health is established, the pathways that connect social position to oral health are not well understood. To date, research has addressed separate aspects of the social context in which oral health is produced, but has not integrated these into a more complete model. Hence, the objectives of this research were to describe the social distribution of oral health, explore its behavioural and psychosocial correlates, estimate the importance of these in multivariate models, and propose a conceptual framework that explained reasons for social variation in oral health. Social determinants were defined as mutable social conditions that influence life opportunities, affect access to resources, and shape patterns of behaviour that impact on oral health.

Method

Data were drawn from the 1999 National Dental Telephone Interview Survey (NDTIS) and its supplementary mail survey. The sampling design involved a stratified random selection of residential telephone numbers listed in the Electronic White Pages drawn from the capital city of each Australian state and territory, and the residual populations of each mainland state. The NDTIS obtained cross-sectional population surveillance information on the sociodemographic distribution of oral health status, and access and utilisation of dental services. The mail survey posted to adult first-person interviewees further explored self-assessed oral health and its behavioural and psychosocial correlates. Oral health was evaluated with five self-reported measures: decayed teeth; missing teeth; oral symptom experience; the social impact of oral conditions; and a global self-rating of oral health. Socioeconomic position was measured with conventional individual level indicators of household income, educational attainment, occupational group and prestige, and a small area measure of socioeconomic disadvantage. Data were weighted to adjust for over-sampling in non-metropolitan areas and of single occupant households, and were standardised to the age and sex distributions for each sampled stratum at the time of the survey. Analysis was limited to the 92.6% of respondents aged 18 to 91 years who were dentate (n=3,974).

Results

Analysis of the social distribution of oral health revealed a systematic distribution characterised by progressively better oral health status at each step up the scale of social advantage.

Not only did persons with fewer resources report greater morbidity, but the consequences of their oral conditions in terms of functional impairment and physical, psychological and social disability were greater, and they rated their oral health less favourably than did adults with greater socioeconomic resource. The fact that this graduated effect applied even among advantaged individuals indicated that inequality in oral health was not simply a function of absolute material deprivation. It also implied that the distribution in oral health reflected underlying inequalities in the social environment. Investigation of the proximate determinants of oral health revealed that dental behaviour was closely tied to oral health status. Monotonic behavioural gradients in oral status revealed strong positive associations between the utilisation of dental services and dental self-care practices and oral health outcomes.

Moving beyond a behavioural view of oral health, attention was directed toward psychosocial factors. Such factors are shown in previous research to affect health indirectly by influencing behaviours that have consequences for health. Indeed, psychosocial factors have been found to affect health directly through biological and physiological pathways. Psychosocial factors examined in this study were personal control, social support, psychological stress and life satisfaction. Not only was this set of factors found to systematically differ by socioeconomic position, but negative gradients in control, support and life satisfaction were associated with increasing prevalence of untreated decay, missing teeth, social impact, oral symptoms and poor self-rated oral health. Similarly, greater perceived stress was positively associated with oral morbidity.

While these findings demonstrated strong evidence for associations between socioeconomic position, psychosocial resource, dental behaviour and oral health, the cross-sectional research design precluded inference made about causality. Intuitively, socioeconomic position and dental behaviour precede oral health outcomes, but a case for social selection whereby poor oral health leads to unfavourable socioeconomic circumstances could not be discounted. In order to investigate possible life course influences on oral health, aspects of the childhood environment at the age of ten years were retrospectively recalled. Childhood socioeconomic position was indexed by parental occupation, and the quality of the psychosocial environment was evaluated by parental cohabitation and rearing style. Individuals with paternal occupation classified as manager, administrator or professional reported fewer decayed and missing teeth and fewer oral symptoms, and a greater proportion rated their oral health positively. Similar, but not identical, associations were observed according to maternal occupation.

Individuals whose parents coresided reported fewer decayed and missing teeth, less social impact and fewer oral symptoms. Those who described their rearing as positive and supportive reported less social impact and fewer oral symptoms, and a higher proportion rated their oral health as being good or better.

Moreover, favourable childhood conditions were also associated with a more advantaged psychosocial profile in adulthood, strengthening the case that social differences in adult oral health reflect the social structuring of advantage from childhood.

Finally, psychosocial conditions of the workplace and their relationships with oral health were investigated. The workplace represents a microcosm of the broader social environment, complete with features of hierarchical position, control, support, stress, security and reward. As expected, socioeconomically disadvantaged workers reported greater psychosocial hazards. Workers who experienced a threat to job security or a risk of skill obsolescence, those with demanding jobs and less control over their work, and in particular, adults who experienced work and home interference, reported poorer oral health.

In multivariate analyses, socioeconomic position was associated with each of the five oral health outcomes, although no single variable was significant in each model. After controlling for the effects of socioeconomic and demographic factors, social support or networks were significant for three outcomes, and distress and coping were also significant for three outcomes. Work-home interference was significantly associated with four outcomes. Dental behavioural factors were important, with dental visiting and dental self-care significantly associated with four outcomes.

Conclusions

Oral health in adulthood is affected by exposure to a range of social conditions that are linked to socioeconomic position. Such resources modify the exposure to stressful social conditions and are likely to influence people's response to stress in ways that have consequences for oral health. This study showed that a set of social characteristics systematically differed by socioeconomic position. Socioeconomic gradients in personal control, social support, stress and life satisfaction underlie patterns of dental behaviour that in turn are associated with oral health. While gradients were observed across the social hierarchy, oral health gains were steeper at the bottom of the social distribution than at the top for each incremental increase in socioeconomic or psychosocial resource. The study of the relationships between social conditions and oral health offers a alternative way to approach population oral health, not merely by access to dental care alone, but also by modifying the broader social environment in which people live, work and seek dental care.

Declaration

This thesis contains no material that has been accepted for the award of any other degree or diploma in any university. To the best of the candidate's knowledge and belief, the thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

I give my consent to the thesis being made available for loan and photocopying.

Signed: .....

Anne E Sanders

Date: ...5 September 2003.

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1. Introduction

This thesis describes the social distribution of oral health among dentate adults in Australia, investigates social factors that contribute to variation in the distribution, and proposes a conceptual framework to explain socioeconomic variation in adult population oral health. Much of the current understanding of the social determinants of health has emerged from general health research. With increasing recognition of the inter-relatedness between general and oral health, there are likely to be shared risk factors that explain variation in both oral and general health outcomes. Consistent with this view, a selection of key social determinants identified in general health research is examined for their associations with oral health. The a priori argument is that social inequalities in oral health are partly explained by differential exposure to risk and protective factors. These risk and protective factors follow a parallel gradient to the distribution of socioeconomic resources and act as pathways for generating social effects on oral health.

This chapter summarises contemporary explanations for social inequality in population health, identifies key social determinants, and presents psychosocial factors as underlying mechanisms that generate inequalities. These themes are introduced with reference to the broader health literature where much of the empirical evidence, theoretical orientations and explanatory models were derived. Moving to a narrower focus, the themes are reviewed with reference to the adult oral health literature. Next, the explanations and empirical evidence are integrated into a conceptual framework proposed to explain variation in adult oral health. Finally, the research hypotheses of this study are presented.

Social determinants of health

Inequalities in health range across a number of sociological dimensions, including socioeconomic position, age, sex, and ethnicity, with risk factors clustered in certain population subgroups and in particular geographical areas. Much of the observed inequality is socially determined. Social determinants of health are societal conditions that link society to health. Such conditions are initiated in the sociopolitical context, and mediated in the more immediate living and working environments of individuals. Over time, the consequences of these conditions are expressed in differentials in population health. It is not coincidental that health inequalities mirror social inequalities. Unequal social conditions produce a cumulative set of burdens that impact adversely on life opportunities, including health outcomes. Understanding the social distribution of health and identifying its social determinants is the basis of the discipline of social epidemiology.[1]

This research takes a social epidemiological approach to examining the social distribution of oral health among dentate adults and identifies social factors associated with its distribution.

In doing so, it moves beyond a description of the relationship to propose a conceptual framework to suggest how socioeconomic position is connected with the oral health of dentate adults.

Socioeconomic differentials are an important public health concern. Individuals at the lower end of the social hierarchy fare significantly worse for almost all health outcomes than do those in higher positions. Despite substantial evidence documenting these associations, important aspects of the relationship are not well specified. Little is known, for example, about the exact pathways and mechanisms that link socioeconomic position (SEP) to health status.

So that the major determinants might be clarified to inform policy decision, the World Health Organization in Europe called for a summary of the key social determinants. In response, Wilkinson and Marmot [2] identified ten factors. These were: the social gradient; stress; early life; social exclusion; work; unemployment; social support; addiction; food; and transport. Of these, this study addresses the social gradient, stress, work and social support. Early life is substituted with the developmental stage of middle childhood; non-employment, rather than unemployment is examined; and non-English-speaking background is examined as a risk factor for social exclusion.

Socioeconomic position

Understanding socioeconomic inequalities in oral health requires conceptual clarity about SEP and its distinction from socioeconomic status. The latter, socioeconomic *status*, is an attribute of an individual represented by indicators of income, education and occupation. SEP extends this construct to include the more subjective notion of prestige, which involves a ranking of self relative to others. SEP is a socially constructed phenomenon that ranks individuals, households, neighborhoods or other aggregates with respect to their capacity to produce or consume goods that are valued by society. Obtaining valid measures of these indicators poses a number of methodological difficulties that have been discussed in detail elsewhere. [3], [4] It is limiting, for example, to use an occupational-based indicator when a large portion of the sample is not in the labour force. Educational attainment is also limited where samples include both young and elderly adults. Apart from wage earnings, income may include dividends, interest, or other monetary income not captured by survey methods. Frequently, measures of household income do not take into account the number of persons dependent on the income. Non-response and inaccurate reporting of sensitive income-related matters pose difficulties in analysing data. Nonetheless, despite their shortcomings, individual-level indicators have been shown to be robust and reliable in measuring socioeconomic variations in health status in cross-sectional studies. In the oral health literature, Locker[5] has discussed methodological and theoretical difficulties of individual-level socioeconomic characteristics and recommended greater use of area-based measures. These too have limitations. They are prone to underestimating the effects of socioeconomic variation, and assume that measured characteristics are stable and homogeneous within the geographic area. In summary, there has been debate regarding the relative merit of alternative ways to measure socioeconomic position. No single indicator is without limitations.

1.1 Socioeconomic inequality in health in Australia

In a review of more than 200 published studies documenting the Australian research evidence of socioeconomic inequality in health, Turrell and colleagues [6] noted that health inequalities spanned the life course in Australian society. Those living in disadvantaged circumstances experienced worse health for almost all outcomes. Several leading reports have contributed to the body of knowledge in Australia.

The 1992 National Health Strategy [7] noted considerable differences in mortality, morbidity and risk factors between the most and least advantaged. Not only was a health gap recorded, but also a clearly defined social gradient was observed. Increasing proportions of respondents rated their general health poorly with increasing socioeconomic disadvantage. A similar distribution in health-related behaviour was observed. Men with low income were 40% more likely to smoke than their more affluent counterparts, and men living in the most disadvantaged areas were 26% more likely than other men to be physically inactive. Similarly, women with low educational attainment were 68% more likely to be overweight than women with higher educational attainment.

Poor health is not confined to vulnerable groups in society such the older aged. From the Health Monitoring Series, Mathers [8] observed that among adults of working age, those with greater socioeconomic disadvantage had poorer health for age-standardised death rates, serious chronic illnesses, disability, recent illness, and self-rated general health. Other research has shown that working males in the lowest occupational prestige group had twice the mortality from all causes of death of those in the highest, after adjusting for other factors.[9]

Geographical patterning in the distribution of health in Australia has been investigated. Mathers and colleagues reported that the 20% of Australians living in the most disadvantaged areas had 35% more years of life lost than the 20% living in the least disadvantaged areas. Even greater differences were observed in the distribution in disability-adjusted life-years as expressed by years of life lived with a disability. [10] Glover and colleagues[11] used geographic mapping techniques to demonstrate the co-occurrence of multiple indicators of disadvantage.

Areas with a high proportion of adults with little formal education also had high proportions of unskilled workers, women on sole parent pensions, families on income support, and higher fertility rates. Areas with a high proportion of residents who rated their health less favourably had high levels of socioeconomic disadvantage, low female labour force participation, and high proportions of public rental dwellings, disability support pensioners, unemployment beneficiaries and dwellings with no motor vehicles. In addition, these areas had higher standardised death rates, hospital admissions and morbidity.

Widening socioeconomic inequalities in health

Evidence of health inequalities in Australia is consistent with findings in almost every country for which data are available. More disturbing is evidence that the socioeconomic gradient in health is becoming steeper. In a methodological repeat of Mathers' earlier analysis, Turrell and Mathers[12] examined trends in age-standardised mortality rates over the period 1985-1987 to 1995-1997. An area-based measure of SEP was employed (IRSD scores) and the Gini coefficient was used as a summary statistic for socioeconomic inequality. Findings revealed that despite overall reductions in age-standardised death rates over the period, mortality inequalities remained, and the size of the mortality gap between the most and least disadvantaged areas (indicated by the rate ratio) had increased for some conditions.

Walker and Abello[13] drew similar conclusions after having performed time-series analyses on unit record files from the Australian Bureau of Statistics' four National Health Surveys conducted in 1977-78, 1983, 1989-90 and 1995. Analyses of trends in relative income and health for Australians aged 0 to 69 years revealed that the health gap between the two lowest income quintiles and more affluent income groups significantly increased over this period, for each outcome measured. Evidence that socioeconomic differentials in mortality and morbidity may be widening over time rather than narrowing or becoming static has been reported elsewhere.[14 15 16]

To compare wealth and health distributions across countries, Clarke and Smith [17] developed an index that quantified the distribution of health by equivalent income. In a cross-national comparison study of self-rated health status in ten countries, Australia's level of health inequality was similar to that of Britain and the United States, but significantly higher than that estimated for the seven European countries.

Among the factors thought to be driving the widening of the health gap, increasing inequality in income between the most affluent and others in society has been identified as important.

Income inequality and poverty in Australia

Some commentators have argued that beyond a certain standard of living, inequality in the distribution of income is more important to population health than absolute per capita affluence. Certainly, there is evidence of a widening income gap in Australia. Analyses of trends in income inequality over 20 years demonstrate that the scale of income differences is rising. [18 19 20] In the Australian context, individuals at the lowest end of the scale of incomes do not live in subsistence poverty, but rather in 'relative' poverty. Such people are socially marginalised because a lack of material resources precludes patterns of consumption and participation in what is seen as the Australian way of life. According to the definition of relative poverty as income less than half the national median, current estimates of the Centre for Independent Studies are that one in 12 Australians live in poverty. [21]

The sociodemographic profile of Australians in poverty has altered over the past two decades because of changes in population demographics, family structures, social security priorities and workforce participation. King has described the changing face of poverty as a shift in burden from the elderly, to other groups, including sole parents and younger single adults.[22] Thus, there are emerging vulnerable groups in Australian society.

In summary, a weight of evidence has revealed that the relationship between SEP and health is linear rather than threshold, with progressively better health encountered with each step up the social hierarchy. However, it is not plausible that socioeconomic resource directly affects health. Explanations for health inequalities must contain a plausible argument for the causes of health and illness as well as indicate plausible biological pathways connecting socioeconomic resource to health. Internationally, the movement to explain health inequalities has become an important research priority.

1.2 Explaining socioeconomic inequality in health

Until comparatively recently, inquiry into socioeconomic inequality in population health was descriptive, with efforts aimed at documenting rather than explaining variation. The early explanatory attempts viewed inequality in health as a constellation of problems associated with poverty. This inferred the presence of a health gap between the poor and the rest of society, and implied that if poverty were adequately addressed the health gap would be resolved. It is now understood that a gradient in health extends well into the upper tiers of the social hierarchy.

Each incremental increase in SEP is linked to corresponding incremental improvements in life expectancy, clinically assessed health and subjective wellbeing. This relationship discounts the explanation of health inequalities as a function of absolute poverty and implies that the determinants of health are not as straightforward, or easily redressed, as previously believed.

One catalyst for the burgeoning interest in explaining socioeconomic health inequalities was the prospective cohort study of British civil servants in stable white-collar jobs known as the Whitehall study. Whitehall data showed a monotonic decrease in morbidity and mortality with increasing social position as measured by employment grade across a relatively homogenous group. The fact that no employee was in poverty showed that poor health was more than an effect of absolute material poverty. It also showed that poor health was not explained by inadequate medical care, as the National Health Service had made health care accessible to all.

Also contributing importantly was the 1980 publication of a review of health inequalities in Britain known as the Black Report. The Black Report highlighted the persistence of health inequalities despite the introduction of the National Health Service that made health care freely accessible. It also advanced a framework of explanations for health inequalities – statistical artefact, selection, material deprivation/structural and cultural/behavioural factors – that have since been refined and expanded.

Moreover, it represented a government-sponsored initiative to translate the evidence of health inequalities into policies to improve the conditions of life for disadvantaged groups and to reorientate health and social service provision.*

Together, Whitehall and the Black Report showed that socioeconomic disadvantage had more than a threshold effect on health, that excess mortality was more than the cumulative effect of the recognised risk factors, and that health inequality could not be accounted for by health delivery systems. Thus, the determinants of health inequality lay elsewhere.

Contemporary explanations for socioeconomic inequality in health

Since 1980, the weight of scientific evidence for socioeconomic inequality in health has resulted in the rejection of the artefactual explanation. Similarly, the plausibility of health selection (reverse causation or asocial drift) has been discounted as a major explanation. Evidence from prospective cohort studies that have measured SEP and health at multiple points in time has shown that health inequalities are, in the main, not driven by selection mechanisms.[23 24]

Furthermore, because completion of education usually precedes the onset of illness in adulthood, and because educational status does not decline with health status as is possible with income or occupation, the likelihood of selection effects is further discounted.

Having established that health inequalities are real and unidirectional, several new hypotheses have been advanced to explain the health gradient. MacIntyre[25] noted that these engage a series of polarities such as relative versus absolute effects, behavioural versus material effects, material versus psychosocial effects, and early-life versus cumulative life experience. Although rival interpretations, some commonality between the explanations is apparent. One area of consensus is that poor health is a manifestation of cumulative or continuous exposure to poor social circumstances and that differential health consequences result from the interplay between exposure, susceptibility and resistance.

Rather than competing hypotheses, it is possible to view the current explanations as differing on their proximity to health outcomes. It has been suggested that there is a continuous distribution of risk conditions ranging from societal determinants upstream (macrosocial) to individual behavioural determinants midstream (mesosocial) and ultimately to physiological changes downstream. Explanations for health inequalities generally focus more specifically on one of these three levels. Downstream determinants and explanations are those with more proximate temporal relationships to health outcomes.

* The Callaghan Labour government initiated the inquiry leading to the Black Report, but the Thatcher Conservative government received its findings and recommendations. Because these conflicted with new free-market economics in Britain and the United States at that time, the political climate was antagonistic to the recommendations and the findings were suppressed. However, the international research community responded to the findings, extended the documentation of the relationship between social position and health, and expanded the explanatory frameworks.

The conceptual framework for health inequalities developed by Turrell and colleagues[26] in Australia adopted this three-level schema of upstream, midstream and downstream determinants.

The next section introduces several of the contemporary explanations for health inequality, beginning with those factors in closer temporal proximity to health outcomes and proceeding to determinants further upstream.

1.2.1 The health care explanation

Differential access and utilisation of health care services contribute to socioeconomic variation in population health. The provision of health care services has a direct effect on population health, but outcomes differ according to the extent to which individuals succeed in efforts to access care. Access is dependent not only on the adequacy of allocation, but also on the affordability and acceptability of services. The accessibility of health care plays a major role in differentially selecting who is able to take up primary or secondary preventive services and subsequently shaping treatment options for individuals with disease.

In the early 1970s, the notion of the 'inverse care law' was introduced by Hart [27] to describe the observation that those with the greatest need of care often faced worst access. The consequences for vulnerable groups are compounding disadvantage resulting from social and economic disadvantage on the one hand, and structural barriers to access on the other.

While access barriers contribute to inequality in population health, there is increased recognition that health care per se is less influential in determining health than was previously thought. Evans and Stoddard[28] drew attention to the increasing gap between recognition of the determinants of health and the narrow focus of health policy in providing health care. The narrow focus, they argued, persisted because existing conceptual frameworks for health determinants did not include categories to accommodate valid evidence for other social health determinants such as social support. So that these determinants could be included in the formulation of health policy, Evans and Stoddard developed the 'Field Model of Health and Wellbeing' that expanded the domains that influence population health. The nine domains of the model were social environment, physical environment, genetic endowment, behaviour, health and function, disease, health care, prosperity and wellbeing.

In quantifying the estimated contribution of health care to population health, McKinlay and McKinlay [29] attributed only 3.5% of the total decline in mortality that occurred in the period 1900-1950 to medical interventions. What was more important for the observed improvements in public health were changes in environmental conditions such as improved nutrition and hygiene.

1.2.2 The behavioural explanation

The emergence of behavioural determinants of population health arose for two reasons. One was concern over the cost containment of the health care system. With the increase in chronic illnesses as the primary source of illness, it was recognised that medicine had a limited capacity to treat these conditions and that increasing expenditure on long-term management lead to diminishing returns in health gain. The second impetus came from the 'new public health' movement that has its inception in the 1974 New Perspective (Lalonde)[30] report. In the report, the Health Field Concept asserted that health outcomes were not solely a consequence of contact with the health care system, but resulted from lifestyle, environment, human biology and health care. Although Lalonde argued that health was ultimately tied to conditions of living, the international response was to invest almost exclusively in the lifestyle (behavioural) component.

The behavioural explanation for health inequality rests on evidence that risk behaviours are more prevalent among disadvantaged individuals. Although behavioural medicine has made a considerable contribution to promoting health and preventing chronic disease, not all groups in society have benefited equally. In Australia, the National Health Survey [7] reported social differences in care-seeking behaviour, with the disadvantaged making less use of preventive screening services and immunisation, and greater use of primary and secondary health services.

The behavioural explanation shifts the accountability for health from one of societal responsibility to one of individual responsibility. It asserts that decisions over health behaviour are subject to personal control and rational choice and assumes an equality of opportunity. However, since behavioural risk factors covary with SEP, and are strongly affected by influences such as health literacy, social norms and resource allocation, differences in behaviour are not solely a matter of individual choice. Understanding why the 'poor behave poorly' requires recognition that behaviours may be maladaptive coping responses to adverse social conditions, and not entirely controlled by choice. [31]

The view of social epidemiologists is that behavioural differences are insufficient for explaining variation in population health. Evidence from epidemiological cohort studies has reduced the importance of health behaviours as major determinants of health outcomes. In the Whitehall study, for example, when the sample was limited to nonsmokers, the gradient in cardiovascular disease across employment grades reduced from fivefold to fourfold,[32] demonstrating that other factors accounted for most of the explained variation in CVD. In fact, Marmot argued that the combined effect of both behavioural and physiological risk factors explained less than half of the relationship between social position and health.[33]

In another prospective cohort study, the Alameda County study, a strong relationship between income and health persisted after controlling for seven traditional health-related risk factors.[34] Other longitudinal studies have similarly reported that higher morbidity and mortality in lower socioeconomic groups remain, after controlling for behavioural effects. [35 36 37] The behavioural explanation overlooks the fact that the socioeconomic gradient is not confined to illness with a behavioural component. The major weakness of the behavioural explanation is that interventions designed to modify health behaviour tend to favour those who are more advantaged, thus producing a steeper gradient in health outcomes. From social epidemiology, Kawachi[38] argued that 'individual risk behaviours can only be shifted on a population-wide scale by addressing the underlying social determinants of the behaviours themselves' (p5). He refutes as 'fallacy' the presumption that individual behaviour change is easier to accomplish than addressing the broader social determinants of health. Other commentators have expressed a similar view. Rose stated in 1992, 'It makes little sense to expect individuals to behave differently from their peers; it is more appropriate to seek a general change in behavioural norms and in the circumstances which facilitate their adoption.' Blaxter[39] argued that even successful behaviour change had little health benefit to individuals in disadvantaged circumstances: 'If circumstances are good, "healthy" behaviour appears to have a strong influence upon health. If they are bad, then behaviours make rather little difference.' (p216). These commentators concur that better health is achieved through a better understanding of the antecedents of behaviour and in particular, the social context in which behaviour occurs. Moreover, if strategies to improve behavioural patterns benefit the more advantaged, the effect on health inequalities will be to further increase the health gap.

Limitations of health care and behavioural explanations

Explanations of health inequality that focus solely on personal behaviour have a narrow focus. McKinlay[40] summarised the limitations of policies that target only behaviour. He argued that 'such policies: divert limited resources away from upstream healthy public policy; blame the victim; produce a lifestyle approach to health policy, instead of a social policy approach to healthy lifestyles; decontextualise risk behaviors and overlook the ways in which such behaviours are culturally generated and structurally maintained; seldom assess the relative contribution of nonmodifiable genetic factors and modifiable social and behavioral factors. '(p77).

1.2.3 Stage-of-life explanations

Upstream from health-care and behavioural determinants are the stage-of-life explanations that differ in the importance attached to developmental periods in life. Debate centres on whether poor adult health results from the latent effects of early life, the outcome of developmental stages throughout life, or the accumulation of hardship across a lifetime. It is plausible that all three effects coexist.

1.2.3.1 In utero

One argument is that risks for many chronic diseases in adulthood are biologically programmed during gestation. The latency effect of restricted growth in utero on health later in life is known as the Barker hypothesis. Barker[41] showed that nutritional deficiencies at critical developmental phases in foetal life resulted in hormonal changes that could reduce the number of cells in particular organs. Such effects were capable of lasting influences on metabolism with consequences for disease resistance. A body of research has shown that these prenatal effects may be independent of exposure to risk factors in adulthood, or may act in combination with risk factors throughout life.

1.2.3.2 Infancy and childhood

Another explanation asserts that experiences in childhood set into motion a cascade of events that have consequences later in life. Elo and Preston[42] have reviewed a number of studies that demonstrated the important role of early life experiences in determining mortality in adulthood. Much of this work shows a clear socioeconomic patterning in exposures and health outcomes. Some research has addressed the effects of nutrition. Other research has emphasised the effect of psychosocial childhood conditions. Findings from these studies have shown that factors such deficient mothering, [43] abusive relationships,[44] and family conflict, maternal depression and poverty [45] each have a negative effect on mental health later in life. One interpretation of how these factors affect health is that childhood experience shapes patterns of behaviour that have health implications.[46] Health-relevant behaviourspatterns and ways of coping with stressful experiences have been shown to be acquired early in life and to be relatively stable across the life course.[47]

1.2.3.3 The life course explanation

The life course explanation has gained prominence with the increasing recognition of the natural history of some common illnesses that become manifest in midlife, but have their origin decades earlier. This view describes the coevolution of social and biological factors that cluster cross-sectionally and accumulate longitudinally throughout life. Factors across the life course interact in complex ways to affect health. Several prospective cohort studies have shown that social circumstances at different stages of the life course are strongly related to later morbidity and mortality.[48 49 50] This research has highlighted the fact that health inequalities are not an invariant feature across the life course, but that a temporary period between childhood and adulthood exists that is characterised by a period of relative equality rather than inequality.[51]

1.2.4 The psychosocial explanation

Psychosocial factors influence an individual's attitudes and beliefs and shape their behaviour. Such influences affect ways that individuals perceive their role and status in the community, which in turn affects ways in which society perceives and responds to the individual.

In explanatory models psychosocial factors complete explanatory pathways between socioeconomic factors and health-related behaviour. They have also been shown to form previously unspecified connections under experimental conditions where manipulations of social rank (a psychosocial phenomenon) in non-human primates have induced physiological changes. Hemingway and Marmot defined a psychosocial factor as one that 'potentially relates psychological phenomena to the social environment and to pathophysiological changes'(p460). [52]

There are two sorts of psychosocial factors: psychosocial resources and psychosocial responses. Psychosocial resources enable individuals to take advantage of the 'fruits of society', or life chances. Examples include adaptive coping ability, a sense of personal control, and supportive ties and networks. Like socioeconomic resources, they are systematically distributed across the social hierarchy, with more resources held by persons with greater socioeconomic advantage. Just as individuals in poverty experience hardship, so individuals with poor psychosocial resources experience distress, subordination and social exclusion. The second type, psychosocial responses, are the cognitive and affective responses that arise from exposure and interaction within the social environment. Responses that have been examined in health research include anxiety, depression and hostility.

1.2.4.1 Psychosocial pathways to health

Disadvantaged SEP may affect health by operating through a direct or an indirect pathway. In the direct pathway, stress evokes a psychobiological stress response. Although the stress response is a normal part of the regulatory system, the body is adapted to deal with brief threats and emergencies. Repeated or continuous arousal disturbs basic physiological regulatory processes central to the maintenance of health. If this pattern is frequent or sustained over long periods, it exacts cumulative physiological stress, ie allostatic load, [53] which affects neuroendocrine function through physiological changes such as raised cortisol, altered blood-pressure response and decreased immunity. In the indirect pathway, psychosocial factors influence ways in which people behaviour. Chronic stress induces health-damaging behaviour such as addictive behaviour or poor dietary management.

The following set of explanations are positioned upstream in the sociopolitical context.

1.2.5 The neoliberal explanation

Furthermost upstream is the neoliberal explanation. Commentators, notably David Coburn,[54] have argued that income inequality and social cohesion are not the critical precursors for health inequalities, but rather are intervening variables. The roots of health inequalities, it is argued, occur further upstream in the global sociopolitical context. Coburn contends that the health gradient is a product of internationally relevant political decisions. In particular, he is critical of neoliberal economic doctrine* for its effect on undermining the welfare state, its link to increases in income inequality that diminish social cohesion, and the consequences that these factors have on health. In Australia in the mid to late 1990s, the Howard government expanded the programs adopted by Hawke and Keating for neoliberal reform that had been initiated by the UK Thatcher and the US Reagan governments. In a political swing to the right, these policies represented a shift away from social interests to support for the productive sector, characterised by a deregulated market and a growth in international trade. The implications for population health were seen in a shift toward greater individual responsibility for health and a withdrawal of government support for programs, services and welfare. [55]

Still located upstream, but in the national arena, are a series of explanations that debate the importance of absolute material resource versus relative material resource.

1.2.6 The neomaterial explanation

The neomaterial argument evolved from the absolute materialist explanation that was prominent in the Black Report. The latter contended that inadequate sanitation, shelter, nutrition and access to health care was the root cause for inequality in population health. This view is less persuasive in economically developed societies such as Australia where, despite comparatively widespread relative poverty, few people lack the basic necessities for daily life. Consequently, neomaterialism addresses the direct effects of material standards within economically developed societies.

1.2.7 The relative income and relative inequality explanations

Two related hypotheses are the relative income and the relative inequality explanations. The former suggests that the relationship between income and health in developed societies is a relative phenomenon. It asserts that income *inequality* is more strongly associated with health than is mean per capita income.

* Neoliberalism is a set of economic policies based on microeconomic reform with the intent of accelerating productivity growth.

Richard Wilkinson first observed an association between income inequality and mortality. Poor societies showed a shallower socioeconomic gradient in health than affluent societies if their social and economic distributions were more equal.[56 57] Among other evidence, Wilkinson cited McCord and Freeman, [58] who showed that mortality rates were higher in Harlem (a deprived area of New York City) than they were in rural Bangladesh, where absolute material resource was less.

Wilkinson argued that in populations with high inequality, the poor are most disadvantaged, but the affluent also face greater risk of illness. He supported this hypothesis using data from Organization for Economic Co-operation and Development (OECD) member nations. These data showed that the most egalitarian countries, ie those with least income inequality rather than those with a high gross national product per capita, had the best life expectancy. Moreover, countries with greater inequality had lower life expectancy.[59] In fact, Wilkinson[60] argued that absolute income was unrelated (r=0.08) to population health in economically developed countries. Support for the income inequality hypothesis (also using aggregate-level data) has been reported in smaller spatial areas in the United States.[61]

A related explanation is that of relative inequality. This extends the explanation of relative income to also include other measures of relative status such as educational or occupational rank. The relative position explanation argues that health is an expression of perceived relativities to social and economic norms in society. Income differentials per se are not the cental issue, but rather differences in relative social position or rank for which income is a proxy. Poor health results from the injurious effects of social comparison. Because differences in social position are greater in less equal, more hierarchical societies, the health consequences are more invidious. Individuals who perceive themselves to be deprived relative to others in their reference group experience psychological stress that has direct health consequences. The perception of inequality may also induce risk-taking behaviour.[62 63]

No single explanation accounts for all of the evidence for socioeconomic inequality in health, but each contributes towards a better understanding of the relationship. The next section addresses selected key social determinants.

1.3 Social determinants

1.3.1 Social exclusion

Social exclusion is one of several terms that refer to social deprivation. Related terms include social alienation and social isolation. Townsend[64] first made the distinction between material and social deprivation. While the former addresses economic deficits, social deprivation is concerned with deficits relating to social roles, ties, participation and acceptance in society.

Social exclusion results from a sense of non-inclusion in groups or places in society, which may arise from stigmatising conditions that preclude participation in community life.

Arguably, the most compelling example of the health consequences of social exclusion is seen in mortality rates of indigenous Australians. Aboriginal and Torres Strait Islanders have been denied social inclusion in Australia for a range of historical and sociopolitical reasons. Figures from the three states with comparable official data indicate that life expectancy for this group is 56 years, which is 21 years and 26 years less than for non-indigenous Australian males and females respectively.[65] A less extreme example is observed among migrant groups. Because of stringent health requirements for entry into Australia, migrants initially have higher health status and lower mortality than non-migrants. However, unfamiliarity with the labour market, lack of contacts and support, the disruption of established social ties, and non-recognition of occupational skills and qualifications restrict the social integration of new migrants. In addition, migrants frequently experience loss of occupational status and downward social mobility in the short term.[66]

Migrants to Australia who speak a language other than English face an additional sense of isolation. Language barriers increase the difficulty for individuals to engage in meaningful work and marginalise individuals from community life, increasing the risk of adverse health consequences. A theoretical framework for understanding how the severance of cultural ties and exposure to a non-inclusive social environment can affect health is Durkheim's 19th century work on social integration and suicide, cited by Berkman and colleagues.[67] Central to this work was the observation that harmful behaviour, including suicide, varied inversely with the degree to which people were integrated into society.

1.3.2 Social support and networks

In contrast to the adverse health effects of social exclusion, a vast literature has shown that supportive relationships benefit health and that few close relationships, and smaller social networks, are predictive of illness and mortality. More so than other 'social determinants', the health impact of social relationships has been widely examined across a range of disciplines and across a wide range of physical and mental health outcomes.

One of the most important studies has been the longitudinal study of adults in the Human Population Laboratory cohort, better known as the Alameda County study. At a nine-year follow-up adults with fewer social and community ties were two to three times more likely to die of all causes than were those with more extensive contacts. The relationship persisted after controlling for age and known behavioural risk factors, including cigarette smoking, drinking, obesity, physical activity and the use of medical services.[68] Other longitudinal studies have contributed to the body of knowledge. In the MacArthur Studies of Successful Aging, adults with higher levels of social support at baseline had better cognitive functioning at follow-up.[69]

In the US longitudinal study of professional men, Kawachi and colleagues[70] found that those with the lowest level of social networks and group membership were significantly more likely to die from cardiovascular disease, accidents and suicide.

Among the related terms, social networks and social support are most commonly discussed. Social networks range in proximity from family members to colleagues, friends and acquaintances. Berkman et al. [71] refer to characteristics of networks in terms of their number of members (size), level of interaction (density), basis for group, eg work or neighbourhood (boundedness), and homogeneity of members. Other features are the frequency of contact, number of types of transactions (multiplexity), duration of ties and reciprocity of transactions.

It is generally agreed that there are four major dimensions of social support. These are emotional, instrumental, appraisal and informational support. Emotional support refers to empathy, love, caring and trust. Appraisal support refers to the receipt of feedback on personal performance. Informational support refers to the teaching of skills, advice and provision of information for problem solving, and instrumental support refers to tangible aid such as the sharing of tasks or actions such as loaning money. The literature is inconsistent in accrediting the articulation of these four dimensions of social support. Various commentators have recognised Weiss in 1974, House in 1981, and Cohen and Wills in 1985. Two models to explain how social relationships influence health have been described in the mental health literature. One is the main-effects mechanism (Figure 1.1), and the other is the stress-buffering mechanism (Figure 1.2). The former has a salutary effect on health through enhanced psychological wellness regardless of whether or not the individual is experiencing stress. Two pathways are present in this model. One pathway is via the positive impact of social networks on psychological states. Positive influences can enhance self-efficacy beliefs and coping beliefs, or promote a sense of purpose and self-worth which can facilitate efforts of the individual to cease smoking, lose weight, manage depression or seek health care. Social networks guide the adoption of health-promoting behaviours such as engagement in physical activities and healthy dietary patterns. The second pathway is via a direct effect on neuroendocrine responses.

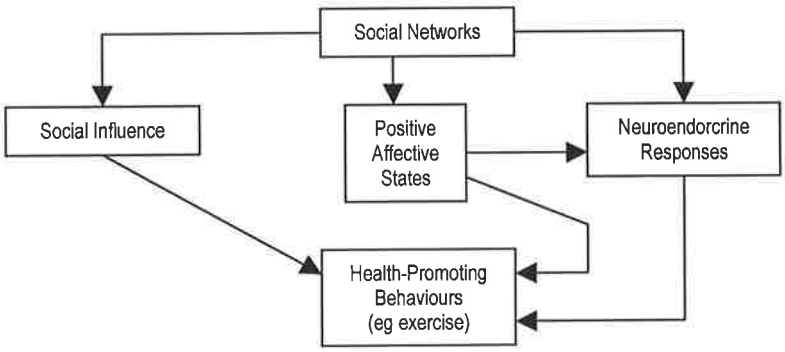

Figure 1.1: Main-effects model linking social ties to mental health
Taken from Kawachi I and Berkman LF. Social ties and mental health. J Urban Health. 2001 Sep;78(3):458-67 (adapted from Cohen S, Underwood LG, Gottlieb BH, Eds. Social support measurement and intervention: a guide for health and social scientists. New York: Oxford University Press, 2000.)

The second model, the stress-buffering mechanism,[72] is useful for describing the pathway linking psychological stress to health. In this model, the role of social support is to moderate the harmful effects to health of a stressful experience. Persons perceiving that social resources are available are less likely to appraise demands as being distressing and are more likely to perceive that their capacity to cope with demands is greater. In this situation the cognitive and emotional response to stress is less likely to have a negative impact (Figure 1.2).

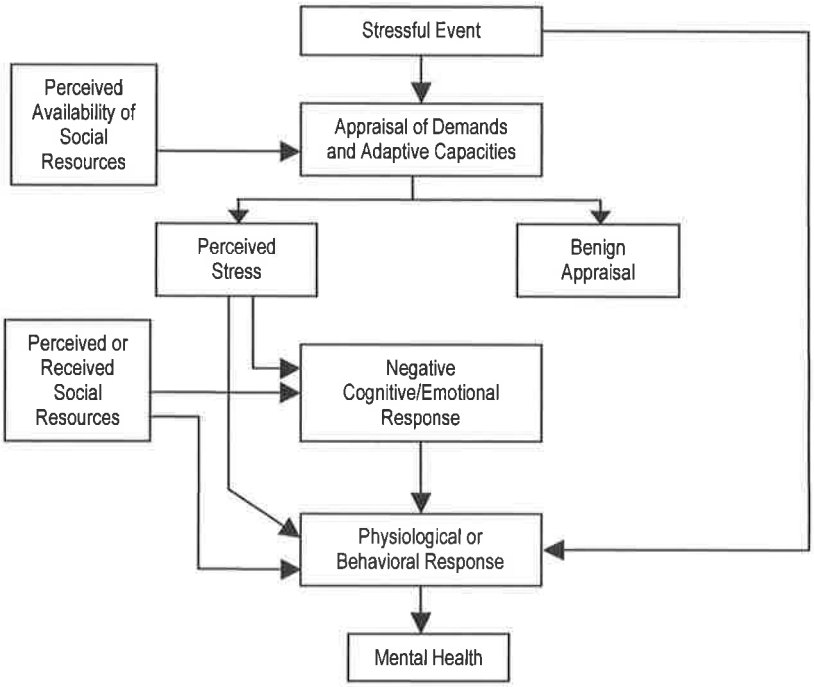

Figure 1.2: Stress-buffering model linking social ties to mental health

Taken from Kawachi I and Berkman LF. Social ties and mental health. J Urban Health. 2001 Sep;78(3):458-67 (adapted from Cohen S, Underwood LG, Gottlieb BH, Eds. Social support measurement and intervention: a guide for health and social scientists. New York: Oxford University Press, 2000.)

1.3.3 Perceived stress

There is increasing evidence that ongoing or repeated stress, as opposed to short-term stress, has a generalised adverse effect on health.[73] In 1926, Selye described stress as the non-specific response of the body to demands made upon it. Whether stress is harmful depends upon the individual's appraisal of the demand relative to their capacity to adapt. Stress that challenges and motivates (eustress) has a positive effect on health, but distress results when coping resources are perceived to be inadequate. Not all coping strategies have favourable health effects. Maladaptive coping through over-eating, excessive alcohol consumption, cigarette smoking and other drug use independently heighten the risk to health. In the previous section, it was noted that the impact of stress on health is moderated by social support. Personality traits also moderate the influence of stress.

Optimism and hardiness are thought to confer stress resistance, and negative affectivity, particularly anger, hostility and depression, increase susceptibility to the harmful effects of stress on health.

Elstad[74] noted that stressful experiences and the resources to manage them are differentially distributed in society in ways that are linked to structural inequalities. Not only do socioeconomically advantaged persons face few stressful circumstances, but they also have better resources for coping. As well as being unequally distributed, the effect of stress accumulates over time. Life course research has shown that the amount and frequency of economic hardship over three decades strongly predicts decreased mental and physical functioning ability and mortality.[75] A large body of literature has examined the health consequences of stress and has differentiated between the effects of acute and chronic stress. Chronic stress results from the strain of living in sustained disadvantage. Individuals in such circumstances are exposed to a host of ongoing stressors such as economic insecurity, limited control over everyday life circumstances, the nature of work and the work environment, and the availability of health and social resources.

Recent advances have been made in the biological plausibility of linking psychosocial stress and relative social status to disease. Much of this is experimental research conducted with non-human primates and has investigated the effects on health of manipulating social hierarchies. Animal studies are important not only because non-human primates have similar hierarchies of dominance to humans, but also because these animals share physiological risk factors that are distributed along similar social gradients. Wilkinson[76] has cited animal studies conducted by Shively and colleagues and by Sapolsky and Mott noting that compared with dominant animals, socially subordinate animals had worse ratios of high density lipids to low density lipids, central adiposity, glucose intolerance, increased atherosclerosis, raised basal cortisol levels and attenuated cortisol responses to experimental stressors. Because experimental conditions could control for other factors such as diet and environment and because manipulating social status could reverse the effects, such studies have strengthened the case for causal inferences and minimised the possibility of reverse causality.

In other research, McEwen[77] has investigated the neurobiological response to stress in humans and discussed this in terms of allostasis and allostatic load. Allostasis is the process that maintains all systems in equilibrium by integrating regulatory parts of the nervous and endocrine systems and other metabolic control functions.

Perceived stress evokes physiological responses that activate a cascade of stress hormones that affect the cardiovascular and immune systems in an attempt to adapt to challenge and mediate the effect of stress. Although this is a normal protective function, prolonged activation or chronic overactivity of the allostatic process exacts a demand on the body leading to what is termed allostatic load. Allostatic load is a cumulative biological burden that accelerates pathophysiology and predisposes individuals to chronic disease. There is clear biological evidence of a socioeconomic gradient in allostatic load.[78]

1.3.4 Personal control

There is growing evidence of a relationship between a sense of personal control and health, and while most associations are positive, mixed findings have been reported. A range of health outcomes have been linked to control beliefs, including lower mortality risk,[79] lower incidence of coronary heart disease,[80] better self-rated health,[81] less psychological morbidity,[82] faster recovery,[83] and – particularly among the elderly – better functional status.[84]

Much of the understanding of the role of personal control in health inequalities is attributed to Whitehall II. The Whitehall studies are prospective cohort studies of British civil servants. The first Whitehall cohort was established in 1967 to investigate factors associated with cardiorespiratory disease among a large sample of male civil servants working in London offices. Findings after ten years of follow-up showed a steep inverse association between SEP (occupational grade) and health over a range of conditions. The finding that workers in lower occupational grades had higher age-adjusted mortality rates from coronary heart disease was unexpected because it contradicted the belief that highest job stress was found in senior positions. Also unexpected was the finding that established behavioural risk factors (smoking, physical activity, obesity) and physiological indicators such as plasma cholesterol, blood pressure and height explained less than half of the gradient in coronary heart disease.[85]

In order to account for the inverse gradient in health by occupational grade, a second cohort was established in 1985 comprising some 10,000 civil servants, male and female aged 35-55 years at baseline (Whitehall II). Based on the earlier findings, it was hypothesised that psychosocial factors such as levels of job demand, control and support may explain the variation in heart disease. Findings at follow-up revealed that workers with low job control at baseline had an odds ratio for subsequent coronary disease of 1.93 compared with workers with high job control.

Importantly, the association could not be explained by factors such as occupational grade, negative affectivity, or established coronary risk factors. However, not supporting the demand-control-support model (described later), job demands and social support were not associated with coronary disease.[86]

An association between personal control beliefs and health has been supported in different environments and populations, measuring a variety of objective and subjective health outcomes. Adler and colleagues [87] argue that one's perceived sense of control affects choices about all aspects of the social class experience.

Personal control and self-efficacy have separate theoretical underpinnings. Individuals may attribute their poor health status to their own behaviour (internal orientation), but may lack the sense of competence over events to effect positive behaviour change (low self-efficacy).

In Rotter's social learning theory, persons who expect that the occurrence of both positive and negative reinforcements are contingent on their own action are described as having stronger generalised expectancy beliefs (ie a higher internal locus of control). Conversely, persons with a high external locus of control exhibit weak expectancy beliefs that success or failure is related to their own actions. Such persons attribute reinforcements to luck, chance or powerful others. Rotter argues that control orientation is influential in the way people interpret events that are novel and ambiguous. This may explain why some people are more receptive to health promotion messages.

1.3.5 Childhood environment

The psychosocial circumstances of childhood family of origin are important for shaping values and attitudes and have also been linked to adult wellness and disease. The reliability of such information reported retrospectively many years later has been investigated and found to be satisfactory in situations where the information was not emotionally laden. Details that are routine, background and 'hum-drum' were most accurately reported.[88]

Lundberg investigated associations between living conditions during childhood and morbidity in adulthood using retrospective recall. Swedish adults in a nationally representative sample reported retrospectively on four items.[89] The first two items addressed economic hardship: 'Did your family experience economic hardship while you were growing up?' The second examined size of family with a large family, defined as four or more siblings. A third item addressed conflict or dissension in the family: 'Was there any serious dissension in your family while you were growing up?' and the fourth assessed parental cohabitation as a measure of family unity. Adults who had been exposed in childhood to economic and psychosocial disadvantage had higher risk of illness and mortality later in life. In separate research using the Swedish dataset, a relationship was found between these indicators and variation in adult height. It was concluded that short stature in adulthood was associated with poorer childhood circumstances even after controlling for genetic factors and nutrition.[90]

1.3.6 Workplace environment

Evidence from prospective cohort studies has revealed that psychosocial workplace conditions impact on the health of workers. The characteristics that have most commonly been addressed are decision latitude (level of control over work, opportunity for use of skills, amount of task variety), psychological job demands (pace of work and conflict between competing tasks), and social support from colleagues and supervisors. Research undertaken in the longitudinal Whitehall II cohort study of British civil servants linked these characteristics to a range of health outcomes, including cardiovascular disease, psychiatric morbidity, alcohol dependence and sickness absenteeism.

Other research has reported similar findings and has extended the range of health outcomes to include musculoskeletal disorders. Overall, the body of evidence shows that these associations are found in a variety of occupational groups, settings and cultures, suggesting that adverse psychosocial features of the work environment are generalised risk factors for ill health.

Theoretical approach

In this field two theoretical perspectives based on stress have directed much of the research. The concept of job strain was advanced by Karasek [91] and later developed into a two-dimensional model by Karasek and Theorell. [92] Central to the model is the interaction between the demands of a job and the worker's 'decision latitude' to manage these demands.

Decision latitude is described as the control over the use of skills (skill utilisation) and control over decisions relevant to the work task (decision-making authority). According to the model (Figure 1.3), workers in jobs with high demand and low decision latitude are said to experience high job strain, placing them at increased risk of illness development. However, where a highly demanding job is matched with a high level of decision latitude (ie control), the individual benefits from increased ability to adapt, so control is a modifier of job demand.

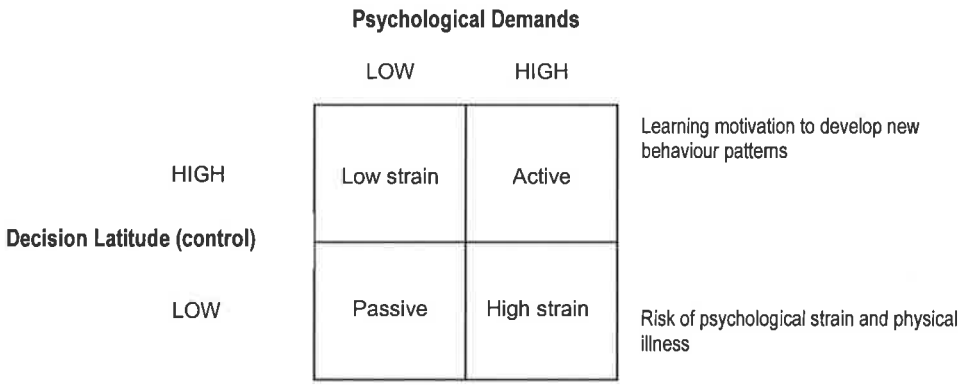

Figure 1.3: The Job-Strain model of Karasek

A third dimension of social support was later added to the model. Johnson reported that the effect of job strain on the prevalence of cardiovascular disease was intensified among workers who were socially isolated.[93]

The second theoretical model to explain the stress-health relationship in the workplace was introduced by Johannes Siegrist in 1996. This model, the Effort-Reward Model, [94] addresses the imbalance been workers' efforts and their expectation of 'reward' in the form of income, self-esteem, career opportunity or job security.

The predictive validity of these two models has been compared, with respect to coronary heart disease among some 10,000 British civil servants in the Whitehall II prospective cohort study. Bosma and colleagues found that both low job control and high effort/low reward work conditions independently influenced the development of heart disease. [95] These findings indicate that although the theoretical perspectives differ in their conceptualisation of stress and the emphasis placed on antecedent factors, the basic relationship between stress and coronary heart disease was consistent.

1.3.7 Cognitive factors

1.3.7.1 Self-efficacy

In Bandura's[96] social-cognitive theory, self-efficacy expectations are beliefs concerning one's capacity to successfully achieve a certain level of performance. Fundamental to the self-efficacy construct is the notion that individuals engage in tasks in which they believe they can manage and avoid tasks that they believe they lack competency to perform. Self-efficacy beliefs can be useful in understanding and predicting patterns of behaviour. Efficacy beliefs help determine how much effort people will expend on an activity, how long they will persevere when confronting obstacles, and how resilient they will prove in the face of adverse situations.

The higher the sense of efficacy, the greater the effort, persistence and resilience that individuals show. Efficacy beliefs also influence thought patterns and emotional reactions. People with low self-efficacy may believe that things are tougher than they really are, a belief that fosters stress, depression and a narrow vision of how best to solve a problem. As a result of these influences, self-efficacy beliefs are strong determinants and predictors of the level of accomplishment that individuals finally attain. The inter-relatedness of control beliefs and distress had been depicted in a model of psychological stress developed by Lazarus and Folkman. [97] According to their model, a person's beliefs about control are central to whether they feel threatened or challenged by life's demands.

1.4 Oral health

The previous section introduced discussion on the contemporary explanations for social inequality in population health and the roles of social and psychosocial factors. While the rival explanations have caused contentious and disputed debate in the general health research, the oral health literature on these themes is less expansive and less controversial. The explanations advanced in the Black Report have been noted in the oral health literature, along with some of the contemporary explanations, but not explored in depth. The material and behavioural explanations have been accepted and findings support those from general health research.

Most emphasis in explaining social differences has been on differential use of dental services and differences in dental behaviour. Theoretical models have been applied to understand the antecedents of behaviour such as attribution style and health beliefs. This approach reflects the predominant view that dental disease is 'mostly preventable' and 'caused or avoided largely by our actions',[98] although Spencer[99] has challenged the case that dental diseases are *individually* preventable.

The emphasis on behaviour in the literatures reflects the absence of a conceptual framework for accommodating broader social determinants of oral health outcomes. In addition, advancement of conceptual frameworks has been limited by an absence of comprehensive datasets combining oral health outcome measures with behavioural indicators and a theoretically derived battery of social and psychosocial factors.[100] The next section provides an overview of socioeconomic inequalities in adult oral health.

1.4.1 Socioeconomic inequality in oral health

1.4.1.1 In Australia

Reported improvements in population oral health in Australia have tended to obscure the unequal distribution of oral health outcomes. Not only does an oral health gap in caries experience exist between Australian children and adults; marked socioeconomic inequality exists among adults. Evidence of inequality emerged from analysis of the 1987-88 National Oral Health Survey of Australia (NOHSA) data.[101] NOHSA collected dental examination data from 14,432 individuals aged 5 years or more within 902 census collection districts in all Australian states and territories except the Northern Territory. Adults living in disadvantaged areas had more missing teeth, more untreated dental caries and fewer restored teeth. Overall, they were about twice as likely to be edentulous than their more advantaged counterparts.[102] [103]

More recent surveillance data reveal an apparent widening of the socioeconomic gap in adult oral health. Data collected in the 1999 National Dental Telephone Interview Survey (NDTIS) were compared with NDTIS data obtained over the period of the Commonwealth Dental Health Program (1994-1996). Oral health differences between concession-cardholders (financially disadvantaged) and other Australian adults were greater in 1999 than in the earlier period. In 1999, missing teeth had declined among non-cardholders from the earlier period, but cardholders did not achieve these gains. The gap had also widened in oral health-related quality of life. The social impact of toothache, dental appearance concerns, and dietary restrictions because of difficulty in chewing had increased among cardholders from the earlier period, but had remained relatively stable for other Australian adults.[104]

While the socioeconomic gradient in adult oral health is steep, it is less steep among children. In areas of Australia with water fluoridation programs, socioeconomic inequalities in caries experience among children have been reduced.[105]

A similar reduction in dental caries inequality has been reported among children in the UK who were exposed to water fluoridation.[106 107] In fact, evidence that water fluoridation differentially benefits disadvantaged communities was highlighted in the British White Paper 'Saving Lives – Our Healthier Nation.[108] Beal[109] has used the success of water fluoridation in reducing socioeconomic inequalities in caries to argue that interventions to prevent caries need not be limited to behavioural change in individuals. Thus interventions at a societal level are already tested and proved.

1.4.1.2 Oral health inequality – the international context

Socioeconomic inequality in adult oral health is a phenomenon found throughout economically developed nations and most dramatically illustrated by socioeconomic differences in edentulism.

Chen[110] has reviewed the dental literature since 1980 on the relationship between SEP and oral health in adults. She concluded that in market-based industrialised countries, adults with lower income and education levels consistently had poorer dentition status. Disadvantaged adults had more untreated dental caries, more missing teeth and more severe periodontal disease, and were more likely to be edentulous than adults with more education and higher incomes.

The relationship was different in developing countries. In comparing industrialised with non-industrialised countries, Chen noted a relationship between the level of economic development of a country and its prevalence of dental caries. In low-income developing countries, poor adults had lower rates of dental caries. The relative oral health advantage of poor adults was maintained in rural and semi-rural areas of middle-income developing countries, but in more affluent countries trends were reversed and the poor had greater caries experience.

The association between a nation's level of economic development and its rates of dental caries was not reflected in periodontal health. Disadvantaged populations had worse periodontal status irrespective of the level of economic development.

Are socioeconomic inequalities in oral health widening?

Despite a relatively large literature detailing oral health inequalities among adults, less is known about trends in the gradient. There is some evidence that socioeconomic differences in the oral health are widening. Schuller [111] compared two samples of young adults in Norway randomly selected in 1983 (n=945) and 1994 (n=702). Oral health was defined using the D (Decayed) and F (Filled) Surface components of the DMFS index and years of education was the socioeconomic indicator. Despite improvements in mean DFS over the period, social inequalities had increased significantly, characterised by greater decline in DFS in adults with higher education. The widened gap was not explained by sex, location of residence, time since last dental visit or type of clinic visited. Of note, the widening gap in oral health occurred despite political interest in Norway for greater equity in oral health. (In 1987, a target of was set to achieve a 25% reduction in oral health inequality between socioeconomic classes by 2000.)

1.5 Explaining oral health inequality

1.5.1 Structural barriers: access and utilisation

Differential access to quality dental care has the potential to aggravate inequalities in oral health. In Australia, socioeconomically disadvantaged adults are eligible to receive public-funded dental care. The severe rationing of these resources, however, has reduced the capacity of the service to offer timely conservative dental care. Consequently, disadvantaged adults are more likely to receive care only for acute dental problems. In addition, they are likely to receive less comprehensive dental treatment.[112]

Dental care in Australia is unlike general health care, where a publicly financed health insurance system is dominant , with a privately financed alternative available. For dental care, those who can afford private dental insurance are highly subsidised, but the working poor who can neither afford insurance nor meet eligibility criteria for public-funded care are severely disadvantaged. Data collected on patterns of service use over twelve months indicated that uninsured adults were less likely to have made asymptomatic visits, and were more likely to receive dental extractions when they did attend.[113]

1.5.2 Dental visiting

The relationship between dental visiting and oral health is complex because it depends on factors such as the accessibility and affordability of care, as well as the comprehensiveness of treatment. In a longitudinal Canadian study, Locker[114] examined the extent to which dental care improved outcomes. At three-year follow-up, comparisons with baseline assessments were made. Adults who had received dental care over the observation period were more likely to report improvements in their oral health.

Improvements in both physical and psychosocial functioning were associated with having received a wider range of dental services, including preventive and therapeutic services. These findings were consistent with those of a national sample in the UK. Adults who had a dental visit in the preceding year had a greater positive impact on quality of life than other adults.[115]

1.5.3 Dental self-care

Differences in dental self-care further contribute to socioeconomic differences in oral health.[116] UK research revealed that people living in poverty were more likely to consume cariogenic diets.[117] Differences in oral hygiene behaviour have also been observed. In the nationally representative 1998 UK Adult Dental Health Survey, dentate adults from manual backgrounds were less likely to use dental floss and mouth rinse than adults from non-manual backgrounds.[118] Although there are little trend data, findings from the decennial UK Adult Dental Survey show that the socioeconomic gradient in dental self-care has become flatter. In 1978, of those dentate adults who only attended a dentist when a problem presented, 49% claimed to brush their teeth twice daily. In 1998, the proportion of problem-oriented attendees brushing twice daily had increased by 12% cent to 61%. For regular dental attendees, the increase in twice daily toothbrushing across this period was only two percent. [119]

A narrowing gap between socioeconomic groups in dental hygiene implies a lag in the response to professional or commercial campaigns among disadvantaged individuals. Such a lag could result from lower levels of health literacy or less exposure to health promotion material or less perceived salience of the promoted message. In Australia, Blaike observed that because disadvantaged adults utilise dental care less regularly they receive less information from dental professionals about the causes, treatments and outcomes of dental conditions.[120]

Other Australian research found that adults with less formal education were more inclined to hold inaccurate lay beliefs about dental disease than more highly educated persons.[121] Alternatively, health self-care may assume a lower priority among people facing immediate concerns arising from their disadvantaged circumstances. [122]

Support for the view that socioeconomic differences in dental behaviour are due to factors other than indifference comes from a report on dental behaviour in Scottish dentate adults.[123] In this study, an unexpected pattern in dental self-care by area-based deprivation was observed. While 19% percent of Scots living in DEPCAT area 1 (least deprived) used mouthrinse, usage increased to 32% in DEPCAT areas 6 and 7 (most deprived). Nuttall[124] commented that the high use of mouthrinse in disadvantaged areas indicated that these adults perceived a need 'for some agent to affect their oral condition and perhaps more importantly are prepared to spend money on such an agent'.

Dimensionality of health behaviour

On the premise that there are generic social determinants of health, it might be the case that there are generic patterns of health behaviour that form a generalised health-related orientation . This, however, does not appear to be the case. Payne and Locker [125] investigated the unidimensionality of preventive oral and general health behaviour. They constructed an additive index of dental behaviour (toothbrushing, dental examination, flossing, use of interdental device, snacking, cariogenic diet) on which scores were only weakly correlated with scores on a similar index for general behaviour (smoking, alcohol intake, seat belt usage, physical activity). This finding was consistent with those of other studies [126] [127] [128]indicating multidimensionality within health behavioural domains.

1.5.4 Limitations of behavioural explanations

1.5.4.1 Do dental self-care behaviours improve oral health?

Considerable effort has been invested in promoting dental self-care in individuals. These efforts were reinforced in the Surgeon General's Report on Oral Health in America that stated, 'For the individual, daily hygiene routines and healthy lifestyle behaviors provide a frontline defense in disease prevention and health promotion' (Chapter 8). However, while there is good evidence that the daily delivery of fluoride in toothpaste is effective in preventing and managing dental caries,[129] [130] the evidence of a protective effect of mechanical cleaning is weak.[131]

In a systematic review of the oral health literature related to socioeconomic position, caries and toothbrushing, Reisine and Psoter[132] sought to answer two questions relevant to adults. The first was, 'Are adults aged 18-64 years (and adults 65+) and of lower socioeconomic status at increased risk of dental caries compared with adults of the same age of higher socioeconomic status?' The evidence among adults aged 18-64 years was weak. Some studies found an inverse relationship between socioeconomic status and caries, but in other studies the relationship was attenuated when other variables were controlled. Among older adults aged 65+ years, the inverse relationship was more consistent and stronger, especially for the prevalence of root caries.

The second question addressed toothbrushing. 'Are adults aged 18 years and over who do not brush their teeth one or more times daily at increased risk of dental caries compared with adults of the same age who do brush daily?' Again, Reisine and Psoter found few longitudinal cohort studies conducted among adults, and of those, most were limited to samples of convenience that were not representative. Findings were equivocal, with some studies finding a weak relationship, and others failing to find a significant association. The authors concluded that toothbrushing may be a marker for other factors that determine caries, such as norms about self-care, nutritional factors and service utilisation.

1.5.4.2 The effectiveness of dental education

Evidence on the effectiveness of oral health promotion to elicit sustained behaviour change is also weak. While evaluation of such programs has revealed that knowledge could be improved, the translation of knowledge into sustained habits or lifestyle change has not been demonstrated. In a systematic review of the research evidence on the effectiveness of oral health promotion on dental knowledge, behaviour and oral health outcomes, Kay and Locker[133] found no convincing evidence that changes in knowledge were causally related to changes in oral health behaviour. In addition, they found no evidence that oral health promotion interventions affected caries rates without the incorporation of topical fluorides. Their finding supported those of Brown,[134] who reviewed the effect of dental health education, and found that education brought about only limited attitudinal change and only short-term gains in knowledge.

The literature reporting the effectiveness of behavioural interventions in reducing oral health inequalities is very limited. There is some evidence that dental health education may contribute to widening the health gap between socioeconomic groups. Shou and Wight observed improved oral hygiene and gingival health in students from non-deprived schools after a dental health campaign.[135] These gains were achieved in students who had better oral health scores at baseline. Similar gains were not achieved from students attending schools in deprived areas with poorer health at baseline.

1.5.4.3 Why do behaviour change interventions fail?

Interventions that target behaviour fail to tackle the preconditions of behaviour. Blinkhorn[136] attributed the failure of dental education to inadequate recognition of the influence of the macro environment, stating, 'behaviour is shaped by the norms on lifestyle which exist in a patient's social environment'. Gift[137] explained their lack of success on an inadequate understanding of the psychosocial factors that motivate dental behaviours. Freeman[138] asserted that the path to dental behaviour change is blocked by the factors that shaped the behaviour initially. These arguments are consistent with medical sociology. Mechanic observed, 'there is little appreciation of the extent to which life imperatives and social opportunities and constraints either enhance or inhibit harmful personal behaviours'.[139] They are also consistent with the social epidemiology approach to heath inequalities.

1.5.5 Conceptual frameworks for dental behaviour

Realisation that dental behaviour was important to oral health coincided with the promotion of healthy behaviour in individuals that dominated health discourse in the 1970s and 1980s. This was reflected in the conceptual models of oral health of the time.[140 141 142] The models took a reductionist approach, in that social inequality in oral health was reduced to a matter of variation in behaviour among individuals.

With growing appreciation that behaviour was bound to social environment, conceptual models by 1990 were beginning to incorporate environmental factors (such as workplace settings) as determinants of oral health. In the interactional model of Maizel, Maizel and Sheiham,[143] both clinical and psychosocial factors were integrated into the framework so that the complex interplay of influences on behaviour and health could be assessed. The interactional model was developed from data collected from a sample of factory workers, and a separate sample of skilled manual workers. One component of the model, 'vulnerability variables', collected information on circumstances of the individual's past or present life, including lifestyle practices, social networks and satisfaction in work and family life.

Until 1990, the oral health literature relied heavily on individual level factors in explaining the poorer oral health status of disadvantaged populations, and gave less attention to the impact of societal factors. A lack of theoretical underpinning was another limitation to explanations. A turning-point came in 1990 when Petersen proposed a theoretical explanation for social inequality in dental health. The explanation was based on interpretation of empirical data from a representative sample of 2008 Danish adults aged 35-64 years classified by occupational group. Petersen interpreted findings within the context of the four explanations proposed in the Black Report. He concluded that oral health inequality was explained by the combined materialist/structuralist and cultural/behavioural explanations, citing Blaxer[144] and Bane[145] in arguing that the distinction between these two explanations was artificial and that behaviour could not be separated from its social context.

Petersen's recognition of social context was expressed in his model of dental visiting behaviour developed a decade earlier (Figure 1.4). The model gave emphasis to environment influences of family and working and living conditions of individuals, while also acknowledging the role of social norms

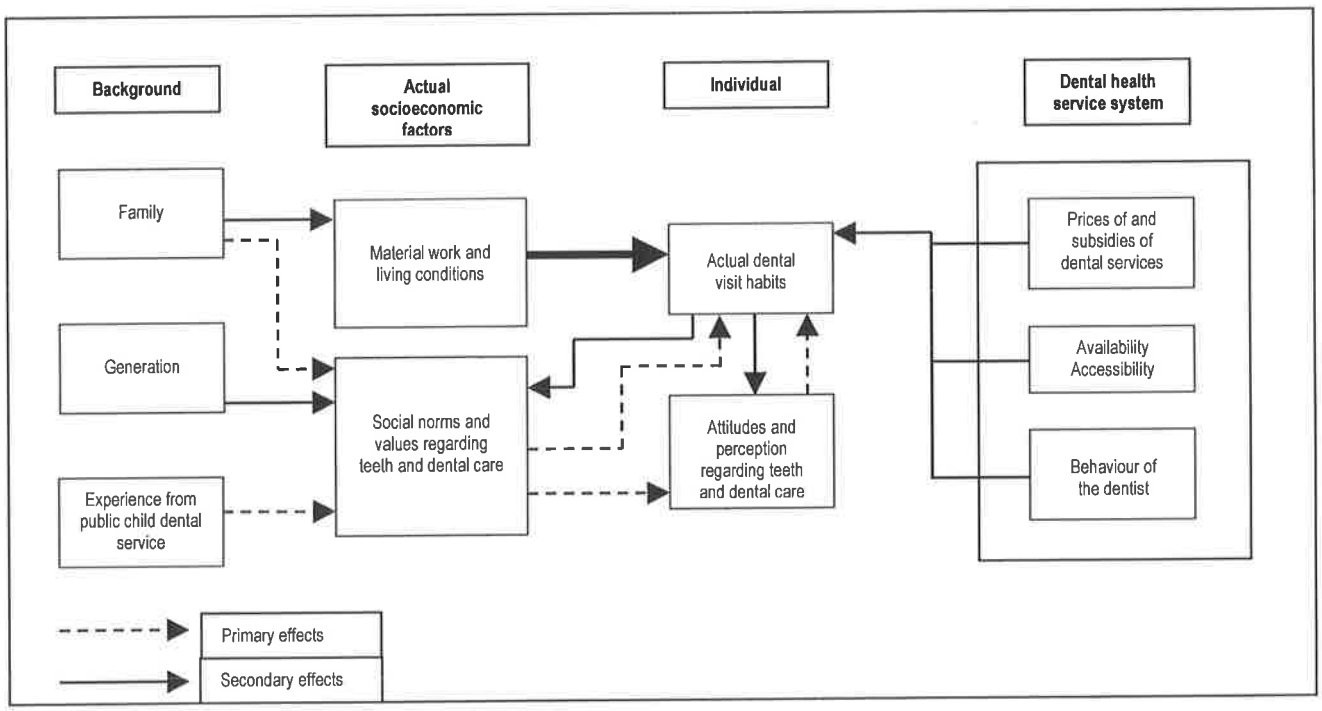

Figure 1.4: Petersen's 'conflict model' explaining dental visiting behaviour

The direction in which oral health models developed parallelled that of general health models. Several of the conceptual models developed in general health research have been applied to oral health. Prominent among these is the Andersen model that has been employed to understand the use of dental services. Originally developed in 1968, the model has evolved through eight variations and in its present form gives primacy to upstream determinants of health behaviour and outcome that include the external environment and population characteristics.[146]

1.6 Conceptual framework for oral health inequality

The Andersen model was used to guide a model developed by Chen to explain the oral health status of disadvantaged populations (Figure 1.5). The key determinants of Chen's model [147] were categorised as individual-level and system-level factors. The system-level factors included societal and environmental characteristics, as well as the organisation and delivery of the oral health care system. The model posits that system-level factors influence oral health status both directly and indirectly through their impact on socioeconomic constraints, cognitive factors and behavioural factors. Although diagrammatically the individual level factors dominate the model, social and environmental characteristics include factors as wide-ranging as social, political, economic cultural factors, as well as dental-specific factors such as sugar production, promotion and consumption, water fluoridation, and nutritional policy.

In addition, Chen described oral health system factors as type of dental service delivery, distribution of oral health care professionals, community availability of fluoride products, viability of dental public health programs and school health programs. Also indicated in the model is a direct relationship between individual SEP and oral health status.

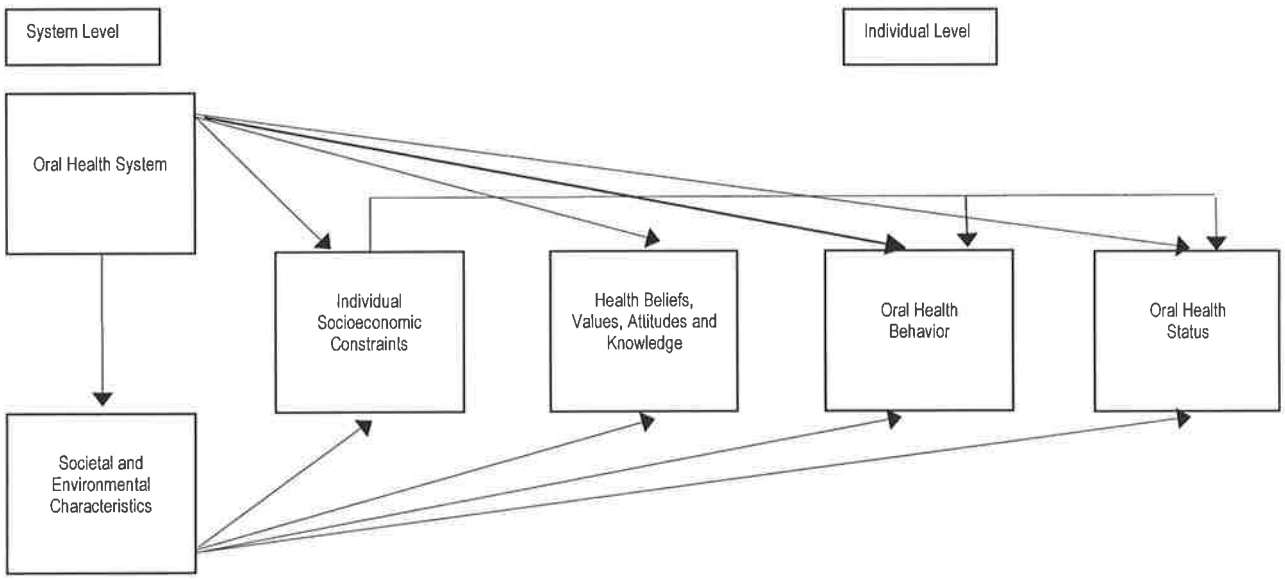

Figure 1.5: The conceptual model of Chen to explain oral health status, 1995

Other explanations for social variation in oral health have developed in one of two directions. In one direction the role of psychosocial factors has been developed. More recently, the role of the broader social environment and factors external to the individual has assumed prominence. Both directions have pursued explanations that are upstream from dental behaviour. Although the pathways through which social contexts directly and indirectly affect disease pathogenesis and oral health outcomes remain to be identified, some research has examined the role of psychosocial factors.

1.7 Psychosocial factors and oral health

Behaviours that influence oral health represent relatively proximate determinants of outcomes; each of them, in turn, has a complex set of determinants, many of which are psychosocial in origin. As stated earlier, the pathways connecting SEP to oral health are via psychosocial factors that operate through either a direct route or an indirect route via health relevant behaviours.

The next section reviews the dental literature on the relationship between psychosocial factors and oral health outcomes in adults. Overall, there is little support for a relationship between dental caries or missing teeth and psychosocial factors, but good evidence linking psychosocial factors to periodontal disease.

Beck and colleagues [148] examined several psychosocial factors in constructing a statistical model for predicting root caries incidence in older males and females over an 18-month period. The model included clinical dental variables, general health variables, behavioural, sociodemographic and several psychosocial variables. The latter comprised multi-item indices for anxiety, social integration and support, social participation, depression and social stress. For males, an 11 variable equation accounted for 48% of the variance, of which the clinical and dental factors accounted for 39%. Two psychosocial factors significant in the model were anxiety and social integration and support. For females, a 12 variable model accounted for 47% of the variance. Again, most of this was explained by the clinical and dental factors, and in the presence of these factors none of the psychosocial variables were significant predictors of root caries.

1.7.1 Personal control and oral health

The view that socioeconomically disadvantaged persons not only lack material resources but also have less control over their lives has been expressed in the oral health literature.[149] Tijmstra[150] found that disadvantaged persons held more fatalistic and pessimistic orientations toward oral health and, being less future-oriented, were less committed to preventive behaviour and planning for oral health. [151]

Loci of control beliefs have been associated with oral health status. Patients with oral health rated by dentists as 'good' were more likely to have an internal locus of control orientation than were those with oral health rated as 'moderate' or 'poor'.[152] In other research, patients with an external locus of control had greater depth of periodontal pocketing.[153] Personal control beliefs have been linked to dental behaviours, with higher plaque index scores associated with an external control orientation.[154 155]

It may be that the adverse effect on oral health of an external control orientation is greater than the protective effect of an internal control orientation. Support for this is seen in the relationship between oral hygiene practice and subscale items on the Dental Coping Beliefs Scale. Items were found to load on four subscales, labelled Internal Locus of Control (15 items), External Locus of Control (15 items), Self-Efficacy (8 items) and Oral Health Beliefs. Of these, only the External Locus of Control subscale was significantly associated with the dental plaque score of participants. While ten of the 15 items on this subscale were correlated with plaque levels, no other subscale was significantly related to oral hygiene.[156]

This relationship is consistent with a finding of Marmot and colleagues who used self-rated general health as an outcome measure among US adults in midlife. They found that constraint (low control) strongly related to self-rated health, but that mastery (high control) was not significantly related to outcomes.[157]

1.7.2 Social support and oral health

In the oral health literature, the term 'social support' is almost exclusively applied to older adults. Among younger adults, marital status or marital satisfaction are discussed. The latter are proxies for social support. The literature identifies certain vulnerable groups. In a British study,[158] information was collected in home interviews on age, socioeconomic position, family structure, working status and barriers to dental care for their impact on dental attendance. Family structure emerged as a strong predictor of service use. In particular, single mothers aged 16-34 years with two or more dependent children were less likely to have attended the dentist compared with older mothers in two-parent families with one or two children.

It is likely that having social support prompts people to make timely dental visits. McGrath and Bedi [159] reported associations between social support and the use of dental services among adults aged 65 years and over. Adults who lived alone were more likely to make visits because of pain or a dental emergency. In addition, they were more likely to wear full dentures compared with adults who lived with another family member. These associations remained after controlling for sociodemographic factors.

A prospective cohort study of men in Malmö, Sweden known as 'Men born in 1914', has contributed greatly to understanding psychosocial aspects of general and dental health. From this study, the association between social participation and a sense of social anchorage and greater use of dental services was observed.[160]

Other research from the 1914 birth cohort has linked several aspects of social networks to numbers of functioning teeth and treatment alternatives for missing teeth.[161] Aspects investigated included social anchorage (degree of sense of belonging to formal and informal groups), contact frequency (quantitative measure of frequency of meeting with others), social participation (level of active involvement), and adequacy of social participation (subjective satisfaction). Social support was operationalised through the availability of informational and emotional support, the adequacy of emotional support, and cohabiting status (with a female partner or alone). Results showed that men with low status for each of social anchorage, social participation and cohabiting states had fewer functioning teeth (although the latter failed to remain statistically significant after controlling for socioeconomic status). Men with anterior open spaces more frequently reported lower levels of social anchorage and social participation, and low adequacy of social participation, and these findings persisted after controlling for socioeconomic status. By contrast, men with fixed bridges reported higher social participation and satisfaction with social participation than did those without fixed bridges – although the associations did not remain significant after adjusted for socioeconomic status.

In other Swedish research, being widowed was associated with edentulism in older females, and not being married or cohabiting was associated in elderly males with periapical pathology.[162] Such findings support earlier research among older Danes in which being socially active was associated with regular dental visiting, lower prevalence of edentulism and fewer symptoms of ill health,[163] and Canadian research found that marital status (being single) predicted missing teeth among community-dwelling older adults.[164] Apart from links to dental behaviour and outcomes, social support has a role in self-management of oral conditions, as social networks and lay consultation were found to be important to females as a means of coping with orofacial pain.[165]

1.7.3 Stress and oral health

While the relationship with periodontal disease has been established, the relationship between stress and dental caries has generally not been supported. In 1962,[166] and in 1993,[167] Sutton reported an association between mental stress and rapidly progressing dental caries in adults and argued that stress may suppress the immune response to bacterial invasion. However, these studies were not based on sound scientific methods. In 1967, Reyna and colleagues[168] investigated the stress-caries relationship and found that laboratory rats exposed to experimentally induced stress showed a significantly higher number of teeth with lesions, and significantly more carious lesions than controls.

The earliest reference to a relationship between stress and dental pathology dates back to 1949, when Manhold [169] demonstrated such a relationship experimentally. In 1971, Manhold and colleagues[170] described the effect of continuous social stress on the gingival tissues of laboratory rats. That research showed that the oral tissues of animals under stress conditions utilised less oxygen, indicating an inadequate blood supply to these tissues.

Since that time, the relationship linking stress to periodontal disease has been substantiated. Specific social stressors that have been investigated include stressful life events and stressful personal relationships. [171] [172]

Genco and colleagues have contributed to the understanding of the stress-periodontal disease relationship. They examined relationships between demographic factors, medical and dental history, clinical factors (supragingival plaque, subgingival flora, gingival bleeding, calculus, probing depth, clinical attachment level, radiographic alveolar bone loss), behavioural factors (tobacco and alcohol consumption), socioeconomic factors (financial strain) and psychosocial factors (life events, daily strains, hassles and uplifts, distress, coping behaviours). In this study, Genco and colleagues[173] showed that financial strain was positively related to attachment loss and alveolar bone loss after controlling for age, sex, and smoking. When those subjects experiencing financial strain were partitioned by coping behaviour, those with inadequate coping had even most severe attachment and bone loss after controlling for age, sex and smoking. Of note, those with financial strain, but problem-based coping styles (adaptive coping), had similar periodontal health to those with no financial strain. The authors reported that the test group with severe periodontitis, high financial strain, and poor coping behaviour had higher salivary cortisol levels than the control group, strengthening the biological plausibility of the relationship.

1.7.4 Life satisfaction and oral health

Life satisfaction is the cognitive component of a broader construct of subjective wellbeing that also comprises positive and negative affect. It is likely that life satisfaction is reflected in a number of domains, including family, work and health. Health research, including oral health research,[174] has generally regarded life satisfaction as an outcome measure, rather than a health determinant. Yet, the majority of evidence is correlational and it is likely that levels of life satisfaction precede oral wellness. It is also likely that adaptive coping styles, positive outlook and mental wellbeing previously shown to be determinants of physical health, are positively correlated with a global sense of satisfaction with life.

There is very little dental literature examining life satisfaction. In one study investigating factors associated with missing teeth among male employees, life satisfaction was not significant factor.[175]

1.7.5 Workplace and oral health

Marcenes and Sheiham[176] investigated associations between psychosocial characteristics of the work environment and oral health outcomes of workers. Workers were male, aged 35-44 years and were equally distributed across four socioeconomic groups. Oral health was measured clinically with DMFS scores (the sum of tooth surfaces decayed, missing and filled because of dental caries) and periodontal indicators of bleeding on probing, and pocket depth.

Work-related variables were drawn from Karasek's job strain theoretical model and measured work mental demand, work control and work variety. Results indicated no significant association between work factors and dental caries. However the relationship between work-related mental demand and periodontal disease was significant, and remained so after controlling for age, socioeconomic position, frequency of dental attendance, toothbrushing frequency, sugar consumption, years of residence in the area and type of toothpaste used.

Recently, the demand-control model was again investigated for relationships with oral health, this time with the construct of social support included. A nationally representative sample of workers engaged in human service work was selected, where interactions with people were a critical component of the job. Data were collected through self-administered questionnaire, and oral health was assessed with four items. These measured satisfaction with teeth (4 categories: 4=very satisfied to 1=absolutely not satisfied), chewing capacity (4 categories: 4=very good to 1=bad), recency of last toothache (4 categories: 4=never had toothache to 1=during the last 3 months), and number of remaining natural teeth (5 categories: 27= all teeth remaining, 25=missing a few teeth, 20=missing rather many teeth, 8=edentulous in one jaw, and 0=edentulous in both jaws). An additive index was constructed, with higher scores indicating more favourable responses to these items. In regression analysis, neither skill discretion nor decision authority (components of job control) were significantly associated with oral health, and neither supervisor nor co-worker social support emerged as significant. However, the emotional demands of the job (but not quantitative demands) were significantly associated with oral health, and the overall psychosocial climate was also significant.

Associations have been found between dental behaviours and psychosocial aspects of work. Petersen reported a link between exhausting jobs and low dental utilisation. Abegg and colleagues[177] observed that, compared with workers with low flexibility of working time, those with a flexible work schedule cleaned their teeth more frequently, used a range of oral hygiene aids and had lower levels of dental plaque. These associations remained after controlling for age, sex, socioeconomic position and marital status.

1.7.6 Cognitive factors

1.7.6.1 Self-efficacy and oral health

In his social cognitive theory, Bandura stated, 'self-belief does not necessarily ensure success, but self-disbelief assuredly spawns failure' (p77).[178] Statements about human agency such as these have spurred the development of behavioural strategies to improve self-efficacy beliefs in individuals. However, whether the basic orientation is dynamic and responsive to intervention or fundamentally stable in adulthood has not been fully articulated. Self-efficacy beliefs develop primarily from past attainment, although persuasion of others and vicarious experiences of comparing self to others contribute to beliefs. It is noteworthy that Bandura stated, 'The human condition is better improved by altering detrimental circumstances and personal perspectives than by trying to alter personal outlooks, while ignoring the very circumstances that serve to nourish them.' (p23).

There is little dental literature examining the impact of self-efficacy on oral health and none at a population level. Most studies have used self-efficacy as a means to predict dental behaviour (rather than health outcomes) in individuals. Beck and Lund[179] reported that perceived self-efficacy was strongly related to the intention to floss than of actual flossing behaviour. Associations remained after controlling for perceived disease severity and outcome expectancy. In other studies, Tedesco and colleagues[180] reported a positive relationship between self-efficacy beliefs and toothbrushing and flossing behaviour, and similar findings have been reported elsewhere.[181] [182] One study reported an inverse relationship between health self-efficacy and dental caries,[183] but because these subjects were insulin-dependent diabetes mellitus patients, findings may not be generalisable to the wider adult population.

1.7.7 Societal factors as oral health determinants

Societal impact on population oral health has been acknowledged in the dental literature for more than two decades. In addressing the seminar on Dentistry for the Underprivileged in Australia in 1979, Dummett [184] called for a preventive approach that targeted social conditions and in particular education, economics, nutrition, family relations and living experiences among people. Such calls were unheeded at that time amid the politically driven focus on 'lifestyle'. Recently there has been renewed interest in societal determinants, with a number of prominent oral health researchers in the UK advocating the inclusion of these factors in oral health promotion.[185] Several factors have prompted this development in the UK. These include mounting evidence of oral health inequalities, government commitment to tackle health inequalities in health policy,[186] the limitations of behaviour change programs, a reluctance to extend water fluoridation, and the perceived value in a common risk factors approach.[187]

Some of the strongest evidence for social determinants operating at a society level has emerged from the second International Collaborative Study of Oral Health Outcomes (ICS II).* In reviewing the oral health inequalities between the seven sites in five countries, Chen [188] highlighted the impact on oral health inequality of prevailing social, political and economic systems. Overall, adults with lower educational attainment had poorer oral health. This was consistent with previous studies. Adult oral health in Baltimore and New Zealand was good, and the poorest oral health status was in Lodz. However, the degree of oral health inequality between socioeconomic groups varied between sites. Greatest oral health inequality was found in Baltimore, followed by New Zealand, and least inequality was found in Lodz followed by Efurt. Chen interpreted these differences by reference to the broader sociopolitical context. In the case of New Zealand, Chen cited literature that reported the adverse affect on disadvantaged groups of the market-oriented economic and competitive market health care reforms introduced in that country since 1984. By contrast, under the socialist health care system in Erfurt, inequality in oral health was much less apparent.

In the UK, Sheiham [189] has called for an approach in health promotion that challenges the social conditions that determine health rather than changing the behaviour of individuals. In citing Watt and colleagues, [190] he argued that current approaches to behaviour change were theoretically flawed in their understanding of the causes of change in health and change in health behaviour. Among other shortcomings listed, Sheiham noted that the traditional approaches showed a lack of recognition of upstream macro-level factors, and an inadequate understanding of the impact of socioeconomic constraints. A call for greater understanding of the pathways to inequality in oral health has been expressed elsewhere. Following a review of the literature on child oral health and social deprivation, Locker [191] observed that establishing correlations between oral health and indicators of deprivation did not advance the understanding of the mechanisms that link socioeconomic inequality to oral health.

Dental research into oral health inequalities has been highly descriptive and until recently the conceptual explanatory frameworks remained rudimentary. The main accomplishments were to amass considerable evidence of inequality in population adult oral health and document the important role of social determinants in conjunction with psychosocial factors.

1.7.8 Integrating multiple factors into explanatory models

Taken together, the collective evidence indicates that psychosocial, social contextual and cognitive factors are associated with dental behaviour and oral health status. Thus far while associations are established, evidence is yet to support causal relationships with oral disease, or indeed, other health outcomes. While there is substantial evidence for plausible pathways linking psychological distress to disease, this needs to be interpreted with some caution because of risk of reporting bias.

* ICS II is a cross-national study of oral health data from seven sites in five countries: Efurt in Germany; Lodz in Poland; Yamanashi in Japan; New Zealand; Balitmore in the US; and sites for the Lakota and Navajo Amercian-Indian communities in the US.

Such bias can occur where persons with a personality trait such as negative affectivity more readily reports illness thus inflating the correlation between exposures to stress and illness experience. Having recognised this caveat, the absence of evidence does not refute causality, but serves to highlight the limitations of current approaches in establishing causality.

Based on the collective research evidence of associations, one team of oral health researchers has proposed a theoretical causal framework for explaining the unequal distribution of caries in populations. This epidemiological framework proposed Holst and colleagues[192] takes into account a full range of societal, social contextual, material, psychosocial, behavioural and ultimately biological determinants and proposes that the biological processes of caries are preceded by a series of integrated non-biological preliminary steps (Figure 1.6).

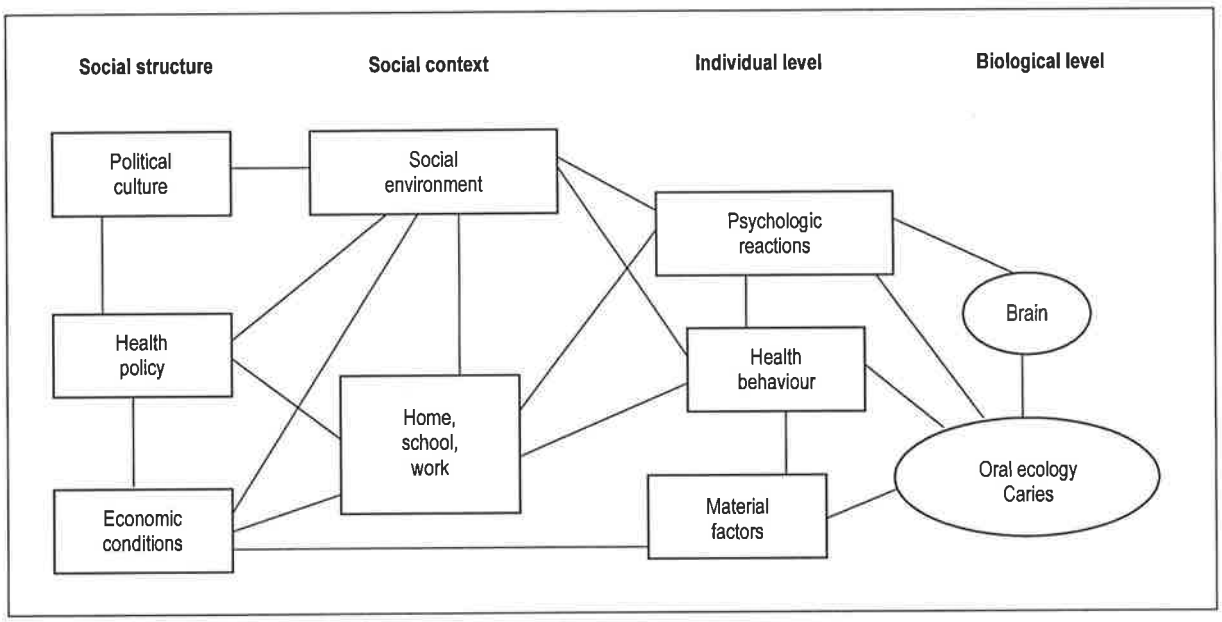

Figure 1.6: A theoretical explanatory framework to explain caries in populations
Holst D, Schuller AA, Aleksejuniene J, Eriksen HM. Caries in populations --a theoretical, causal approach. Eur J Oral Sci. 2001 Jun;109(3):143-8.

Explanations for inequalities in oral health are in their infancy and evidence remains fragmented. The current challenge is to advance the understanding of: (1) how socioeconomic groups differ in their engagement in damaging and promoting dental behaviours; and (2) how socioeconomic groups differ in their level of exposure to psychosocial risk and protective factors. Having explored these relationships, the challenge remains to develop an explanatory framework of socially and biologically plausible mechanisms and pathways that link socioeconomic factors at the individual level to adult oral health.

1.8 Research problem to be investigated

In reference to caries risk identification in adults, Beck observed that there were two deficits in social epidemiologic research in oral health.[193] The first was a lack of conceptual models of disease etiology, and the second was an inadequate use of multivariate methods of data analysis. Since Beck's 1988 observation, several conceptual models have provided a theoretical basis for understanding the distribution and determinants of oral conditions, and the use of multivariate statistical models has become routine. While existing conceptual frameworks have shifted their focus from dental utilisation to proximal antecedents of dental behaviour, there remains a gap in the understanding the links between SEP behaviour and health.

How much of the variation in oral health is attributable to material disadvantage and dental behaviour, and what role psychosocial factors may play in elucidating these pathways and explaining oral health inequalities remains to be investigated. This research presents and tests a conceptual framework that examines the combined effects of socioeconomic, psychosocial and behavioural factors on a range of self-assessed oral health outcomes.

1.8.1 Rationale

For developing a conceptual model

A comprehensive examination of the social determinants of oral health outcomes needs to reflect some conceptual notion of how the important contributors to oral health link together and how they might jointly operate to influence oral health outcomes among social groups.

For including behavioural factors

The social determinants of oral health are not usually inclusive of behavioural factors. However, the impact of the actions of individuals on their oral health is argued to be socially determined and consequently important in constructing the conceptual pathways to oral health outcomes.

For a focus on adult oral health

Much of the research into oral health inequalities undertaken to date has addressed child rather than adult populations. In Australia, children do not face the access inequity concerns that adults experience. In addition, the burden of oral disease has shifted from children to adults. Much of the adult-based research has addressed vulnerable subgroups, such as migrants or the elderly, so that the determinants of adult oral health at a population level remain to be examined.

1.8.2 Conceptual framework

Oral health research has demonstrated associations between psychosocial factors and oral health, yet current explanatory frameworks emphasise the roles of material and behavioural factors.

The proposed conceptual framework examined in this research is presented in Figure 1.7. Pathways indicated in the framework show that social variation in oral health is a consequence of differential exposure to risk and protective materialist, psychosocial and behavioural factors in childhood and adulthood. Proposed relationships are assessed empirically in subsequent chapters using cross-sectional data in a nationally representative sample of adults.

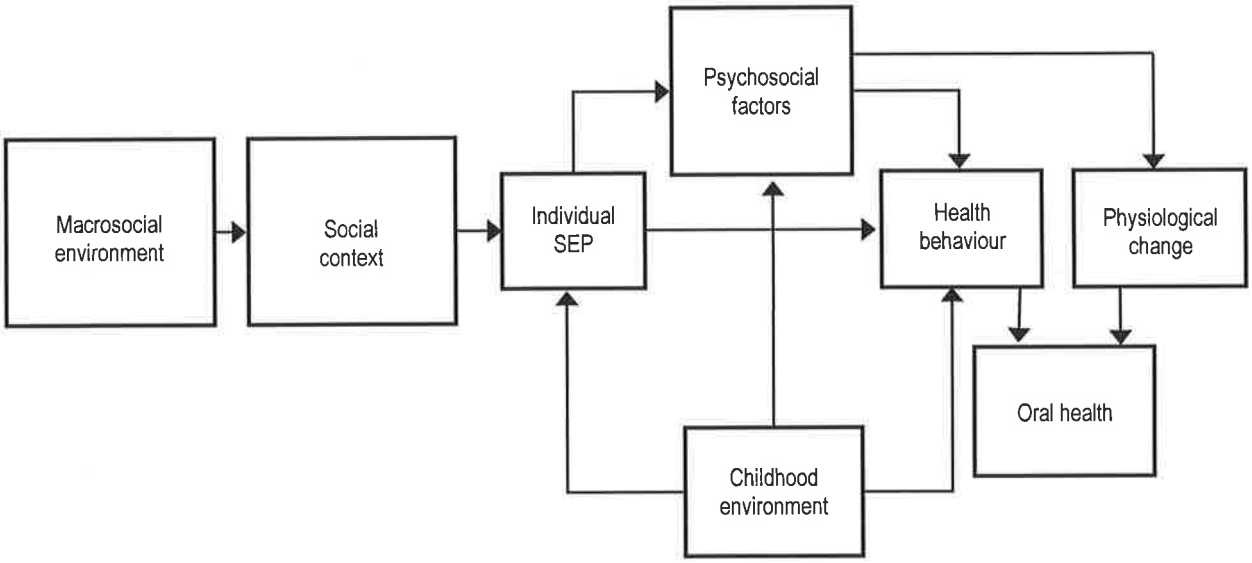

Figure 1.7: Conceptual framework explaining social variation in adult oral health

The conceptual framework represented schematically in Figure 1.7 depicts how oral health is influenced by circumstances during childhood, by individual socioeconomic resources in adulthood, by exposure to contextual settings, and by the psychosocial impact of these relations. While the framework is constructed around the individual-level determinants investigated in this research, it extends the individual-level focus to incorporate the broader macrosocial influences such as globalism, national policy, income distribution, and social cohesion.

The arrows linking the major components indicate the general directions of relationships. Associations between these components and oral health are tested in Chapters 4 to 8 of this thesis. Chapter 4 assesses whether socioeconomic inequality in adult oral health is evident by examining associations between socioeconomic indicators and oral health. The explanatory process begins with factors in closer temporal proximity to oral health outcomes.

In Chapter 5, dental behaviour is examined for its relationship with oral health outcomes along with behavioural correlates (health self-efficacy beliefs, dental satisfaction). The changes to physiological systems and biological functioning that are indicated in the framework are not examined in this research, but are included as the proposed direct pathway via psychosocial factors. Chapter 6 investigates relationships between psychosocial factors and oral health.

In Chapter 7, the associations between childhood circumstances and oral health are examined. As indicated schematically, childhood circumstances influence oral health indirectly by placing the individual on a life course trajectory and shaping attitudes and dental behaviours. In Chapter 8, a socio-environmental setting is examined. In this case, characteristics of the workplace environment are evaluated for their relationship with oral health outcomes. Other settings not examined in this research are the home and the residential neighbourhood. To determine whether potential explanatory factors follow a socioeconomic gradient, the relationships between these and socioeconomic indicators are also assessed.

1.8.3 Specific objectives

The central objective is to determine the extent to which the association between SEP and oral health is explained by factors previously identified as social determinants of health.

This research has four specific objectives:

1. The first is to establish whether social inequality in adult oral health is measurable using a range of self-assessed outcomes and to describe the relationships.
2. The second is to examine associations between social determinants, psychosocial factors and self-assessed oral health in a nationally representative sample of adults.
3. The third is to estimate the relative importance of socioeconomic, behavioural and psychosocial factors in explaining oral health differentials using multivariate analytic methods.
4. The fourth is to test the associations depicted in the explanatory conceptual framework for social determinants of oral health.

1.8.4 Research hypotheses

This core objective was underpinned by the hypothesis that oral health is influenced by the same social determinants as general health and that these determinants follow a socioeconomic gradient.

The specific hypotheses to explain social inequality in subjectively assessed oral health outcomes in dentate adults are:

1. that there is socioeconomic inequality in population adult oral health;
2. that there is a socioeconomic gradient in oral health-related behaviour;
3. that dental behaviour has oral health consequences that are independent of socioeconomic difference;
4. that there is a socioeconomic gradient in psychosocial factors;
5. that psychosocial factors are independently associated with oral health;
6. that SEP in childhood is related to oral health in adulthood;
7. that psychosocial factors in childhood are related to oral health in adulthood;
8. that the psychosocial environment of the workplace is associated with oral health.

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2. Methods

This chapter outlines the methods used in establishing and managing the dataset. It describes the study design, sampling frame and data collection methods, the selection of scales and outcome measures, the mail survey pilot test, the validation study and reliability test, ethical implications, the calculation of sample weights and the treatment of missing values. It concludes with a summary of the analytical approach.

A cross-sectional design was used to collect information from a randomly selected nationally representative sample of adults in Australia. Data were collected in two stages between August 1999 and February 2000. In the first stage information was obtained using a Computer-assisted Telephone Interview (CATI) system. The survey, the 1999 National Dental Telephone Interview Survey (NDTIS), was developed and administered by the Dental Statistics and Research Unit (DSRU) of the Australian Institute of Health and Welfare (AIHW) at the University of Adelaide. In the second stage, a self-administered mail survey titled the Dental Health and Lifestyle Factors questionnaire (DHALF) was posted to adult interviewees. A small subsample of these respondents subsequently participated in a dental inspection so that self-assessed tooth counts could be clinically validated.

2.1 Sampling frame

The sampling design for NDTIS involved a random selection of residential telephone numbers listed in the Electronic White Pages. A stratified sample was drawn from each mainland state with equal numbers from the capital city of that state and its residual population. For Tasmania and the territories, a single sample was drawn. Overall, this produced 13 geographical strata, with sample sizes determined to yield at least 600 participants per site.

Sampling methodology

A primary approach letter (PAL) was mailed to the address matching the sampled telephone number to explain the purpose of the survey and promote participation. If a householder contacted DSRU and declined participation, the household was coded as a refusal and the telephone number was omitted from the sample to be contacted. Approximately ten days after mailing the PAL, a trained telephone interviewer contacted the households. In instances of a single occupant at the residence, that occupant became the target person.

Where more than one person resided at the dwelling, a target occupant for the survey was chosen by random allocation of the persons aged five years and over to have the next or previous birthday.

National Dental Telephone Interview 1999

If the target person was available, they were invited to participate in the interview immediately. The interviewer was guided in reading survey questions from the computer monitor and data were entered directly onto the database.

One of three interview schedules was administered in the CATI. Schedule #1 was used for persons aged 16 years and over. Schedule #2 was a proxy interview conducted with a household resident aged 16+ years where the target person was aged five to 15 years. Schedule #3 was a proxy interview for persons aged 16 years and over. Such interviews were conducted with another household occupant when several attempts to contact the target person were unsuccessful, or when the target person could not participate because of language, illness, or absence from the household for more than six weeks.

The 1999 NDTIS was based on the NDTIS schedules of 1994, 1995, and 1996. Two socioeconomic were used in the CATI. These were annual household income (six categories) and educational attainment (seven categories). Demographic characteristics included age, sex, country of birth, Aboriginality, language spoken at home and number of householders aged five years and over. Indicators of oral health included missing teeth, denture use, oral symptom experience and a limited number of social impacts of dental conditions. A major focus was the use of dental services and items addressed dental attendance patterns, barriers to access, reasons for attending, insurance status, eligibility for public dental care, perceived treatment need and type of treatment received at most recent visit. The 1999 NDTIS interview schedule #1 is presented in Appendix A.

At the conclusion of the CATI, interviewees who had completed schedule #1 and who were aged 18 years or more were notified that a mail survey would be forwarded to them, and their address details were confirmed. Those who declined further participation were recorded as a refusal.

2.2 Dental Health and Lifestyle Factors questionnaire

The supplementary mail survey was posted usually within two weeks of the CATI. An identification code was handwritten on the questionnaire to enable matching of data. The survey package comprised the questionnaire, a personalised covering letter and a reply-paid return envelope.

To maximise participation, aspects of the Total Design Method for mail survey research described by Dillman[1] were used. Two weeks after posting the questionnaire, a reminder postcard was sent to non-respondents. A second and third round of questionnaires was mailed at two-weekly intervals to non-responders.

Replacement packages included a personalised covering letter, the questionnaire and a reply-paid envelope. A revised covering letter was used for the third mailout. Examples of these letters are presented in Appendix B.

The mail survey questionnaire was titled Dental Health and Lifestyle Factors (DHALF). Although 'lifestyle' implies a behavioural focus, the term was first used by sociologist Max Weber to describe the distinctive *style of life* of groups in society. These 'status groups' adopted a style of life that reflected their social values, resources, consumption and styles of social interaction. Such lifestyles resulted from an interplay between choice and opportunity arising from 'life chances' linked to socioeconomic position.[2] In contemporary health research, 'lifestyle' usually refers to a selection of behaviours that are devoid of any social contextual meaning, and usually are assumed to be subject to choice rather than opportunity.

The DHALF comprised nine scales, with some additional items, together totalling 142 statements and questions. In order of presentation, 62 items related to oral health issues, 44 measured social and psychosocial factors, and five retrospectively addressed childhood environment when the respondent was ten years of age. The remaining 31 items were directed only to respondents in the paid workforce or self-employed, and these dealt with work-related factors, the psychosocial workplace environment, and the work-home interface.

2.2.1 Response formats

The predominant response format was a five-point Likert-style rating scale to which respondents agreed or disagreed with a set of attitudinal statements. Each response option was worded to convey the notion of evenly scaled intervals, and was assigned a numerical value ranging from 1 (most negative evaluation) though 3 (neutrality) to 5 (most positive evaluation). Although the number of response options on a Likert scale is arbitrary, five-point scales do not force a positive or a negative response and have been shown to be superior to four and seven response options in terms of ease of completion.[3]

There is controversy about whether a Likert scale should be treated as an ordinal level of measurement or whether the differences between values can be safely treated as interval without introducing undue measurement error. The more conservative argument states that there is no justification in treating ordinal data with parametric techniques because averages constructed with ordinal data are not considered meaningful.[4] The more liberal argument states that while it is not technically correct to use interval-based statistical techniques for ordinal data, many parametric techniques are sufficiently robust so that substantial bias does not occur.[5, 6]

Certainly in the social sciences, the use of parametric statistical procedures that assume interval level data for rating scales is commonplace[7] and acceptance is high when sample sizes are large and the number of categories is greater than four. Another argument is that if the values have approximately equal intervals, or conceptually meaningful distances between their ranks, concern about whether scales are ordinal or interval is overstated. Moreover, Monte Carlo simulations have shown that parametric tests are not seriously affected by the violation of these assumptions.[8] Although intended to be a summated rating scale,[9] Likert scale scores can also be calculated by averaging all valid responses to items,[10] and this is the approach taken to produce scale scores in this study.

While the debate on the use of ordinal-scaled data in parametric analysis is acknowledged, the method was justified in this study, based on the arguments of common practice, robustness of the parametric tests used and use of composite scale scores in analysis (rather than single items).

Following data entry, the responses were recoded from 1-5 to 0-4. An example of the DHALF questionnaire is presented in Appendix B.

Selection of items and scales

The selection of scales was based on empirical evidence or a theoretical basis for an association between SEP and health outcomes. The length and complexity of scales were practical considerations. Generally, established scales and scales items were used, as these had the advantage of having been tested previously. In most cases, the psychometric properties of validity and reliability of the selected scales had been reported in literature. Furthermore, findings could be compared with the findings of other research.

Section one of the DHALF survey comprised oral health items and scales that examined satisfaction with dental care, dental behaviour, self-assessed caries experience and oral health-related quality of life.

2.2.2 Oral health items and scales

2.2.2.1 Dental satisfaction

The first scale was the 31-item Dental Satisfaction Index. Results of this index have been analysed separately and reported elsewhere[11]. In this study only five items were used (#13, #17, #19, #28, and #29) that have been demonstrated to capture the underlying dimensions of dental satisfaction.[12] These items are listed below. Those with the suffix 'R' were reverse scored, so that in computing an overall mean scale score, higher scores indicated greater satisfaction with dental services.

Responses were coded on a 5-point Likert scale ranging from 0=strongly disagree, through to 4=strongly agree, with a neutral mid-point of 2=neither disagree nor agree.

13	The dental professional I saw explained well what treatment was needed.
17R	I would like to have had more explanation of my dental treatment options.
19	I was satisfied with the dental care I received.
28	I am confident that I received good dental care at my last visit.
29R	There are things about the dental care I received that could have been better.

2.2.2.2 Dental behaviour

A 10-item scale measured dental behaviour and attitude. It was based on the seven-item Dental Neglect Scale[13] developed for use with a South Australian child population. These items were included to clarify relationships between socioeconomic position, behaviour patterns and oral health. The items measured the utilisation of dental services and dental self-care. The conventional five-item Likert scale of agreement response categories was used.

2.2.2.3 Quasi-DMFT components

To obtain a series of proxy clinical measures, respondents were invited to count their number of remaining teeth in each arch. They also counted in each arch those teeth decayed (D), missing (M) and filled (F). Missing teeth were categorised four ways (agenesis, orthodontic extraction, pathological extraction and missing because of trauma). This permitted a more precise estimation of the 'M' component of the DMFT Index. To distinguish this self-assessed measure from objectively determined DMFT, this index is referred to as the Quasi-DMFT.

In self-assessment, respondents were guided with a mouth sketch obtained from electronic image software[14] subsequently recoloured for better image reproduction and labelled to indicate incisors, canines, premolars, molars and third molar 'wisdom teeth'. Simple text suggested common reasons for missing teeth, and teeth commonly affected because of orthodontic extraction, or agenesis/non-eruption. Respondents were not asked to distinguish teeth from retained roots or fixed prostheses, to differentiate root caries from coronal lesions, or to indicate the position in the mouth of missing teeth. Thus the number of functional units could not be determined, and teeth extracted because of caries could not be distinguished from other pathological extractions. The summed DMFT score over-estimated caries experience, as teeth counted as decayed could have also been counted as being filled.

Although widely used as an indicator of oral health status, the DMFT score reflects a historic summary of disease and treatment. As such, it fails to reflect the problems that people experience as a result of their dentition and the impact of such problems on functional capacity and overall wellbeing.[15] Consequently, an oral health-related quality of life measure was included to measure subjective oral wellbeing.

2.2.3.4 Oral health-related quality of life

The Oral Health Impact Profile (OHIP) is one of several scales developed to assess oral health-related quality of life. The 49-item scale developed by Slade and Spencer[16] was based on Locker's 1988 theoretical model of oral health,[17] adapted from the 1980 World Health Organization classification of impairments, disabilities and handicaps.[18] The scale comprises seven conceptual dimensions of social impact arranged in hierarchical order of ascending social impact.

A shortened version of the OHIP subsequently developed by Slade was chosen for this study. Slade has reported that the 14-item subset of OHIP items demonstrates good psychometric properties of precision, reliability and validity as an independent scale. OHIP-14 displayed the same pattern of variation among sociodemographic variables as the full instrument, and accounted for 94 % of the variation in total OHIP scores.[19] OHIP-14 dimensions include functional limitation (#1-2), physical pain (#3-4), psychological discomfort (#5-6) through to physical (#7-8), psychological (#9-10) and social disabilities (#11-12), and ultimately handicap (#13-14).

Response options on a 5-point scale measured the frequency of impact, coded to: never=0, hardly ever=1, occasionally=2, fairly often=3, and very often=4. Each item was prefixed with the words, 'How often during the past year have your teeth, mouth or dentures ...'

2.2.3 Psychosocial items and scales

Section two of the DHALF survey addressed social determinants and psychosocial factors. Scales measured personal control, health self-efficacy, social support, social network, perceived stress and life satisfaction. It was expected that these factors would improve the understanding of how SEP affects oral health status, and clarify the relationships between socioeconomic position and dental behaviour linked to oral health outcomes.

2.2.3.1 Personal control

A sense of personal control over life was operationalised with two dimensions proposed by Lachman and Weaver as personal mastery and perceived constraints.[20] Seven of the items (#1, #5, #6, #8, #9, #10, #11) comprise Pearlin and Schooler's Mastery Scale, [21] to which Lachman and Weaver added five further items. Personal mastery refers to individuals' beliefs regarding the extent to which they are able to influence outcomes and achieve goals. Conversely, perceived constraints refer to the extent to which external factors beyond the individual's influence shape outcomes and obstruct the achievement of personal goals. In computing an overall scale score, negatively worded items were reverse scored so that a higher score indicated higher levels of perceived control. Again, five response options were provided on a Likert scale coded 1=strongly disagree to 5=strongly agree.

2.2.3.2 Health self-efficacy

In this study, health self-efficacy expectations are regarded as potential mediators between SEP and oral health outcomes. According to Bandura's social learning theory,*[22] individuals who engage in patterns of positive behaviour do so because they feel competent in these tasks and believe they can positively influence their health status. Conversely, those who appraise their skills as inadequate to promote good health, avoid or are less persistent in maintaining healthy behaviours. Self-efficacy beliefs specific to personal health management were assessed with the eight-item Perceived Health Competence Scale developed by Smith, Wallston and Smith (1995).[23] Items on this scale do not assess specific behaviours, but rather assess a more generalised measure of health self-efficacy. Consistent with many of the selected scales, five response options were arranged on a Likert scale of agreement.

2.2.3.3 Social support and social networks

Four social support items were developed from the literature based on House's four conceptual definitions of support.[24] Item #1 assessed emotional support; item #2 appraisal support; item #3 instrumental support; and item #4 informational support. Each statement was prefixed by the words, 'There are people in my life who ...' and the items were: #1 '... pay attention to my feelings and problems', #2 '... express appreciation of my work', #3 '... I can get help from with certain activities if needed', and #4 '... I can get advice from on how to handle things if needed'. For consistency, the response categories of agreement on a five-point Likert scale were applied.

To test whether a relationship might be found between levels of social networks and oral health, active membership of formal and informal groups was assessed as a measure of social networks. Respondents were to asked to indicate any active memberships they held from among a selection of 11 categories, including religious, civic, interest, sporting groups, professional associations and a twelfth category of 'other, please specify'.

2.2.3.4 Perceived stress

Appraisals of stressfulness vary between individuals according to one's coping resources and overall situation in life. Scales that measure acute stress such as a critical life event fail to capture the affective and cognitive responses to those events. Further, relatively minor stressors may assume greater impact if their effect is continuous or perceived to be beyond the control of the individual. In order to assess the degree to which situations (rather than events) are appraised as threatening or challenging, the Perceived Stress Scale of Cohen, Kamarck, and Mermelstein (1983)[25] was selected. The 14 items measure both cognitive judgments of ability to manage situations and affective response to stressors. Consistent with the temporal period used with OHIP-14, each of the items was prefixed by the words, ' How often during *the past year* have you felt ...?'

* Albert Bandura first published work on Social Learning Theory in the early 1960s, and later from 1986 renamed his work Social Cognitive Theory, which better described his focus, and separated it from the behaviourist approach.

Again, response options were arranged on a 5-point scale, and in this instance were labelled, 'Not at all' = 0, through to 'Very often' = 4, with a mid-point of 'Sometimes' = 2. Items that measured adaptive coping were scored in the reverse direction, so that a high scale score indicated a high level of perceived psychological distress.

2.2.3.5 Satisfaction with life

Individuals continuously appraise the quality of their lives against some self-referenced standards according to self-determined criteria such as expectations, values, and previous experience. These appraisals have both affective (eg happiness) and cognitive (eg fulfilment) elements. In the Satisfaction with Life Scale, Deiner and colleagues (1985) [26] measure the cognitive component of subjective wellbeing with five items. The items tap issues such as meeting ideals, conditions in life, global satisfaction, life achievement and desire to change past life experience. In developing and testing the scale, seven response categories of agreement were established, but for consistency within the DHALF survey, only five agreement options were offered in this study.

2.2.4 Childhood environment items

The aim of this section was to obtain brief retrospective data on aspects of childhood social environment. Life course development orientations are increasingly recognised for their contribution to understanding health outcomes in adulthood. Respondents were asked to recall and report on circumstances in their family when they were ten years of age. While recall bias might be expected to limit the usefulness of such information, items were limited to two general aspects of life: one of which was factual, and the other more attitudinal. In developing a method for collecting reliable retrospective personal details in surveys, Blane [27] has noted that recall bias is minimised if required material is not detailed and not emotionally laden for the respondent.

The first item addressed family structure. Respondents were asked about parental cohabitation when the respondent was ten years of age. Response categories were 'together', 'separately', and 'unsure'. The second item sought to obtain a measure of the psychosocial functioning in the family of origin. Respondents were invited to rate the parenting style of their primary care-giver as either 'generally positive and supportive', 'generally negative and unsupportive', or 'other, please specify'.

SEP in family of origin was measured with the occupational category of both father and mother (*or the male/female carer living in your household).* Response options were the eight major Australian Standard Classification of Occupations (ASCO) categories plus two additional categories labelled 'domestic duties' and 'other, please specify'. A second indicator of childhood SEP was obtained by asking respondents to name the town/suburb, state, and postcode for the area in which they lived at the age of ten years.

2.2.5 Work environment items and scales

Respondents currently in the paid workforce or self-employed were asked to complete section four of the DHALF which addressed employment, working conditions, the psychosocial work environment and the work-home interface, with a total of 31 items.

2.2.5.1 Occupational classification and prestige

To supplement the indicators of socioeconomic status obtained in the telephone interview on income, education, and labour-force status, information about each individual's occupation was elicited with two items. In the first item, respondents were asked to state and describe their usual occupation. In the second item respondents were asked to write a brief description of their usual type of work. Examples were provided. Key words from descriptors were used during data entry to assign from look-up tables (a) a six-digit ASCO code, and (b) an occupational prestige score (Daniel Prestige scale). A comprehensive description of the ASCO coding system is available from the Australian Bureau of Statistics.[28] Three questions assessed hours per week worked (5 response options), perceived job security (4 response options) and risk of skill obsolescence (4 response options).

2.2.5.2 Job strain and social support

Eleven questions asked about decision authority and skill discretion (3 response options), and two questions asked about job strain (response categories of 'yes' and 'no'). Karasek's job-strain model predicts that the greatest risk to health from stress occurs among workers facing high psychological workload demands combined with low control or decision latitude in meeting those demands.[29] Johnson and Hall (1988) added to Karasek's original scale the construct of work social support in redefining this model.[30] Their five work-related social support items were included in the DHALF survey, and their original dichotomous response categories were expanded to 'rarely or not at all', 'sometimes', and 'often'.

2.2.5.3 Work-home interference

It is generally acknowledged that balancing the commitments of work and home responsibilities is a demanding task. Developmental psychologists have examined the effects of role strain on family life, and organisational psychologists have examined the impact of family commitments on work productivity. More recently, research has investigated the spillover effects of role conflict on the health of individuals.[31] The DHALF survey included a measure of work-home interference developed by Gutek and Searle (1991)[32] to measure both phenomena. Four items addressed work interfering with home life or recreational time and four measured family/personal life interfering with work. The period in life where work-home spillover is likely to cause greatest impact coincides with the period of adult development in midlife. Midlife is a time of high productivity, with responsibilities and challenges peaking for both work and family domains.

Previous research has also indicated that midlife is a period when substantial socioeconomic difference in health become evident.[33] This scale was used to evaluate relationships between role integration/conflict and oral health outcomes.

2.3 Dependent variables

Five dependent variables were used in this study. Three already described in this chapter are self-assessed number of decayed teeth, self-assessed missing teeth and oral health-related quality of life. The remaining two measures were obtained in the computer-assisted telephone interview (CATI) and these are self-rated oral health and oral symptom experience.

The single item or 'global' self-rated oral health item asked, 'How would you rate your own dental health? Would you say it is excellent, very good, good, average, poor, very poor? This item followed directly on from a comparable item for general health with the same six response categories: 'How would you rate your own *general* health?' The latter item has been included in many major health studies, including the National Health Survey in Australia and, from other countries, the National Health and Nutrition Examination Study (NHANES) and the Rand Health Insurance Experiment (HIE). The global item has been consistently shown to be a strong and independent predictor of subsequent illness and mortality, even after controlling for known biomedical risk factors.[34 35 36]

The single item perceived oral health rating has also been used in the US [37] and other studies, including the second International Collaborative Study of Oral Health Outcomes. It has been shown to accurately reflect objectively determined clinical condition of the teeth [38] and is related to other self-assessed measures of oral health. [39]

The final dependent variable is referred to as oral symptom experience, for which information was also collected in the CATI. Respondents were asked whether they had experienced during the last 12 months: a broken or chipped natural tooth; gums that hurt or bleed; sores on tongue or the inside of the mouth; a bad taste in the mouth or bad breath. Response categories were 'Yes' and 'No'. Affirmative responses were summed to produce a composite measure for the number of symptoms experienced with potential to range from zero (no symptom experienced) to four (all symptoms experienced).

Small area measure of socioeconomic position

Individual-level SEP indicators were supplemented with an area-based level of socioeconomic disadvantage. Values on the Index of Relative Socio-economic Disadvantage (IRSD) were assigned to each interviewee's postcode. The IRSD is one of a series of five summary measures of socioeconomic disadvantage by geographic area developed by the Australian Bureau of Statistics.

The IRSD score is a composite value derived from a number of social and economic variables. The methodology behind the construction of this index has been described elsewhere.[40] IRSD scores have been standardised to have mean of 1000 and a standard deviation of 100 points across all census collection districts (CDs) in Australia. In urban areas, a CD comprises about 250 dwellings, but the number of CDs within a postcode area varies. A low IRSD value indicates that an area has a large proportion of disadvantaged households.

2.4 Pilot study

Following an informal evaluation of the DHALF among colleagues and acquaintances, the survey was pilot-tested prior to circulation. Potential participants were selected from the random number listing of telephone numbers drawn for NDTIS that had been surplus to requirement. The next 40 consecutive residential telephone numbers from the Adelaide metropolitan strata were selected, and up to six attempts were made to contact each household by telephone to explain the purpose of the pilot test and invite participation. Potential participants were requested to evaluate the items for readability; to identify any ambiguous or leading statements; to comment on the suitability of response formats, the clarity of instructions and the presentation of the scales; to identify any items to which they objected, and measure the length of completion time.

Thirty-eight households were contacted in this manner and all agreed to participate. A package containing the questionnaire, instruction sheet, evaluation sheet and a reply-paid envelope was mailed to the identified householder within two days of telephone contact. After three weeks, with no follow-up contact, 25 completed questionnaires and evaluation sheets had been returned, (response = 65.8%). Minor refinement to wording of several scales was introduced to improve clarity, but no omissions or additions were made.

2.5 Validation study

So that the validity of these self-assessed numbers of teeth remaining, decayed, missing and filled might be determined, estimates were validated against a clinical dental inspection.

2.5.1 Sample maintenance

Four months before conducting the dental inspection, a greeting card was posted to dentate South Australian respondents as a sample maintenance exercise. The South Australian Tourism Commission provided an electronic image of the state's floral emblem for the card. Adults were thanked for participation in the earlier stages of data collection, and the planned dental inspections were mentioned.

2.5.2 Planning and management

Eligibility criteria for inclusion in the validation study were participation in the NDTIS and DHALF surveys, being dentate and resident in South Australia. Eligible metropolitan participants were mailed a letter that outlined the purpose of the study, the venue, available dates and times, and requirements of participation. They were advised that they would be contacted by telephone to arrange an appointment for a dental inspection. After appointments had been made by telephone, written confirmation of the appointment details was mailed to those who agreed to participate and a map indicating the location of the Adelaide Dental Hospital and options for car parking was enclosed. During working hours dental inspections were conducted in the Colgate Australian Clinical Dental Research Centre, and after hours in SADS' General Dentistry Unit, both located in the Adelaide Dental Hospital. Most inspections were completed during June 2000, and the remainder (for persons who had rescheduled or failed to attend an earlier appointment) was completed over the period from July to October.

A separate letter was mailed to eligible participants residing in non-metropolitan South Australia. The letter advised that an examiner and recorder would visit 16 sites (where a SADS' clinic or mobile caravan was located), and corresponding dates and times were provided along with requirements of participation. Those who lived within 100 km by road to a site were telephoned and appointments arranged for those agreeing to participate. Confirmation of the appointment details, clinic address and contact information was mailed to these participants. One examiner and one of two recorders visited each site over a six-week period from July to August 2000. Dental inspections were conducted in Whyalla, Port Augusta, Port Pirie, Kadina, Clare, Eudunda, Berri, Bordertown, Mount Gambier, Naracoorte, Murray Bridge, Gawler, Birdwood, Angaston, Port Willunga, and Victor Harbor. A research grant from the Australian Dental Research Foundation covered the travel and accommodation costs of the non-metropolitan dental inspections.

Written consent was obtained from participants on arrival at the clinic, and the dental examiners took a medical history. Because several months had lapsed since DMF estimates were obtained, a series of up to 11 questions were asked to adjust earlier estimates for cases of new disease or treatment. The recorders who collected this information had no knowledge of participants' earlier responses. These questions are presented in Appendix C along with other forms and correspondence related to the validation study.

2.5.3 Protocol development

The protocol for the dental inspections was based on diagnostic guidelines of the World Health Organization Basic Methods fourth Edition (1997).[41] The examining team participated in the protocol development. All examiners and recorders were issued with the criteria and scoring protocol and a single summary sheet of guidelines.

2.5.3.1 Clinical measurements

Dental inspections used visual criteria to assess oral hygiene, periodontal health and tooth level scores for coronal and root caries experience. The inspection also recorded the presence of oral pathology (suspected tumour, leukoplakia, lichen planus, ulceration, ANUG, abscess, chelitis, candidiasis or other), and, where applicable, an assessment of dentures.

Tooth presence and caries experience

Tooth presence was scored using 11 categories: Present; Crown coverage; Unerupted or agenesis; Extracted, removable denture in place; Extracted, replaced with fixed bridge; Extracted, replaced with implant; Extracted, no space (< ½ unit space remaining); Extracted due to caries; Extracted due to other; Retained root sound (≤ ¼ crown remains); or Retained root carious (≤ ¼ crown remains).

There were eight categories for evaluating coronal status: Sound; Decayed; Recurrent; Filled; Filled unsatisfactory, or temporary filling; Filled, Primary decay on separate site; Fissure sealant; or Trauma. These categories (except Fissure Sealant and Trauma) were also used to evaluate root status and an additional category of 'No exposed cementum'. Subgingival aspects were not assessed.

All teeth, including wisdom teeth, were assessed. Surfaces not visible were regarded as sound. Non-vital teeth were scored in the same manner as vital teeth, except that any restoration placed solely as the result of root canal treatment was not scored. Similarly, teeth restored because of trauma were scored as sound, unless otherwise indicated. When any part of a crown was visible through the gum, the tooth was considered erupted. In the case of supernumerary teeth, only the tooth regarded to be the 'legitimate' one was scored. The One Half Rule was applied to distinguish root caries from coronal caries, stating that where both the crown and root appear equally affected, both were scored as decayed. If more than half of the lesion was above the cemento-enamel junction (CEJ), it was regarded only as a coronal lesion; if more than half of the lesion was below the CEJ it was regarded only a root lesion. Precavitated carious lesions were not recorded unless shadowing indicated dentinal involvement. Tooth wear, hypoplasia and stain were not recorded. Calculus and plaque were not intentionally removed to examine underlying surfaces. No assessment was made for the need of preventive or restorative dental treatment.

Plaque and debris

The presence and extent of plaque was scored according to the 1964 criteria of Silness and Löe:[42]

SCORE	PLAQUE INDEX CRITERIA
0	No plaque
1	A film of plaque adhering to the free gingival margin and adjacent area of the tooth. The plaque may be seen in situ only after application of disclosing solution or by using the probe on the dried tooth surface.
2	Moderate accumulation of soft deposits within the gingival pocket, or on the dried tooth and gingival margin which can be seen with the naked eye.
3	Abundance of soft matter within the gingival pocket and/or on the dried tooth and gingival margin.

Six buccal/labial surfaces were assessed. These were the buccal surface of the most anterior molar in each quadrant; the labial surface of 11; and the labial surface of 31. Hence the first molar was used or, in its absence, the second molar, or in the absence of both, the third molar. When no molar index tooth was available, no other tooth was substituted. Missing anterior index teeth could be substituted with the 21 or 41.

Periodontal status

Periodontal health was assessed using the Community Periodontal Index (CPI) according to the guidelines of the WHO Oral Health Surveys, fourth edition, 1997. Three indicators of periodontal status used in this assessment were gingival bleeding, calculus, and the presence and depth of periodontal pockets. The mouth was divided into sextants, and a sextant was examined only when there were two or more teeth present that were not clearly indicated for extraction. The ten index teeth were 17, 16, 11, 26, 27, 37, 36, 31, 27 and 47.

The worst periodontal status of each of the sextants was recorded. Where the index tooth was missing, the remaining teeth in the sextant were assessed and the highest score recorded. The codes were:

COMMUNITY PERIODONTAL INDEX	CODE
Healthy	0
Bleeding observed, directly or by using mouth mirror, after probing	1
Calculus detected during probing, but all the black band on the probe visible	2
Pocket 4–5 mm (gingival margin within the black band on the probe)	3
Pocket 6 mm or more (black band on the probe not visible)	4
Excluded sextant (less than two teeth present)	X

Four calibrated examiners and six trained recorders performed the dental inspections. Three examiners were dentists and the fourth was a dental therapist employed by SADS.

2.5.3.2 Reliability testing

Inter- and intra-examiner reliability testing was conducted on a separate sample of consenting dentate adults. In August 2000, a randomly selected sample of residential telephone numbers from the electronic white pages listing was obtained. A PAL was mailed to these households followed two weeks later with a telephone call to invite dentate adults to participate in the reliability study. Appointments were confirmed in writing. Eighteen adults attended a dental inspection conducted in the Colgate Australian Dental Research Centre. As one examiner was unavailable, three examiners examined each participant. Only one arch was assessed, selected by the first examiner on the basis of greatest number of remaining teeth, or greatest perceived clinical complexity. Oral hygiene and denture assessments were not assessed. Six participants agreed to return one week later so that intra-examiner reliability could be conducted with an inspection of the same arch.

A signed, informed consent was obtained at the first dental inspection, and medical history was checked for contraindication for periodontal probing. A modified version of the 'Findings of Dental Inspection' form was issued to indicate that a half-mouth inspection was performed. Three of the recorders involved in the validation study returned for the reliability testing.

In October 2000, a convenience sample of six dentate patients attending for emergency care at SADS' General Dentistry clinic at the Adelaide Dental Hospital were approached in person so that inter-examiner reliability might be tested between the fourth examiner, and the other examiners. All agreed to participate and signed the study's consent form. Medical history was checked for contraindications for periodontal probing. The modified version of the 'Findings of Dental Inspection' form was issued at the conclusion of the four half-mouth inspections. Two dental assistants working in the clinic acted as recorders.

2.5.4 Ethical implications and approvals

NDTIS and DHALF surveys

The AIHW approved the NDTIS and the content of the DHALF questionnaire survey and its circulation among NDTIS participants. To maintain confidentiality, a numerical ID of six digits identified participants.

Validation Study

Approval for the validation study was obtained from the Adelaide University's Human Research Ethics Committee. The South Australian Dental Service and the Colgate Australian Clinical Dental Research Centre approved the use of their clinical facilities and equipment for the study. On receipt of legal advice, the Dental Board of South Australia approved dental inspections being conducted on adults by a dental therapist on the grounds that inspections were conducted for the purpose of research, that participants were fully informed and that a dentist was present or accessible by telephone.

Signed informed consent was obtained from all participants on arrival for the appointed dental inspection. The health risks to participants were no greater than those associated with a standard dental examination. High quality equipment was used and the policy guidelines of the South Australian Dental Service for infection control were adhered to strictly. Disposable periodontal probes were purchased especially for the study and were used once only. A medical history taken at the commencement of the appointment assessed medical risks involved with periodontal probing, and where contraindicated, a periodontal inspection was not performed. Brief written reports of findings were issued at the conclusion of the inspection to each participant with an indication of whether or not a dental consultation before their next planned recall was recommended.

Participants were not exposed to radiation, no treatment was performed, no drugs were administered and only minimal discussion of findings was entered into. A referral system for urgent assessment of any participant with oral pathology deemed serious, was established, but not required. Participants were not paid or offered any other incentive.

2.6 Data management

2.6.1 Survey return and data entry

All returned questionnaires were date-stamped immediately and the respondent's unique ID was entered into the D-Base program on the same day to minimise the risk of incorrectly mailing a replacement questionnaire. All data entry was conducted externally by a commercial organisation and each questionnaire was verified (re-entered) to ensure a high level of accuracy. A document detailing data entry guidelines was issued to clarify requirements for data entry. During data entry, occupation codes denoted by the six-digit classification of the Australian Bureau of Statistics' Australian Standard of Classification of Occupation[43] (a skill-based classification of occupations) were assigned from look-up menus to match job descriptors. Using the same system of look-up menus, Daniel's occupational prestige codes[44] were assigned, as were postcodes for childhood area of residence.

During data cleaning, all written responses to the 'other, please specify' categories were individually assessed and, where possible, a judgment was made to reassign them. Rules were developed to guide such reassignment. Where data entry operators had indicated ambiguous responses, interpretations were made and, where possible, data were entered.

2.6.2 Missing values

Various methods for handling incomplete data have been described. One strategy is to impute missing values, producing complete data that can be analysed with standard procedures. Having explored missing data with SPSS missing data analysis, and experimented with mean imputation and nearest neighbour hot deck imputation (use of sampling strata for the variables dentate status, age, sex, education and income, and replacing missing values with the mean of the nearest valid values 2 above and 2 below), a decision was made to not impute missing values. There were two reasons supporting this decision. The most important reason was that there was only a small proportion of cases with missing data and those were seemingly evenly distributed and unrelated to other variables (although the assumption of data missing completely at random was not tested). The second reason pertains to the problems arising from estimating the mean from available-case analysis.

Little and Rubin[45] argue that these methods tend to produce systematic underestimation of the variances and distortion in the distribution of the sampled values. Although these problems are less important with hot deck imputation, the choice of variables used to partition the data is critical, and in this study the factors that predict scores on psychosocial characteristics were not fully understood.

An alternative conventional strategy to manage missing values where there are limited missing data is to ignore missing values. In this study, participants with more than one missing value on any one scale were omitted from analysis using that scale. This rule was applied across all scales, irrespective of the number of scale items. No missing values were imputed for participants with only one missing value on any scale. It is argued that this level of missing data was ignorable and did not bias results, given the large sample size and relatively small proportion of missing values.

2.6.3 Weighting

Separate sample weights were calculated for each of the NDTIS and the DHALF samples. Specifically weights corrected for: the over-representation of persons from smaller households, since the probability of selection as target occupant was inversely proportional to household size; the greater probability for persons residing in less populous areas of being sampled.

Data were weighted by household size (the number of persons aged 5 years or more) and by geographic sampling region to account for differing sampling probabilities due to the sampling design. The data were also post-stratified and weighted by age and sex to ensure that the weighted data more accurately represent the Australian population for each region as estimated by the Australian Bureau of Statistics. Within each of the 13 strata, substrata were defined by sex and by age group. For the DHALF sample six age groups were defined: 18-29; 30-39; 40-49; 50-59; 60-69; and 70+. To achieve estimates consistent with the Australian population, these sub-strata were each linked to data published by the Australian Bureau of Statistics on resident population estimates.

Geographic remoteness

Values on the Accessibility/Remoteness Index of Australia (ARIA) were assigned to postcodes. The ARIA index was developed by the National Centre for Social Applications of Geographic Information Systems (GISCA) at the University of Adelaide.[46] ARIA index values range from 0 to 12 and can be used as interval data in statistical analysis as a measure of geographical remoteness. Values for 11,340 populated localities have been derived from the road distance to service centres. A zero value indicates areas with the highest level of access to services. For use as a categorical variable, ARIA values can be collapsed into five categories.

Highly Accessible (0-1.84) – relatively unrestricted accessibility to a wide range of goods and services and opportunities for social interaction. Accessible (>1.84-3.51) – some restrictions to accessibility of some goods, services and opportunities for social interaction.

Moderately Accessible (>3.51-5.80) – significantly restricted accessibility of goods, services and opportunities for social interaction. Remote (>5.80-9.08) – very restricted accessibility of goods, services and opportunities for social interaction. Very Remote (>9.08-12) – very little accessibility of goods, services and opportunities for social interaction.

2.7 Analytical approach

Statistical tests were performed using the SPSS program, version 11. The analytical methods proceeded in several steps. Analysis commenced with a simple univariate description of the sample and the distributions of the variables. The validity of self-assessed tooth counts was evaluated using percentage agreement between estimates and clinical assessment, and quantified using intraclass correlation coefficients with 95% confidence intervals.

In bivariate analysis, the statistical significance of differences was evaluated using One-Way Analysis of Variance (ANOVA) for continuous measures and Pearson's chi-square for categorical data.

Principal components factor analysis was used to confirm the underlying structure of the scales and reduce the number of variables to a small number of subscale scores. The internal consistency of these subscales was tested using Chronbach's alpha. A correlation matrix of the independent variables was constructed prior to entering these into multivariate models to test for multicolinearity. The contributions of the independent variables to oral health outcomes were evaluated using linear multiple regression models. Key variables such as age and sex were entered into all multivariate models, even when bivariate analysis showed associations to be non-significant. Hierarchical multiple linear regression was used for the continuous dependent variables – decayed teeth, missing teeth, oral health-related quality of life and the sum of oral symptoms. Logistic regression models was used when the dependent variable was ordinal, as was the case for self-rated dental health.

2.8 References to Chapter 2

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3. Response and Sample Characteristics

This chapter reports details of response to data collection and describes characteristics of respondents to the 1999/2000 Dental Health and Lifestyle Factors (DHALF) mail survey. The DHALF survey was conducted over October 1999 to January 2000 in conjunction with the 1999 National Dental Telephone Interview Survey (NDTIS). A description of the age and sex of the unweighted sample is compared with estimates of the Australian adult population. After reweighting the data to more accurately represent the age and sex distributions of the Australian population for each sampled region, the adjusted sample is described. All subsequent analyses in this study are performed using weighted data with edentulous cases omitted.

3.1 Response

3.1.1 Response by state and territory

Table 3.1 presents participation data for the 1999 NDTIS. Overall, 7,829 computer assisted telephone interviews (CATI) were completed, representing a response rate of 56.6% of useable telephone numbers sampled. Highest participation was achieved in South Australia (65.9%), followed by Tasmania (63.4%), and lowest participation was achieved in New South Wales (50.6%).

Table 3.1: Participation in the 1999 National Dental Telephone Interview Survey by State and Territory

	NSW	Vic	Qld	SA	WA	Tas	ACT	NT	Australia
Number of telephone numbers sampled	2,793	2,634	2,638	2,074	2,500	1,115	1,180	1,355	16,289
Excluded	431	351	438	241	386	162	149	281	2,439
Sub-Total	2,362	2,280	2,190	1,831	2,113	952	1,030	1,074	13,832
Outcome									
Non-contact	126	138	95	87	133	53	80	61	773
Refusal	1,042	929	877	538	776	295	347	426	5,230
Participants	1,194	1,213	1,218	1,206	1,204	604	603	587	7,829
Percent participation	50.6	53.2	55.6	65.9	57.0	63.4	58.5	54.7	56.6

The 1,382 CATI surveys conducted by proxy were excluded from eligibility for the DHALF survey, along with 175 respondents aged under between 16 and 17 years, and a further 120 cases deemed out of scope because the interviewee had an undeliverable postal address. As shown in Table 3.2, the omission of these cases left a valid sample of 6,152 adults to whom the DHALF mail survey was posted.

Table 3.2: State and Territory participation in the 1999 NDTIS by interview schedule and deadmail categories

	NDTIS participants	#2 Child proxy	#3 Adult proxy	#1 Adult self	#1 Adult self aged16-17	Undeliverable	Unavailable	Valid sample for DHALF
State or Territory								
NSW	1,194	133	64	997	15	19	7	956
Vic	1,213	145	46	1,022	27	10	7	978
Qld	1,218	171	48	999	26	20	9	944
SA	1,206	165	57	984	30	13	6	935
WA	1,204	153	66	985	30	18	5	932
Tas	604	66	26	512	19	5	1	487
ACT	603	75	32	496	13	0	0	483
NT	587	110	25	452	15	0	0	437
Australia	7,829	1,018	364	6,447	175	85	35	6,152

After the initial mailout, a reminder card was posted to non-respondents after two weeks. A second and third approach comprising with a letter and replacement questionnaire were subsequently made a two-weekly intervals. A final response rate of 64.6 % was achieved. As shown in Table 3.3, response was greatest from South Australia (68.7%), followed by Queensland (66.8%), and lowest in the Northern Territory (59.5%).

Table 3.3: Dental Health and Lifestyle Factors questionnaire response by State and Territory

	Valid sample for DHALF	Non-response	Responded	Percent response
State or Territory				
New South Wales	956	364	592	61.9
Victoria	978	365	613	62.7
Queensland	944	313	631	66.8
South Australia	935	293	642	68.7
Western Australia	932	323	609	65.3
Tasmania	487	168	319	65.5
Australian Capital Territory	483	176	307	63.6
Northern Territory	437	177	260	59.5
Australia	6,152	2,179	3,973	64.6

3.1.2 Response bias

As sociodemographic information was obtained for all targeted DHALF participants in the CATI, respondents and non-respondents could be compared on key study variables. As shown in Table 3.4, there were significant differences (Chi-square, $p<0.05$) in response rates by all tested variables except country of birth. The response rate for males was significantly lower than for females. Response rates increased across successive age groups, but declined in the 70+ age group. As expected, the response rate from those who spoke a language other than English (LOTE) at home was significantly lower than from those who spoke English. A significantly higher response rate was obtained from adults living in areas outside of Capital city boundaries.

Reflecting a socioeconomic bias, a positive gradient in response was observed with increasing levels of household income ranging from 56.8% among those on lowest income to 70.9% from in the highest income category. In addition, response rates were higher from adults with post-secondary education, and from adults who were not eligible for a government concession.

There was a significantly lower response from adults with no remaining natural teeth.

Table 3.4: Comparison of respondents and non-respondents on key characteristics, all persons (unweighted data)

	Response	Non-response
	Row percentages	
Sex *		
Male	62.3	37.7
Female	66.2	33.8
Age group *		
18-29 years	54.9	45.1
30-39 years	62.2	37.8
40-49 years	69.2	30.8
50-59 years	70.4	29.6
60-69 years	70.9	29.1
70+ years	59.4	40.6
Country of birth ns		
Australia	64.8	35.2
Overseas	63.8	36.2
Language at home *		
LOTE	51.9	48.1
English	65.9	34.1
Geographical location *		
Capital city	62.3	37.7
Other	66.1	33.9

	Response	Non-response
	Row percentages	
Household income *		
<$12,000	56.8	43.2
$12-20,000	64.8	35.2
$20-30,000	66.7	33.3
$30-40,000	64.4	35.6
$40-50,000	70.2	29.8
$50,000+	70.9	29.1
Post-secondary education *		
Yes	67.3	32.7
No	59.8	40.2
Concession card status *		
Card holder	59.5	40.5
No card	66.6	33.4
Dentate status *		
Dentate	65.8	34.2
Edentulous	56.6	43.4
Total	**64.6**	**35.4**
	n=3,973	**n=2,179**

ns p> 0.05 level
* Significant Chi-square p<0.05

3.2 Australian Estimated Resident Population comparison

Table 3.5 compares the adult Australian Estimated Resident Population (ABS, 1998) with survey respondents. Participation across strata varied by a maximum of 1.8% (between Northern Territory and Adelaide). For NSW, Victoria, and Western Australia, greater response was obtained from those living outside of Capital cities. However rates considerably under-represented population estimates in Sydney, Melbourne, and the remainder of NSW, and over-represented strata with lower populations - the remainder of Western and South Australia, Tasmania, and the Territories.

Table 3.5: Population distribution (18+ years) by sampling stratum for the Australian ERP and the DHALF sample

	Estimated Resident Population 18+ years,		Dental Health and Lifestyle Factors (all persons, unweighted)	
	Sum	Percent	Frequency	Percent
Strata				
NSW, Sydney	3,030,064	21.6	284	7.1
NSW, residual	1,733,754	12.4	308	7.8
Victoria, Melbourne	2,574,287	18.3	296	7.5
Victoria, residual	944,475	6.7	317	8.0
Queensland, Brisbane	1,176,150	8.4	321	8.1
Queensland, residual	1,383,474	9.9	310	7.8
South Australia, Adelaide	838,097	6.0	329	8.3
South Australia, residual	293,756	2.1	313	7.9
Western Australia, Perth	1,005,585	7.2	300	7.6
Western Australia, residual	348,993	2.5	309	7.8
Tasmania	349,197	2.5	319	8.0
Australian Capital Territory	228,173	1.6	307	7.7
Northern Territory	131,003	0.9	260	6.5
Total	14,037,008	100.0	3,973	100.0

Males were under-represented in each age group, comprising 40.6% of the unweighted sample, compared with 49.2% of the Australian adult population. Across both sexes, people aged less than 40 years were under-represented, while people aged 50+ years were over-represented.

Table 3.6: Population distribution (18+ years) by age group and sex for the Australian ERP and the DHALF sample

	Australian Estimated Resident Population				Questionnaire Respondents			
Count	14,037,008	6,912,320	7,124,688		3,973	1,613	2,360	
	All	Male	Female	%Male	All	Male	Female	%Male
	Column percentages				Column percentages			
Age group								
18-29 years	23.9	24.6	23.3	50.7	13.7	13.0	14.2	38.5
30-39 years	20.7	21.0	20.5	49.9	17.3	16.2	18.1	38.0
40-49 years	19.3	19.6	19.0	50.0	19.3	18.2	20.0	38.3
50-59 years	14.5	15.0	14.1	50.9	19.8	20.5	19.4	41.9
60-69 years	10.1	10.2	10.1	49.4	15.6	17.1	14.5	44.7
70+ years	11.4	9.6	13.1	41.6	14.4	15.1	13.9	42.6

3.3 Unweighted and weighted sample comparisons

So that estimates might more accurately reflect the Australian population, data were weighted using current ABS age and sex by strata estimates for the distribution for persons aged 18 years and over. The age ranges used were: 18-29 (12 years), 30-39 (10 years), 40-49 (10 years), 49-59 (10 years), 60-69 years (10 years), and 70+ (open). Sampling weights adjusted for differences in selection probability. Since only one eligible respondent was selected for the survey from each household, sole occupants were more likely to be selected than persons living in households with more eligible persons. Weights also corrected for different sampling probabilities based on geographical strata.

To adjust for age and sex differences between the survey sample and the population, the data were also post-stratified and reweighted by age and sex. All estimates presented in this report were calculated using weighted data and limited to dentate respondents unless otherwise stated.

Table 3.7 describes the demographic characteristics of the sample at three stages. Firstly the unweighted sample is described. After weighting, the age and sex distribution of survey respondents reflected that of the Australian population aged 18 years and over for the 13 sampling sites, and the weighted sample is described. Finally a description of the sample is presented following the omission of 296 edentulous cases. It was considered that retention of edentulous cases would confound associations with the outcome variables. For example, one outcome variable – decayed teeth – is not relevant to edentulous cases. In addition, the social impact of oral conditions has been found not to vary across edentulous population subgroups in the way it does among dentate persons. [1] By confining the sample to dentate cases, findings will be pertinent to the majority of the population who retains some natural teeth.

3.3.1 Demographic characteristics

The unadjusted sample comprised 3,973 dentate adults. Males were under-represented among respondents, comprising 40.6% of the unweighted sample. This was corrected to 49.3% after weighting, and following omission of edentulous cases, males represented exactly 50.0% of the sample (n=1,839).

In the unweighted sample, adults aged 18-29 years were considerably under-represented (13.7%, n=543), while those aged 50+ years were over-represented in each age group. In the weighted sample, adults aged 18-29 years represented 23.9%, and this increased further in the weighted dentate sample to 25.9%. While the representation of the youngest age group almost doubled, the representation of those aged 60+ reduced by almost half to less than 9% for each of the 60-69 year age group, and the 70+ years age group. By contrast, very little change occurred for those aged 40-49 years.

Respondents were categorised by country of birth into Australian-born or Overseas-born. In all, 77.8% of the sample were born in Australia and data weighting and omission of dentate cases made little impact on their relative contribution to the sample.

While approximately one fifth of the sample was born overseas, only 7.5% spoke a language other than English (LOTE) at home in the unweighted sample. Their representation increased following weighting partly reflecting a greater likelihood of migrants to Australia to reside in a capital city. In the weighted dentate sample, those speaking a LOTE at home represented 10.6% of the sample.

Forty percent of the sample reported being in full-time work, increasing to 44.1% of the weighted sample, and 46.4% in the weighted dentate sample. The representation of part-time workers also increased from 15.2% to 18.2% of the final sample. Sample weighting made a considerable reduction in the contribution of retirees from 23.7% to 16.8% and a further reduction in numbers resulted from the omission of edentulous cases, resulting in a final proportion of 13.9%. Adults who described their employment status as not employed were relatively unaffected by changes and contributed 14.9% of the final sample.

The distribution of respondents by household size altered considerably as a result of weighting for sampling probability, and age-weighting (as more of the elderly lived alone). The representation of sole household occupiers decreased from 25.7% to 13.3% in the weighted sample, and further decreased to 11.9% following the removal of edentulous cases. The relative contribution of those living in households of four or more increased from 4.3% to 10.7% in the final sample.

Sample weighting altered the profile of the sample by geographical location. Persons residing outside of capital cities were over-represented in the unweighted sample, and their relative proportions decreased from 39.2% to 33.0%. This trend was also reflected in ARIA categories. The majority of survey respondents (69.3%) lived in areas classified as 'highly accessible'. The relative contribution of these respondents increased in the weighted sample to 82.7% and changed little in the weighted dentate sample (82.9%). The representation of each of the other ARIA categories decreased in the weighted data. In the weighted dentate sample, 11.5% lived in areas classified as 'accessible' and 3.5% lived in areas classified as 'moderately accessible'. A small minority of respondents lived in areas classified as remote (1.1%) or very remote (0.8%).

Table 3.7: Demographic characteristics for unweighted, and weighted samples, and weighted dentate sample

	Unweighted		Weighted		Weighted, dentate only	
	N	%	N	%	N	%
Sex						
Male	1,613	40.6	1,957	49.3	1,839	50.0
Female	2,360	59.4	2,016	50.7	1,839	50.0
Total	3,973	100.0	3,974	100.0	3,678	100.0
Age group						
18-29 years	543	13.7	951	23.9	951	25.9
30-39 years	687	17.3	823	20.7	811	22.1
40-49 years	765	19.3	766	19.3	742	20.2
50-59 years	787	19.8	577	14.5	521	14.2
60-69 years	618	15.6	402	10.1	328	8.9
70+ years	573	14.4	453	11.4	324	8.8
Total	3,973	100.0	3,974	100.0	3,678	100.0
Country of birth						
Australia	3,091	77.8	3,111	78.3	2,880	78.3
Overseas	849	21.4	823	20.7	761	20.7
Missing	33	0.8	40	1.0	37	1.0
Total	3,973	100.0	3,974	100.0	3,678	100.0
Language at home						
Other than English	296	7.5	425	10.7	389	10.6
English	3677	92.5	3548	89.3	3,289	89.4
Total	3,973	100.0	3,974	100.0	3,678	100.0
Employment status						
Full time	1,589	40.0	1,754	44.1	1,708	46.4
Part time	603	15.2	688	17.3	668	18.2
Retired	943	23.7	669	16.8	511	13.9
Not employed	594	15.0	597	15.0	549	14.9
Missing	244	6.1	265	6.7	241	6.6
Total	3,973	100.0	3,974	100.0	3,678	100.0
Householders aged 5+ years						
One	1,022	25.7	527	13.3	439	11.9
Two	1,797	45.2	1,564	39.4	1,410	38.3
Three or four	982	24.7	1,478	37.2	1,429	38.9
More than four	169	4.3	398	10.0	395	10.7
Missing	3	0.1	6	0.1	5	0.1
Total	3,973	100.0	3974	100.0	3,678	100.0
Geographical location						
Capital city	2,416	60.8	2,642	66.5	2,465	67.0
Non-capital	1,557	39.2	1,332	33.5	1,213	33.0
Total	3,973	100.0	3,974	100.0	3,678	100.0
ARIA category [(a)]						
Highly accessible	2,752	69.3	3,287	82.7	3,048	82.9
Accessible	707	17.8	460	11.6	422	11.5
Moderately accessible	277	7.0	142	3.6	128	3.5
Remote	106	2.7	42	1.1	39	1.1
Very remote	83	2.1	32	0.8	30	0.8
Missing	48	1.2	12	0.3	12	0.3
Total	3,973	100.0	3,974	100.0	3,678	100.0

(a) Accessibility/Remoteness Index of Australia (ARIA)

3.3.2 Socioeconomic characteristics

In Table 3.8 a comparison of the sample at three stages is presented according to socioeconomic indicators. The socioeconomic indicators used were household income, educational attainment, occupational group, occupational prestige, concession status, and area disadvantage. Daniel's occupational prestige scores and values on the Index of Relative Socio-Economic Disadvantage (IRSD) were continuous and were classified into quintiles based on unweighted data. Prestige scores were assigned to respondents' job descriptions. IRSD values were assigned to the postcode of each respondent's usual residence.

Data weighting and omission of edentulous cases altered the distribution to represent a more socially advantaged profile. The largest proportion of respondents (30.0%) in the unweighted sample reported household income above $50,000 and the representation of this group increased to 41.0% in the weighted dentate sample.

The proportion of respondents with some or completed vocational studies remained stable after weighting at approximately 30.0% while the proportion with tertiary education increased slightly to 26.6% using weighted data with the edentulous omitted.

Respondents in the workforce were classified by occupation into one of eight major groupings defined by the Australian Standard Classification for Occupation (ASCO, first edition) based on skill level and skill specialisation. Ten percent of workers were classified as managers or administrators, 15.0% as professionals, and a further 9.5% were classified as clerks in the weighted sample. Smaller proportions of the sample comprised the other occupational groups, and 36.2% of the sample were not defined by occupation. The vast majority of these were not in the workforce. The representation of concession cardholders decreased from 25.5% to 18.3% in the weighted dentate sample.

Table 3.8: Socioeconomic characteristics pre- and post weighting unweighted, and weighted sample dentate only

	Unweighted		Weighted		Weighted, dentate only	
	N	%	N	%	N	%
Household income						
<$12,000	510	12.8	312	7.9	237	6.5
$12-20,000	584	14.7	478	12.0	387	10.5
$20-30,000	546	13.7	434	10.9	388	10.5
$30-40,000	484	12.2	464	11.7	454	12.4
$40-50,000	436	11.0	483	12.2	459	12.5
>$50,000	1,191	30.0	1,532	38.5	1,507	41.0
Missing	222	5.6	272	6.8	246	6.7
Total	3,973	100.0	3,974	100.0	3,678	100.0
Educational attainment						
Primary	108	2.7	67	1.7	41	1.1
Some secondary	700	17.6	569	14.3	493	13.4
Secondary	543	13.7	522	13.1	481	13.1
Some vocation	181	4.6	175	4.4	157	4.3
Vocation	970	24.4	1,018	25.6	940	25.6
Some tertiary	242	6.1	359	9.0	344	9.3
Tertiary	965	24.3	1,000	25.2	980	26.6
Other	222	5.6	200	5.0	183	5.0
Missing	42	1.1	62	1.6	60	1.6
Total	3,973	100.0	3,974	100.0	3,678	100.0
Occupational group [(a)]						
Manager/administrator	325	8.2	376	9.5	369	10.0
Professional	548	13.8	559	14.1	551	15.0
Paraprofessional	205	5.2	209	5.3	195	5.3
Tradesperson	245	6.2	298	7.5	290	7.9
Clerk	387	9.7	355	8.9	350	9.5
Sales/Personal services	271	6.8	328	8.3	311	8.4
Plant/machine op; Driver	90	2.3	125	3.2	117	3.2
Labourers/related	163	4.1	170	4.3	162	4.4
Missing	1,739	43.8	1,552	39.1	1,333	36.2
Total	3,973	100.0	3,974	100.0	3,678	100.0
Occupational prestige [(b)]						
Low	403	10.1	492	12.4	468	12.7
Low-moderate	407	10.2	472	11.9	446	12.1
Moderate	470	11.8	470	11.8	458	12.5
Moderate-high	565	14.2	580	14.6	568	15.4
High	453	11.4	518	13.0	511	13.9
Missing	1,675	42.2	1,442	36.3	1,228	33.4
Total	3,973	100.0	3,974	100.0	3,678	100.0
Concession entitlement						
Card holder	1,014	25.5	810	20.4	673	18.3
No card	2,952	74.3	3,159	79.5	3,001	81.6
Missing	7	0.2	4	0.1	4	0.1
Total	3,973	100.0	3,974	100.0	3,678	100.0
Area disadvantage [(c)]						
Quintile 1- most disadvantage	774	19.5	747	18.8	679	18.5
Quintile 2	775	19.5	623	15.7	549	14.9
Quintile 3	776	19.5	834	21.0	766	20.8
Quintile 4	782	19.7	773	19.5	731	19.9
Quintile 5	759	19.1	946	23.8	905	24.6
Missing	107	2.7	50	1.3	49	1.3
Total	3,973	100.0	3,974	100.0	3,678	100.0

(a) Australian Standard Classification of Occupation (ASCO) Major Groups
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage - Australian Bureau of Statistics' Socio-Economic Indexes for Areas

3.3.3 Sample description

Demographic characteristics by age

The distribution by age group of key demographic characteristics was examined and results are presented in Table 3.9. Males and females were similarly distributed within in each of the six age groups, although there were more females (55.2%) than males (44.8%) in the 70+ age group.

The proportion of Overseas-born respondents varied between age groups ranging from 11.6% in the 18-29 years group to almost one third (32.4%) of those aged 60-69 years. Although fewer Overseas-born people comprised the youngest age group, the highest proportion of people who spoke a LOTE at home was in the 18-29 years age group (15.0%). Persons born in Australia were younger (mean age 41.4 years) than Overseas-born adults (46.8 years) but persons who spoke English at home were older (42.9 years) than adults who spoke a LOTE at home (39.8 years).

Considerable differences in employment status were observed across age groups. In all, 42.1% of respondents worked full time, varying between age groups from 2.5% of the oldest age group to 64.0% of those aged 40-49 years. One third of people were retired (32.3%), and as expected these persons were largely from the 60-69 years (64.8%) and the 70+ years (87.1%) age group. Those who described their employment status as 'not employment' comprised 14.5% of the sample.

One third (33.0%) of adults aged 70+ years were a sole occupier of a household, and yet sole occupiers comprised only 14.2% of the overall sample. People aged 30-39 (9.4%) and 40-49 (6.9%) years were least likely to report being a sole occupant (aged 5+ years). In fact, of those aged 40-49 years, a high percentage (54.7%) lived in households with 3-4 persons, and a further 18.2% lived in households with more than four occupants aged five years or more. By contrast, less than one percent (0.5%) of people aged 60 or over lived in households of more than four persons.

The proportion of persons living outside of capital cities tended to increase across successive age groups ranging from 30.0% of the 18-29 years olds to 37.1% of the 60-69-year-olds. This trend was similarly reflected in ARIA categories where the proportion living in areas classified as 'highly accessible' by road to services tended to decrease across age groups. The vast majority of survey respondents lived in areas classified as 'highly accessible' (83.0%) and a further 11.7% lived in 'accessible' areas. Together, only 5.3% of the sample lived in areas classified as 'moderately accessible', 'remote', or 'very remote'.

Table 3.9: Demographic characteristics by age group (dentate persons, weighted data)

	Age group (years)						
	18-29 n=951	30-39 n=811	40-49 n=742	50-59 n=521	60-69 n=328	70+ n=324	Total n=3,678
	Column percentages						
Sex							
Male	50.7	49.8	49.6	52.0	51.5	44.8	50.0
Female	49.3	50.2	50.4	48.0	48.5	55.2	50.0
Country of birth							
Australia	88.4	80.3	74.3	76.1	67.6	75.9	77.1
Overseas	11.6	19.7	25.7	23.9	32.4	24.1	22.9
Language at home							
LOTE	85.0	92.7	88.4	91.4	92.6	90.3	9.9
English	15.0	7.3	11.6	8.6	7.4	9.7	90.1
Employment status							
Full-time	49.1	63.8	64.0	58.1	15.3	2.5	42.1
Part-time	31.7	17.5	21.3	13.4	11.6	3.0	16.4
Retired	0.0	0.3	0.7	8.8	64.8	87.1	32.3
Not employed	19.2	18.4	13.9	19.7	8.3	7.4	14.5
Householders aged 5+							
One	10.7	9.4	6.9	10.8	14.5	33.0	14.2
Two	29.7	39.8	20.2	45.2	70.2	59.1	44.0
Three or four	44.1	43.3	54.7	34.5	14.9	7.8	33.2
More than four	15.6	7.5	18.2	9.5	0.5	0.0	10.3
Geographical location							
Capital city	70.0	67.7	65.5	67.0	62.9	64.2	66.2
Non-capital	30.0	32.3	34.5	33.0	37.1	35.8	33.8
ARIA category [(a)]							
Highly accessible	85.2	81.5	82.6	83.3	81.3	83.7	83.0
Accessible	10.2	12.7	11.1	11.6	12.7	11.7	11.7
Moderately accessible	3.0	3.6	3.8	3.7	4.3	2.7	3.5
Remote	0.7	1.1	1.3	0.9	1.1	1.8	1.1
Very remote	0.9	1.0	1.2	0.5	0.5	0.1	0.7

(a) The Accessibility/Remoteness Index of Australia (ARIA)

Table 3.10: Socioeconomic indicators by age group (dentate persons, weighted data)

	Age group (years)						
	18-29 n=951	30-39 n=811	40-49 n=742	50-59 n=521	60-69 n=328	70+ n=324	Total n=3,678
	Column percentages						
Household income							
<$12,000	3.7	2.3	3.0	6.7	16.0	29.5	10.2
$12-20,000	7.1	5.9	6.3	9.7	28.8	34.9	15.5
$20-30,000	8.6	10.8	11.1	11.3	15.9	16.3	12.3
$30-40,000	16.5	14.2	12.7	9.0	14.6	8.0	12.5
$40-50,000	13.9	17.1	15.7	12.5	6.6	4.7	11.7
>$50,000	50.3	49.7	51.3	50.8	18.1	6.5	37.8
Educational attainment							
Primary	0.0	0.0	0.2	1.9	3.5	5.6	2.8
Some secondary	5.7	13.6	15.0	15.0	19.1	24.8	15.5
Secondary	14.8	14.0	9.2	13.2	15.0	15.3	13.6
Some vocation	7.5	2.9	2.6	3.4	5.1	3.9	4.2
Vocation	18.8	27.8	28.2	30.3	30.2	25.1	26.7
Some tertiary	26.5	6.8	3.3	2.8	1.4	2.2	7.1
Tertiary	23.2	30.9	35.3	28.3	20.5	14.1	25.4
Other	3.5	4.0	6.3	5.0	5.3	9.0	5.5
Occupational group [(a)]							
Manager/administrator	8.3	19.2	16.0	21.1	20.3	22.6	17.9
Professional	21.8	22.4	25.4	23.5	28.5	31.4	25.5
Paraprofessional	7.3	8.0	7.7	12.7	5.3	0.0	6.8
Tradesperson	14.7	11.6	13.0	9.2	10.8	7.0	11.1
Clerk	11.3	15.9	19.2	12.1	18.0	16.3	15.5
Sales/Personal services	21.5	12.2	7.7	10.5	7.2	16.6	12.6
Plant/machine operator; Driver	7.5	3.4	4.3	4.7	3.3	6.0	4.9
Labourers/related	7.4	7.3	6.6	6.2	6.5	0.0	5.7
Occupational prestige [(b)]							
Low	31.6	12.1	16.3	14.0	14.6	19.2	17.9
Low-moderate	16.4	21.5	18.1	16.1	17.5	18.5	18.0
Moderate	17.8	17.1	21.3	16.8	28.3	12.6	19.0
Moderate-high	15.7	29.7	23.7	25.7	20.4	18.0	22.2
High	18.6	19.6	20.6	27.4	19.2	31.6	22.9
Concession entitlement							
Card holder	18.8	10.2	9.9	11.5	42.9	42.7	22.7
Non card holder	81.2	89.8	90.1	88.5	57.1	57.3	77.3
Area disadvantage [(c)]							
Quintile 1- most disadvantage	18.8	10.2	9.9	11.5	42.9	42.7	18.3
Quintile 2	81.2	89.8	90.1	88.5	57.1	57.3	15.9
Quintile 3	18.8	10.2	9.9	11.5	42.9	42.7	20.6
Quintile 4	81.2	89.8	90.1	88.5	57.1	57.3	18.9
Quintile 5	18.8	10.2	9.9	11.5	42.9	42.7	26.3

(a) Australian Standard Classification of Occupation (ASCO) Major Groups
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage - Australian Bureau of Statistics' Socio-Economic Indexes for Areas

3.3.4 Socioeconomic characteristics by age

The distribution by age group of socioeconomic characteristics was examined and results are presented in Table 3.10.

While 37.8% of the sample reported an annual household income greater than $50,000, the sample average was reduced by the comparatively low income of adults aged 60 years and over. For all other age groups, the proportion reporting the highest income category was approximately half. Overall, the 30-39 years age group was most advantaged in terms of household income with a smaller percentage of persons reporting income in the two lowest income categories.

The educational profile of the sample differed by age group. About one quarter of the sample reported having completed vocational training (26.7%) and a further quarter had completed tertiary education (25.4%). Proportions having completed vocational training were lower in the 18-29 years age group than in other age groups. A greater proportion of the 40-49-year-olds (35.3%) had completed some tertiary study compared with other age groups. A comparatively small proportion of 18-29-year-olds (5.7%) reported 'some secondary' as their highest level of educational attainment. This proportion increased across age groups to 13.6% of 30-39 years olds, to the highest proportion in the 70+ years age group (24.8%).

While higher percentages of older adults reported lower levels of formal education, older adults who were still in the work force had greater participation in managerial and professional occupations than did younger age groups. Of those aged 70+ years who offered a job description, 54.0% were managers or professionals. Across age groups the proportion of workers who were labourers or in related work was relatively stable, although no respondents in the 70+ years age groups were classified into this occupational group. Nearly a third of adults (31.6%) aged 18-29 years had occupations classified into the lowest 20% of prestige scores, and the same percentage of 70+ year olds (31.6%) had occupations that were classified in the top 20% of prestige scores.

Large differences were observed in the proportions of persons eligible for government concession, i.e., cardholders across age groups. Proportions ranged from 9.9% of 40-49 years olds to 42.7% of those aged 70+ years.

3.4 References to Chapter 3

[1] Slade GD, Spencer AJ, Locker D, Hunt RJ, Strauss RP, Beck JD. Variations in the social impact of oral conditions among older adults in South Australia, Ontario, and North Carolina. J Dent Res. 1996 Jul;75(7):1439-50.

4. Social Inequality in Oral Health

This chapter examines the social distribution of oral health status in the dentate adult population in Australia. Addressed are the associations between socioeconomic and demographic characteristics of individuals and their self-assessed oral health.

4.1 Social inequality

Health status follows a socioeconomic gradient. People in poorer socioeconomic circumstances are less healthy than are those who occupy positions midway up the social hierarchy, who in turn are less healthy as those higher up. The objective of this chapter is to establish population estimates of self-assessed oral health measures and describe the social distribution of these measures among dentate adults in Australia. The hypothesis being tested is that there is socioeconomic inequality in population adult oral health.

4.1.1 Socioeconomic indicators

Socioeconomic position (SEP) is not directly measurable, but is operationalised indirectly through indicators such as income, education and occupation whcih are markers of wider access to material resources. In some studies, sample characteristics or a theoretical judgment guides the selection of an indicator. For example, Marmot and colleagues used education as the socioeconomic indicator in the National Survey of Midlife Development in the United States,[1] arguing that education precedes illness in midlife. For workplace studies such as the Whitehall Studies of British Civil Servants,[2] indicators based on occupational hierarchy are more appropriate. In Australia, Turrell has discussed problems associated with income non-reporting,[3] and Locker and Ford have raised similar issues as a rationale for greater application of small-area based measures in oral health research.[4]

Because this study is population-based rather than defined by an age range or social domain, a selection of indicators has been used. These are household income, educational attainment, occupational group and prestige, concession status, and area disadvantage. Although they are likely to have independent associations with oral health, the individual indicators of SEP are clearly related. For example, education increases opportunities for income and job security.

Table 4.1 shows correlation coefficients (Spearman's rho) for socioeconomic indicators. Coefficients range from 0.20 between area disadvantage and occupational prestige to 0.37 between occupational prestige and educational attainment. As expected, a strong correlation existed between occupational group and occupational prestige (0.80) and an association in the weak-moderate range was found between concession status and household income (0.50).

Table 4.1: Spearman's correlation matrix for socioeconomic indicators

		Household income	Educational attainment	Occupation group	Occupation prestige	Concession status	SIEFA IRSE values
Household income	Coefficient	1.000	0.332 **	-0.218 **	-0.279 **	0.464 **	0.226 **
	Sig.	.	<0.001	<0.001	<0.001	<0.001	<0.001
	N	3,422	3,378	2228	2317	3418	3371
Educational attainment	Coefficient		1.000	-0.291 **	-0.331 **	0.187 **	0.225 **
	Sig.		.	<0.001	<0.001	<0.001	<0.001
	N		3,610	2306	2412	3606	3559
Occupational group	Coefficient			1.000	0.798 **	-0.144 **	-0.199 **
	Sig.			.	<0.001	<0.001	<0.001
	N			2,330	2330	2328	2289
Occupational prestige	Coefficient				1.000	-0.182 **	-0.180 **
	Sig.				.	<0.001	<0.001
	N				2,438	2436	2395
Concession status	Coefficient					1.000	0.192 **
	Sig.					.	<0.001
	N					3,665	3613
SEIFA IRSE values	Coefficient						1.000
	Sig.						.
	N						3,617

** Correlation is significant at the 0.01 level (2-tailed).

Apart from the high correlation between occupational group and prestige scores (rho=0.798), coefficients were generally low to moderate, implying that different indicators may be measuring different constructs within socioeconomic position.

A correlation matrix was also constructed to observe the strength of linear relationship between the outcome variables (Table 4.2). The ordinal variable self-rated oral health was treated as a continuous variable coded 0 (very poor) to 6 (excellent). Associations were in the weak to moderate range, with the strongest associations between estimated social impact and self-rated oral health (r=-0.42). The weakest association was between filled and decayed teeth (r=0.10).

Table 4.2: Pearson's correlation matrix for oral health outcomes (dentate persons, weighted data)

		Decayed	Missing	Filled	Social impact	Oral symptoms	Self-rated oral health
Decayed teeth	Coefficient	1.000	0.133**	0.095**	0.356**	0.152**	-0.310**
	Sig.	.	<0.001	<0.001	<0.001	<0.001	<0.001
	N	2,993	2974	2949	2954	2992	2989
Missing teeth	Coefficient		1.000	-0.104**	0.172**	-0.048**	-0.261**
	Sig.		.	<0.001	<0.001	0.005	<0.001
	N		3,558	3446	3512	3557	3553
Filled teeth	Coefficient			1.000	0.069**	0.109**	-0.127**
	Sig.			.	<0.001	<0.001	<0.001
	N			3,472	3426	3470	3468
Social impact	Coefficient				1.000	0.262**	-0.423**
	Sig.				.	<0.001	<0.001
	N				3,623	3622	3618
Oral symptoms	Coefficient					1.000	-0.224**
	Sig.					.	<0.001
	N					3,677	3672
Self-rated oral health	Coefficient						1.000
	Sig.						.
	N						3,673

** Correlation is significant at the 0.01 level (2-tailed).

4.1.2 Demographic characteristics

A number of demographic characteristics were included to enable an exploration of social variation in the distribution of oral health. These were sex, age, country of birth, language spoken at home, employment status, household size and urbanicity of residence.

- Ethnicity

In the 20 years to 1996, Australia's overseas-born population increased from 2.8 million to 4.2 million, to comprise 23% of the country's total population.[5] In 1996, 15% of Australia's population spoke a language other than English (LOTE) at home and of these, 74% were people born overseas and the remainder were second-generation Australians.[6]

Employment status

Employment status influences income-earning potential, social interaction, self-esteem, and available family and leisure time. This study categorised employment status as employed full-time, employed part-time, retired, and non-employed.

- **Household composition**

Mather's 1994 findings of health differentials among Australian adults showed that marital status and family composition were associated with significant health differentials. This study uses one indicator of household composition – the number of persons usually resident in the household aged five years and over.

- **Geographic location**

Australia has a highly urbanised population, with 60.5% of the population residing in capital cities in 1996. This study compared capital city dwellers with those living in the rest of Australia. In this chapter, it also examined location based on accessibility. ARIA (Accessibility/Remoteness Index of Australia) is a continuous variable scaled from 0 (high accessibility) to 12 (high remoteness), based on road distances from the 11,338 populated towns to 201 service centres across Australia. Index scores were categorised by GISCA* as highly accessible, accessible, moderately accessible, remote, and very remote.

4.1.3 Self-assessed oral health

Information was collected on four self-reported measures of oral health. The first substituted for a clinical measure of caries experience. Adults self-assessed numbers of remaining, decayed, missing and filled teeth. These estimates formed components of a quasi-decayed (D) missing (M) and filled (F) tooth (T) index. The use of DMFT scores for describing variation in population oral health has limitations, and in particular the interpretation of filled teeth as an oral health indicator is problematic given that a filling is preceded by disease and yet restores health and function. Because of the complexity in interpreting restored teeth as measure of disease or wellness, filled teeth was examined in this chapter, but not selected as a dependent variable in this study. Only teeth self-assessed as missing because of the consequence of disease were included in computing the missing teeth variable. Thus, teeth judged to be missing as a result of agenesis, non-eruption, orthodontic extraction or trauma were not included.

Caries experience is a historic cumulative measure of disease and treatment that frequently has little bearing on current appraisals of oral wellness. In order to capture non-clinical aspects of oral health, the short-form Oral Health Impact Profile (OHIP-14) was included. The full 49-item scale was developed in Australia by Slade and Spencer [7] to measure the adverse impact of dental conditions on oral health-related quality of life, and the abbreviated 14-item scale used in this research was developed later.[8]

* The ARIA Index was developed in 1998 at the National Key Centre for Social Applications of Geographical Information Systems (GISCA), at the University of Adelaide. ARIA quantifies remoteness on the basis of geographical accessibility only, excluding social position, urban/rural and population size factors.

The third outcome measure, taken from the 1999 National Dental Telephone Interview Survey (NDTIS), examined variation in recent experience of four common complaints. Symptoms such as these represent the most immediate experiential outcomes of oral conditions. Interviewees were asked whether over the previous 12 months they had experienced each of: a broken or chipped natural tooth; gums that hurt or bleed; sores on the tongue or inside of the mouth; and a bad taste or breath. Responses categories were 'Yes' or 'No'.

The fourth outcome measure, also drawn from the 1999 NDTIS, was a single self-rated oral health item, 'In general, would you say your dental health is excellent, very good, good, average, poor, or very poor?' Responses were coded on a six-point scale from 0=very poor to 5=excellent. Similar global items have been included in other oral health studies such as the second International Collaborative Study of Oral Health Outcomes. The measure has been found to accurately predict missing teeth over time [9] as well as change in perceived oral health over three years. [10]

4.2 Quasi-DMF teeth components

Table 4.3 presents estimates of central tendency and dispersion for each estimate. Except for teeth remaining, the observed distribution of the counts was positively skewed, especially for decayed and missing (pathological) teeth. The mean number of decayed teeth was 0.81, skewed from the median value (0.00) by several high estimates. Median and modal values for estimates were identical. The sum of missing and remaining mean teeth slightly under-estimated 32 teeth, explained by the number of teeth estimated as missing for reasons other than pathology, such as orthodontic extraction, agenesis/non-eruption or missing because of trauma (not shown).

Table 4.3: Summary statistics of quasi-DMF components (dentate persons, weighted data)

		Remaining	Decayed	Missing (path)	Filled
N		3,560	2,993	3,558	3,472
Missing		119	685	120	207
Mean		26.11	0.81	3.40	7.93
Median		28.00	0.00	0.00	7.00
Mode		28.00	0.00	0.00	0.00
Std. deviation		5.98	1.51	6.05	6.18
Skewness		-1.83	2.37	2.27	0.85
Std. error of skewness		0.04	0.04	0.04	0.04
Kurtosis		3.21	6.11	4.65	0.38
Std. error of kurtosis		0.08	0.09	0.08	0.08
Minimum		0.00	0.00	0.00	0.00
Maximum		32.00	9.00	31.00	32.00
Percentiles	20	24.00	0.00	0.00	2.00
	40	27.00	0.00	0.00	5.00
	60	28.00	0.00	1.00	8.00
	80	30.00	2.00	6.00	13.00

The distribution of estimates is further described in Table 4.4. Just over 10% of the dentate sample reported fewer than 20 remaining teeth, and more than half (56.4%) reported 28 or more teeth, equivalent to a full permanent dentition. More than half (52.2%) reported no decayed teeth and 88.1% reported two or fewer decayed teeth. Just over a fifth (20.5%) reported more than five teeth missing as a consequence of disease. The maximum number of filled teeth reported was 32, although 90% of survey respondents estimated 16 or fewer filled teeth. More responses were missing for estimates of decayed teeth (685) than for the other estimates.

Table 4.4: Distribution in components of quasi-DMFT (dentate persons, weighted data)

	Remaining			Decayed			Missing			Filled		
	N	Valid %	Cum %	N	Valid %	Cum %	N	Valid %	Cum %	N	Valid %	Cum %
0	0	0.1	0.1	2,023	67.6	67.6	1,857	52.2	52.2	332	9.6	9.6
1	2	0.0	0.1	337	11.2	78.8	316	8.9	61.1	207	6.0	15.5
2	3	0.1	0.2	277	9.3	88.1	285	8.0	69.1	184	5.3	20.8
3	3	0.1	0.2	149	5.0	93.1	132	3.7	72.8	237	6.8	27.7
4	3	0.1	0.3	101	3.4	96.4	148	4.2	77.0	266	7.7	35.3
5	12	0.3	0.7	33	1.1	97.6	91	2.5	79.5	228	6.6	41.9
6	33	0.9	1.6	41	1.4	98.9	98	2.8	82.3	215	6.2	48.1
7	26	0.7	2.3	6	0.2	99.1	80	2.3	84.5	176	5.1	53.2
8	30	0.8	3.2	23	0.8	99.9	59	1.6	86.2	253	7.3	60.5
9	33	0.9	4.1	3	0.1	100.0	55	1.5	87.7	177	5.1	65.6
10	36	1.0	5.1				46	1.3	89.0	147	4.2	69.8
11	21	0.6	5.7				47	1.3	90.3	137	4.0	73.8
12	19	0.5	6.2				32	0.9	91.2	161	4.6	78.4
13	17	0.5	6.7				22	0.6	91.8	92	2.7	81.0
14	28	0.8	7.5				19	0.5	92.4	124	3.6	84.6
15	18	0.5	8.0				22	0.6	93.0	86	2.5	87.1
16	25	0.7	8.7				26	0.7	93.7	116	3.3	90.4
17	20	0.6	9.3				14	0.4	94.1	67	1.9	92.4
18	25	0.7	10.0				20	0.6	94.7	56	1.6	94.0
19	34	1.0	10.9				11	0.3	95.0	29	0.8	94.8
20	49	1.4	12.3				19	0.5	95.6	33	1.0	95.8
21	55	1.6	13.9				21	0.6	96.1	25	0.7	96.5
22	85	2.4	16.2				24	0.7	96.8	27	0.8	97.3
23	90	2.5	18.8				22	0.6	97.4	14	0.4	97.7
24	208	5.8	24.6				24	0.7	98.1	23	0.7	98.4
25	165	4.6	29.2				21	0.6	98.7	14	0.4	98.8
26	252	7.1	36.3				29	0.8	99.5	18	0.5	99.3
27	259	7.3	43.6				11	0.3	99.8	2	0.1	99.4
28	791	22.2	65.8				1	0.0	99.9	15	0.4	99.8
29	195	5.5	71.3				1	0.0	99.9	2	0.1	99.9
30	315	8.9	80.2				3	0.1	100.0	2	0.1	99.9
31	211	5.9	86.1				0	0.0	100.0	1	0.0	100.0
32	495	13.9	100.0							1	0.0	100.0
Valid	**3,560**	**100.0**		**2,993**	**100.0**		**3,558**	**100.0**		**3,472**	**100.0**	
Missing	**119**			**685**			**120**			**207**		
Total	**3,678**			**3,678**			**3,678**			**3,678**		

4.2.1 Validity of Quasi-DMF teeth components

To assess the validity of self-reported estimates, a subset of 275 dentate respondents resident in South Australia participated in a dental inspection conducted by four trained dental examiners. The number of teeth observed by dental examiners with the measured condition was subtracted from the self-assessed estimate. Results of agreement between the estimate and the examiner's assessment are presented in Table 4.5. In Table 4.5, the column labelled '0 (same)' indicates agreement, ie no difference between the two measures. The columns labelled '0±1 tooth' and '0±2 teeth' indicate differences obtained between the methods in the ranges of one and two teeth respectively.

Greater agreement was achieved for counts in the maxilla than the mandible. Over 70% of respondents accurately recorded their number of remaining teeth in each arch, and agreement within the range of two teeth increased to 93.9% and 94.3% for the maxilla and mandible respectively. However, validity across both arches within the range of two teeth reduced to 90.5%. Overall, validity within the range of two teeth was highest for estimates of remaining teeth, followed by estimates of decayed (85.0%), filled (76.8%) and missing teeth (74.7%).

Table 4.5: Percentage agreement for counts in each arch (dentate persons, unweighted data)

	0 (same)		0 ± 1 tooth		0 ± 2 teeth	
	N	Valid %	N	Valid %	N	Valid %
Maxilla						
Remaining	195	74.4	221	84.4	246	93.9
Decayed	143	67.5	184	86.8	202	95.3
Missing (path)	145	54.9	196	74.2	225	85.2
Filled	187	72.8	217	84.4	229	89.1
Mandible						
Remaining	188	71.8	231	88.2	247	94.3
Decayed	137	65.9	182	87.5	197	94.7
Missing (path)	125	47.9	182	69.7	221	84.7
Filled	107	42.1	170	66.9	216	85.0
Both arches						
Remaining	150	57.3	209	79.8	237	90.5
Decayed	103	50.0	154	74.8	175	85.0
Missing (path)	104	39.8	153	58.6	195	74.7
Filled	84	33.1	148	58.3	195	76.8

Table 4.6 presents a comparison of mean (sd) scores between self-assessed estimates and dental inspection counts. Respondents slightly over-estimated remaining teeth in each arch and under-estimated teeth missing as a consequence of disease. Across both arches, the self-assessed mean decayed teeth count of 0.86 was higher than the actual mean (0.62). Self-assessed estimates of filled teeth were slightly under-estimated in the maxilla (5.44 compared with 5.61) and more accurately reported in the mandible (4.24 compared with 4.21).

Table 4.6: Comparison of the two methods (dentate persons, unweighted data)

	Self-assessed				Dental inspection			
	N	Missing	Mean	SD	N	Missing	Mean	SD
Maxilla								
Remaining	262	13	11.76	4.05	275	0	11.62	4.17
Decayed (path)	212	63	0.40	0.83	275	0	0.40	0.96
Missing	264	11	3.16	4.20	275	0	3.66	4.59
Filled	257	18	5.44	3.88	275	0	5.61	4.16
Mandible								
Remaining	262	13	12.80	2.95	275	0	12.53	2.77
Decayed	208	67	0.46	1.00	275	0	0.46	0.97
Missing (path)	261	14	2.28	3.47	275	0	2.89	3.09
Filled	254	21	4.24	2.78	275	0	4.21	2.66
Both arches								
Remaining	262	13	24.56	6.29	275	0	24.15	6.40
Decayed	206	69	0.86	1.57	275	0	0.62	1.26
Missing (path)	261	14	5.43	7.00	275	0	6.55	7.21
Filled	254	21	9.68	5.71	275	0	9.84	6.16

Previous research has shown that survey respondents estimate remaining teeth with high accuracy, and this research sought to extend the usefulness of self-counts. Results indicated that the validity of these estimates were acceptable for the purpose of comparison of population subgroups on a range of social determinants for these measures.

4.2.2 Quasi-DMF components and socioeconomic indicators

Table 4.7 presents mean (sd) values and counts for remaining teeth and Quasi-DMF teeth components by socioeconomic indicators. Differences in estimates were statistically significant irrespective of the measure of SEP used, and an inverse relationship between SEP and caries experience was observed. Only three tests failed to reach significance – filled teeth by educational attainment, remaining teeth by occupational group, and missing teeth by occupational prestige. Differences in magnitude were greatest using household income as the socioeconomic indicator. Compared with those with least income, adults with highest income had approximately six more remaining teeth, 0.65 fewer decayed teeth, and 1.24 more filled teeth.

Adults with tertiary education had fewer missing teeth and fewer decayed teeth than those with less formal education. Among occupational groups, plant or machine operators and drivers had highest mean decayed teeth (1.46), followed by labourers and related workers (1.06). All other groups had fewer than one decayed tooth, with paraprofessionals reporting least decay (0.57) followed by professionals (0.59). Findings were supported using occupation prestige scores to examine mean differences in decayed teeth. A 1.6-fold difference across quintiles was observed, with decayed teeth estimates ranging from 0.99 for those in the top 20% of occupational prestige, to 0.63 for those in the lowest quintile of prestige scores. Labourers and related workers reported 3.41 missing teeth, while the mean number of missing teeth among professionals was 1.71. Differences in caries experience and treatment patterns were apparent based on concession-card status.

A 1.6-fold difference in decayed teeth was observed, with cardholders reporting 1.16 affected teeth compared with others reporting 0.74. Persons who were eligible for a government concession reported significantly more missing teeth and fewer restored teeth than adults who were not eligible.

A gradient in oral health status was observed across quintiles of area disadvantage. Adults in quintile 5 (least disadvantage) reported more remaining teeth, fewer decayed teeth, more missing teeth, and more filled teeth than adults in quintiles 1-4. Conversely, adults in quintile 1 reported poorest outcomes for each of these four measures than adults in quintiles 2-5.

Unlike decayed and missing teeth, mean numbers of filled teeth were positively related to socioeconomic position, reflecting a more conservative approach to disease treatment in socially advantaged groups.

Table 4.7: Quasi-DMF components by socioeconomic indicators (dentate persons, weighted data)

	Remaining			Decayed			Missing (path)			Filled		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Household income												
<$12,000	216	21.84	7.91	161	1.22	1.86	222	8.28	8.48	207	6.96	5.79
$12-20,000	373	22.17	8.09	292	1.17	1.64	372	7.71	8.49	357	7.24	6.17
$20-30,000	369	24.15	6.98	296	0.84	1.60	367	5.04	6.75	356	8.02	6.08
$30-40,000	448	26.63	5.14	378	1.02	1.86	449	2.92	5.33	428	7.72	6.01
$40-50,000	454	27.17	4.55	372	0.95	1.63	452	2.14	4.52	445	8.49	6.02
>$50,000	1,463	27.72	4.19	1,308	0.57	1.18	1,461	1.65	3.79	1,448	8.20	6.34
Total	3,323	26.09	5.96	2,808	0.81	1.50	3,323	3.39	6.03	3,240	7.97	6.18
Test of significance	F =100.462, p<0.001			F=14.606; p<0.001			F=119.781; p<0.001			F=3.275; p=0.006		
Educational attainment												
Secondary or less	977	24.63	6.96	765	1.00	1.74	980	5.20	7.22	945	7.98	6.12
Vocation or other	1,230	25.55	6.14	1,016	0.89	1.59	1,225	3.78	6.28	1,200	8.29	6.01
Tertiary	1,294	27.69	4.54	1,168	0.62	1.23	1,294	1.77	4.19	1,269	7.74	6.41
Total	3,502	26.08	6.00	2,948	0.81	1.51	3,500	3.43	6.07	3,414	8.00	6.19
Test of significance	F=83.570; p<0.001			F=16.637; p<0.001			F=97.327; p<0.001			F=2.422; p=0.089		
Occupational group [(a)]												
Manager/administrator	363	27.32	4.52	301	0.73	1.32	361	2.27	4.40	356	9.36	6.17
Professional	546	27.48	4.60	495	0.59	1.21	545	1.71	4.19	537	8.37	6.46
Paraprofessional	187	27.59	4.36	153	0.57	1.26	186	1.98	4.03	184	9.20	6.40
Tradesperson	276	27.19	4.44	242	0.93	1.84	277	2.32	4.00	261	7.24	5.36
Clerk	339	26.83	4.03	288	0.66	1.33	339	1.92	4.07	336	8.72	6.47
Sales/Personal services	305	27.58	4.84	262	1.01	1.49	303	2.19	4.77	301	6.76	5.89
Plant/machine op; Driver	116	27.86	5.03	101	1.46	2.08	116	2.50	4.99	114	6.46	6.16
Labourers/related	160	26.53	6.45	128	1.06	1.41	157	3.41	6.20	153	7.68	5.73
Total	2,291	27.30	4.69	1,968	0.80	1.46	2,284	2.14	4.47	2,243	8.15	6.21
Test of significance	F=1.728; p=0.098			F=7.267; p<0.001			F=2.916; p=0.005			F=7.599; p<0.001		
Occupational prestige [(b)]												
Low	450	27.51	5.42	374	0.99	1.59	450	2.39	5.18	441	6.05	5.58
Low-moderate	429	26.92	4.92	381	0.93	1.55	424	2.29	4.57	412	7.92	6.26
Moderate	445	27.36	4.12	371	0.71	1.34	446	2.18	3.94	435	8.63	6.02
Moderate-high	559	26.87	4.82	475	0.70	1.50	557	2.08	4.38	551	8.95	6.54
High	507	27.85	4.23	459	0.63	1.19	507	1.78	4.19	499	8.11	6.10
Total	2,391	27.30	4.73	2,060	0.78	1.44	2,384	2.13	4.46	2,339	7.98	6.20
Test of significance	F=3.806; p=0.004			F=4.834; p=0.001			F=1.341; p=0.252			F=15.679; p<0.001		
Concession status												
Card holder	637	23.06	7.66	497	1.16	1.70	636	6.53	8.09	610	6.65	5.77
No card	2,919	26.77	5.32	2,493	0.74	1.46	2,918	2.73	5.28	2,858	8.20	6.23
Total	3,556	26.11	5.98	2,990	0.81	1.51	3,554	3.41	6.06	3,468	7.93	6.18
Test of significance	F=213.161; p<0.001			F=33.045; p<0.001			F=218.868; p<0.001			F=31.904; p<0.001		
Area disadvantage [(c)]												
Quintile 1 (highest)	651	25.62	6.35	541	1.08	1.76	653	3.91	6.38	633	7.22	5.87
Quintile 2	534	25.75	6.38	455	0.98	1.60	533	3.89	6.41	522	8.29	6.13
Quintile 3	745	25.84	5.98	612	0.85	1.53	746	3.69	6.09	733	7.43	6.08
Quintile 4	706	26.16	5.78	601	0.68	1.48	707	3.04	5.87	677	7.54	6.19
Quintile 5	875	26.90	5.49	745	0.57	1.18	871	2.74	5.54	861	8.96	6.41
Total	3,511	26.12	5.97	2,953	0.81	1.51	3,510	3.40	6.04	3,426	7.93	6.19
Test of significance	F=5.887; p<0.001			F=12.138; p<0.001			F=5.716; p<0.001			F=10.468; p<0.001		

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First Edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage – Australian Bureau of Statistics' Socio-Economic Indexes for Areas

4.2.3 Quasi-DMF components and demographic characteristics

Table 4.8 describes the distribution of Quasi-DMF teeth by other demographic characteristics. Males reported significantly more remaining teeth (26.4 cf 25.8) and fewer filled teeth (7.2, cf 8.7) than females, but differences in decayed and missing teeth were not significant.

As expected, strong relationships were found between tooth counts and age group. The difference in magnitude was most apparent for missing teeth, where those aged under 30 years reported 0.24 mean missing teeth compared with 11.38 missing teeth among those aged 70+ years. Reflecting changes in disease treatment as well as cumulative loss, adults aged 70+ reported twice as many missing teeth as those aged 50-59 years (11.38 compared with 5.40). Those aged 30-39 years reported less than half the missing teeth of the 40-49 years age group (1.17 compared with 2.75). Absolute numbers of mean decayed teeth peaked in middle age for the 50-59 year age group (0.94), although differences across age groups failed to reach statistical significance. This age group also reported highest mean filled teeth.

Adults who spoke a LOTE at home had significantly fewer missing and filled teeth, and they reported more decayed teeth than those who spoke English in the home.

Among employment status groups, those not employed fared worst in terms of decayed teeth. Except for retirees, they also reported more missing teeth than did those in the workforce.

Differences based on ARIA categories were significant for each count. Adults with unrestricted accessibility to services reported highest mean number of remaining teeth (26.26) while those in the Accessible category, with some restriction to accessibility of services, reported fewest remaining teeth (25.16). According to the definition of Moderately accessible[11] people in these areas face significantly restricted accessibility to goods, services and opportunities for social interaction. Mean decayed teeth was highest in this category (1.21) and reduced with increasing accessibility to 1.03 and 0.76 decayed teeth for highly accessible areas. Adults in Accessible areas reported highest mean number of missing teeth (4.25) and those in Moderately accessible areas reported highest mean filled teeth (7.27).

Table 4.8: Quasi-DMF components by demographic characteristics (dentate persons, weighted data)

	Remaining			Decayed			Missing			Filled		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Sex												
Male	1,80	26.38	6.15	1,16	0.84	1.56	1,782	3.45	6.01	1,735	7.21	5.82
Female	1,79	25.84	5.80	1,77	0.77	1.45	1,776	3.36	6.10	1,737	8.65	6.45
Total	3,60	26.11	5.98	2,93	0.81	1.51	3,558	3.40	6.05	3,472	7.93	6.18
Test of significance	F=7.465; p=0.006			F=1.557; p=0.212			F=0.212; p=0.645			F=48.122; p<0.001		
Age group												
18-29 years	929	29.16	2.41	831	0.74	1.36	927	0.24	0.90	906	3.51	3.28
30-39 years	799	27.89	3.89	679	0.88	1.51	796	1.17	2.48	781	7.71	5.11
40-49 years	715	26.58	4.69	627	0.71	1.37	715	2.75	4.75	703	10.81	6.26
50-59 years	499	24.60	6.45	407	0.94	1.64	502	5.40	6.85	492	11.11	6.48
60-69 years	318	20.76	7.78	245	0.81	1.67	320	9.02	8.10	311	9.72	7.02
70+ years	299	18.96	7.65	205	0.85	1.89	298	11.38	8.14	278	8.04	5.90
Total	3,560	26.11	5.98	2,993	0.81	1.51	3,558	3.40	6.05	3,472	7.93	6.18
Test of significance	F=288.946; p<0.001			F=1.914; p=0.089			F=369.027; p<0.001			F=198.705; p<0.001		
Country of birth												
Australia	2,796	26.16	6.01	2,360	0.79	1.48	2,792	3.35	6.07	2,722	7.81	6.24
Overseas	727	25.92	5.94	607	0.85	1.62	730	3.59	6.07	712	8.49	5.99
Total	3,523	26.11	5.99	2,967	0.80	1.51	3,521	3.40	6.07	3,435	7.95	6.19
Test of significance	F=0.929; p=0.335			F=0.687; p=0.407			F=0.879; p=0.349			F=6.918; p=0.009		
Language at home												
LOTE	373	27.04	5.10	298	1.10	1.85	373	2.69	4.96	361	7.24	5.61
English	3,187	26.00	6.07	2,695	0.77	1.46	3,185	3.49	6.17	3,110	8.01	6.24
Total	3,560	26.11	5.98	2,993	0.81	1.51	3,558	3.40	6.05	3,472	7.93	6.18
Test of significance	F=9.973; p=0.002			F=12.450; p<0.001			F=5.841; p=0.016			F=5.056; p=0.025		
Employment status												
Full-time	1,662	27.38	4.74	1,442	0.76	1.46	1,660	2.16	4.48	1,636	8.06	5.94
Part-time	648	27.26	4.55	566	0.77	1.35	646	1.96	4.38	639	7.44	6.55
Retired	480	19.69	7.96	356	0.92	1.87	484	10.36	8.38	460	8.55	6.31
Not employed	531	26.20	5.52	439	1.01	1.61	527	3.05	5.59	514	8.00	6.36
Total	3,322	26.06	6.03	2,804	0.82	1.52	3,318	3.46	6.10	3,248	8.00	6.19
Test of significance	F=265.356; p<0.001			F=3.951; p=0.008			F=314.740;p<0.001			F=2.985; p=0.030		
Householders aged 5+												
One person	419	24.42	7.36	328	0.65	1.39	420	5.08	7.38	388	7.79	5.99
Two persons	1,351	24.88	6.82	1,131	0.80	1.52	1,354	4.79	7.12	1,326	8.15	6.23
Three-four persons	1,401	27.35	4.42	1,184	0.85	1.54	1,400	2.09	4.21	1,370	7.79	6.11
More than four persons	384	27.80	4.51	349	0.83	1.44	380	1.42	3.99	383	7.79	6.45
Total	3,555	26.11	5.98	2,991	0.81	1.51	3,554	3.40	6.05	3,467	7.92	6.18
Test of significance	F=63.660; p<0.001			F=1.630; p=0.180			F=74.337; p<0.001			F=0.912; p=0.434		
ARIA [(a)] category												
Highly accessible	2,946	26.26	5.89	2,482	0.76	1.49	2,946	3.25	5.92	2,878	7.90	6.22
Accessible	412	25.16	6.35	352	1.03	1.60	410	4.25	6.58	404	7.60	5.60
Mod accessible	123	25.73	6.57	95	1.21	1.71	123	4.03	6.90	115	9.90	7.27
Remote	37	25.48	6.29	27	0.77	1.32	37	4.31	6.86	34	8.32	5.28
Very remote	30	26.00	5.58	27	0.44	1.04	30	2.85	5.66	29	7.01	5.60
Total	3,548	26.11	5.98	2,983	0.81	1.51	3,546	3.40	6.05	3,460	7.93	6.19
Test of significance	F=3.308; p=0.010			F=4.429; p=0.001			F=3.059; p=0.016			F=3.414; p=0.009		

(a) The Accessibility/Remoteness Index of Australia (ARIA)

4.3 Oral health-related quality of life (social impact)

The Oral Health Impact Profile (OHIP) measures the perceived impact of problems relating to the teeth, mouth or dentures on quality of life over a reference period of the preceding 12 months. The impact of these problems is evaluated across seven dimensions of wellbeing (physical pain, psychological discomfort, physical disability, psychological disability, social disability, handicap). Responses are made on a five-point ordinal scale coded 0=Never, 1=Hardly ever, 2=Occasionally, 3=Fairly often, 4=Very often. A single summary statistic for the scale was computed as the sum of the items over the number of items answered (this accounts for missing data). Omitted from analysis were cases with more than one missing response.

Summary statistics are presented in Table 4.9. Mean scores were highly (positively) skewed, indicating that oral health conditions severely affected quality of life for a minority of dentate Australians. The overall mean scale score was 0.53, with the most frequently reported (modal) score being zero, and no respondent reported the maximum possible score of 4.0. However, with a percent floor statistic of 11.9%, the majority of respondents reported that oral health conditions had resulted in an adverse impact on some aspect of their life over the preceding 12 months.

Table 4.9: Descriptive univariate statistics for OHIP-14 (dentate persons, weighted data)

Oral health-related quality of life (OHIP-14)			
		Skewness	1.70
N	3,623	SE skewness	0.04
Missing	55	Kurtosis	3.59
N of items	14	SE kurtosis	0.08
Mean	0.53	Percent floor	11.93
Median	0.36	Percent ceiling	0.00
Mode	0.00	Minimum	0.00
Std. deviation	0.54	Maximum	3.86

Table 4.10 presents the distribution of responses for the OHIP-14 items. Items most frequently reported 'very often' were feeling self-conscious (2.7%), followed by oral discomfort (2.6%).

Applying a threshold of occasionally, fairly often, or very often, oral discomfort was experienced by 44.5% of dentate Australian adults, and more than one third (37.4) experienced pain. Nearly a quarter of respondents (24.8%) said they had felt self-conscious during the past year because of their oral conditions. For a small minority of respondents (3.4%), oral conditions were sufficiently severe that they had been unable to lead a normal life.

Table 4.10: OHIP-14 response to items (dentate persons, weighted data)

	Response category						
	Never	Hardly ever	Occasionally	Fairly often	Very often	Valid	Missing
	Row percentages						
Item							
Pronunciation difficult	75.8	13.4	6.4	1.7	0.4	97.7	2.3
Taste	71.2	18.4	6.9	1.3	0.4	98.2	1.8
Pain	27.7	32.7	30.3	6.0	1.1	97.9	2.1
Discomfort	22.1	31.2	34.4	7.5	2.6	97.8	2.2
Self-conscious	51.3	21.9	16.5	5.6	2.7	98.0	2.0
Tense	65.6	18.2	11.0	2.4	0.9	98.2	1.8
Diet unsatisfactory	70.2	18.6	7.5	1.4	0.5	98.2	1.8
Interrupt meals	65.3	21.1	10.2	1.2	0.6	98.4	1.6
Difficult to relax	66.3	21.3	9.2	1.0	0.5	98.3	1.7
Embarrassed	69.2	15.7	10.0	2.0	1.3	98.2	1.8
Irritable	74.9	15.9	6.3	0.9	0.4	98.4	1.6
Difficult usual jobs	82.7	12.0	3.2	0.3	0.2	98.4	1.6
Life less satisfying	79.2	12.4	5.5	0.9	0.5	98.5	1.5
Unable normal life	86.1	8.9	2.6	0.6	0.2	98.4	1.6

4.3.1 Social impact and socioeconomic indicators

Table 4.11 shows an inverse socioeconomic gradient in oral health-related quality of life. Across income categories, impact scores ranged from 0.49 for those with highest income to 0.63 for those with household income between $12,000 and $20,000, representing a 1.3-fold difference in magnitude. Adults with vocational education reported greater impact compared with those with secondary education only or those with tertiary education. Among occupational groups, professionals reported lowest impact scores of 0.46, followed by administrators and managers (0.48). Adults with a concession card reported higher impact than those without (0.67 and 0.50). A stepwise gradient in declining social impact scores was observed across quintiles of decreasing area disadvantage. OHIP scores ranged from 0.60 for quintile 1 to 0.47 for quintile 5.

4.3.2 Social impact and demographic factors

There was no difference in impact scores between males and females. OHIP scores peaked in the 40-49 years group at 0.60, before declining across successive age groups to 0.43 among those aged 70 years and over. Overseas-born persons experienced greater social impact (0.60 compared with 0.51), and persons speaking a LOTE at home reported still higher impact (0.72). In fact, the mean score of this group was the highest of any population sub-group examined. Reflecting the low scores of older adults, retirees reported least impact among employment groups (0.50), while highest scores were recorded for those not in the workforce (0.60). Full-time workers had better oral health-related quality of life than part-time workers. Also reflecting age-related trends, sole household occupants reported lowest impact scores (0.47), and adults resident in 3-4 person household reported highest impact (0.56). Adults living in moderately accessible areas had highest OHIP scores (0.58), and those in very remote areas reported least impact (0.36).

Table 4.11: Mean OHIP score by socioeconomic and demographic characteristics (dentate persons, weighted data)

	Social Impact (OHIP-14)		
	N	Mean	SD
Household income			
<$12,000	230	0.61	0.69
$12-20,000	383	0.63	0.66
$20-30,000	380	0.59	0.59
$30-40,000	441	0.52	0.58
$40-50,000	456	0.55	0.52
>$50,000	1,492	0.49	0.47
Total	3,382	0.54	0.55
Test of significance	F(5, 3375) =6.122; p<0.001		
Educational attainment			
Secondary or less	992	0.53	0.57
Vocation or other	1,263	0.57	0.56
Tertiary	1,308	0.51	0.50
Total	3,563	0.53	0.54
Test of significance	F(2, 3559) =4.066; p=0.017		
Occupational group [(a)]			
Manager/administrator	363	0.48	0.51
Professional	543	0.46	0.47
Paraprofessional	193	0.61	0.58
Tradesperson	280	0.61	0.58
Clerk	349	0.51	0.48
Sales/Personal services	310	0.60	0.51
Plant/machine op; Driver	116	0.52	0.48
Labourers/related	160	0.60	0.67
Total	2,315	0.53	0.52
Test of significance	F(7, 2307) =4.642; p<0.001		
Occupational prestige [(b)]			
Low	465	0.52	0.51
Low-moderate	442	0.60	0.51
Moderate	457	0.60	0.59
Moderate-high	557	0.47	0.51
High	499	0.46	0.46
Total	2,420	0.52	0.52
Test of significance	F(4, 2415) =8.500; p<0.001		
Concession status			
Card holder	657	0.67	0.67
No card	2,962	0.50	0.50
Total	3,619	0.53	0.54
Test of significance	F(1, 3617) =54.361; p<0.001		
Area disadvantage [(c)]			
Quintile 1 (highest)	665	0.60	0.58
Quintile 2	543	0.56	0.59
Quintile 3	753	0.54	0.57
Quintile 4	724	0.52	0.54
Quintile 5	889	0.47	0.46
Total	3,574	0.53	0.54
Test of significance	F(4, 3568) =6.112; p<0.001		

	Social Impact (OHIP-14)		
	N	Mean	SD
Sex			
Male	1,810	0.53	0.55
Female	1,813	0.53	0.53
Total	3,623	0.53	0.54
Test of significance	F(1, 3620) =0.122; p=0.726		
Age group			
18-29 years	943	0.49	0.50
30-39 years	806	0.54	0.56
40-49 years	722	0.60	0.55
50-59 years	513	0.55	0.56
60-69 years	323	0.54	0.56
70+ years	316	0.43	0.51
Total	3,623	0.53	0.54
Test of significance	F(5, 3616) =5.981; p<0.001		
Country of birth			
Australia	2,844	0.51	0.53
Overseas	741	0.60	0.58
Total	3,586	0.53	0.54
Test of significance	F(1, 3583) =18.980; p<0.001		
Language at home			
LOTE	373	0.72	0.65
English	3,250	0.51	0.52
Total	3,623	0.53	0.54
Test of significance	F(1, 3620) =51.536; p<0.001		
Employment status			
Full-time	1,678	0.51	0.52
Part-time	660	0.56	0.52
Retired	500	0.50	0.55
Not employed	546	0.60	0.63
Total	3,384	0.53	0.55
Test of significance	F(3, 3379) =3.977; p=0.008		
Householders aged 5+			
One person	429	0.47	0.52
Two persons	1,394	0.53	0.56
Three-four persons	1,408	0.56	0.55
More than four persons	387	0.51	0.45
Total	3,618	0.53	0.54
Test of significance	F(3, 3614) =2.851; p=0.036		
ARIA [(d)] **category**			
Highly accessible	2,999	0.53	0.54
Accessible	419	0.57	0.59
Moderately accessible	126	0.58	0.52
Remote	37	0.52	0.50
Very remote	30	0.36	0.42
Total	3,611	0.53	0.54
Test of significance	F(4, 3605) =1.502; p=0.199		

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage – Australian Bureau of Statistics' Socio-Economic Indexes for Areas
(d) The Accessibility/Remoteness Index of Australia (ARIA)

4.4 Oral symptom experience

While OHIP-14 measured the social impact of oral conditions on subjective wellbeing, oral symptom experience addresses specific oral complaints. An overall summary statistic was computed as the sum of respondents' affirmative answers to four questions, indicating a symptom recalled over the preceding 12 months. In total, 2.1% of respondents declined to answer each oral symptom question, and these were omitted from calculations that involved the composite score. Because symptoms addressed common complaints of the hard and soft oral tissues, as well as bad taste and oral malodor, it was thought instructive to examine each symptom separately before assessing the summed score for overall symptom experience.

4.4.1 Individual symptoms

Over the preceding 12 months, 30.8% of adults experienced gums that hurt or bleed. Slightly fewer (29.3%) reported awareness of bad taste or breath. A quarter of the sample (25.0%) recalled having sores on their tongue or the inside of their mouth, and almost as many (24.8%) had experienced a broken or chipped natural tooth, as shown in Table 4.12.

Table 4.12: Response to oral symptom items (dentate persons, weighted data)

	Oral symptom experience							
	Broken/chipped natural tooth		Gums that hurt or bleed		Sores inside mouth		Bad taste or breath	
	N	%	N	%	N	%	N	%
Yes	914	24.8	1,132	30.8	919	25.0	1,077	29.3
No	2,758	75.0	2,545	69.2	2,751	74.8	2,534	68.9
Missing	7	0.2	1	0.0	7	0.2	67	1.8
Total	3,678	100.0	3,678	100.0	3,678	100.0	3,678	100.0

Of the 3,6000 valid responses, 31.7% persons reported having experienced none of the symptoms over the past 12 months, and 36.3% reported one symptom. Only 1.5% of the sample reported having experienced all four symptoms (Table 4.13).

Table 4.13: Number of symptoms experienced (dentate persons, weighted data)

	Oral symptom experience					
	No symptoms	One symptom	Two symptoms	Three symptoms	Four symptoms	Missing
Frequency	1,166	1,334	720	326	54	78
Percent	31.7	36.3	19.6	8.9	1.5	2.1
Cumulative percent	31.7	68.0	87.5	96.4	97.9	100.0

4.4.2 Combined oral symptoms

Table 4.14 presents estimates of central tendency, and distribution for the oral symptoms as an additive index. The sum of symptoms had an observed range of 0 to 4, with a mean (sd) value of 1.10 (1.01) and a positive skewness value of 0.68. Almost one third (32.3%) of respondents did not recall experiencing one or more of these symptoms over the preceding 12 months.

Table 4.14: Summary statistics for the sum of oral symptoms (dentate persons, weighted data)

Oral symptom experience			
		Skewness	0.68
N	3,677	SE skewness	0.04
Missing	1	Kurtosis	-0.20
N of items	4	SE kurtosis	0.08
Mean	1.10	Percent floor	32.30
Median	1.00	Percent ceiling	1.47
Mode	1.00	Minimum	0.00
Std. deviation	1.00	Maximum	4.00

4.4.3 Oral symptom experience and sociodemographic characteristics

Table 4.15 describes the relationship between social characteristics and the mean (sd) sum of symptoms experienced. Differences between income groups were not significant, but differences based on education were significant, with adults with vocational training reporting highest symptom experience (1.19) and those with secondary education reporting least symptoms (1.00). Differences based on occupational group and prestige were significant. Plant/machine operators reported highest symptom experience (1.30). However, because professionals reported second highest mean symptoms (1.23), findings did not indicate a clear socioeconomic gradient. Similarly, adults with prestige scores in the second-lowest quintile reported highest mean symptoms (1.25), followed by adults with highest prestige scores (1.18). Differences in symptom experience based on concession-card status revealed a socioeconomic gap. Cardholders reported 1.25 mean symptoms, compared with 1.07 for those not eligible for concession. Comparison of symptom experience across quintiles of area disadvantage did not reveal a significant difference. Taken together, the evidence for a relationship between SEP and sum of oral symptoms was weak.

With respect to other social indicators, differences based on sex, country of birth, number of householders and geographical location were not significant. Age-related differences were observed. The mean number of symptoms increased with age, to peak in midlife (1.21) before decreasing steeply into older age to 0.76 for those adults aged 70 years and over. Adults who spoke a LOTE at home reported significantly more symptoms (1.27) than those who spoke English at home (1.08). Reflecting age effects, retirees reported significantly fewer symptoms (0.92) than workers and those who were not employed. Among population subgroups examined, older adults reported lowest symptoms, and adults who spoke a LOTE in the home reported the highest symptom experience.

Table 4.15: Mean (sd) sum of oral symptoms by social characteristics (dentate persons, weighted data)

	Oral symptom experience		
	N	Mean	SD
Household income			
<$12,000	237	1.05	0.95
$12-20,000	387	1.17	1.05
$20-30,000	386	1.12	0.97
$30-40,000	454	1.06	1.02
$40-50,000	459	1.14	1.04
>$50,000	1,507	1.12	0.98
Total	3,431	1.11	1.00
Test of significance	F (5, 3425)= 0.790, p= 0.557		
Educational attainment			
Secondary or less	1,015	1.00	0.97
Vocation or other	1,280	1.19	0.99
Tertiary	1,324	1.10	1.03
Total	3,618	1.10	1.00
Test of significance	F (2, 3615)= 9.409, p< 0.001		
Occupational group [(a)]			
Manager/administrator	369	1.05	0.95
Professional	551	1.23	1.05
Paraprofessional	195	1.14	0.91
Tradesperson	289	1.02	0.92
Clerk	350	1.10	1.04
Sales/Personal services	311	1.16	1.12
Plant/machine op; Driver	117	1.30	1.07
Labourer/related	162	1.14	0.94
Total	2,344	1.14	1.01
Test of significance	F (7, 2335)= 2.173, p= 0.034		
Occupational prestige [(b)]			
Low	468	1.04	1.00
Low-moderate	446	1.25	1.06
Moderate	457	1.10	1.02
Moderate-high	568	1.07	0.92
High	511	1.18	1.07
Total	2,449	1.13	1.01
Test of significance	F (4, 2444)= 3.188, p= 0.013		
Concession status			
Card holder	672	1.25	1.05
No card	3,001	1.07	0.99
Total	3,673	1.10	1.00
Test of significance	F(1, 3671)= 18.911, p< 0.001		
Area disadvantage [(c)]			
Quintile 1 (highest)	679	1.12	1.00
Quintile 2	548	1.09	1.01
Quintile 3	766	1.09	1.03
Quintile 4	731	1.12	0.97
Quintile 5	905	1.09	1.01
Total	3,628	1.10	1.00
Test of significance	F (5, 3425)= 0.790, p= 0.557		

	Oral symptom experience		
	N	Mean	SD
Sex	1,837	1.11	1.01
Male	1,839	1.09	1.00
Female	3,677	1.10	1.00
Total	1,837	1.11	1.01
Test of significance	F (1, 3674)= 0.272, p= 0.602		
Age group			
18-29 years	950	1.10	1.02
30-39 years	811	1.14	0.98
40-49 years	742	1.21	1.04
50-59 years	521	1.18	1.05
60-69 years	328	0.98	0.89
70+ years	324	0.76	0.82
Total	3677	1.10	1.00
Test of significance	F (5, 3670)= 11.331, p< 0.001		
	5, 3670	11.331	<0.001
Country of birth			
Australia	2,879	1.08	1.00
Overseas	761	1.15	1.02
Total	3,640	1.10	1.00
Test of significance	F (1, 3637)= 2.687, p= 0.101		
Language at home			
LOTE	389	1.27	1.04
English	3,288	1.08	0.99
Total	3,677	1.10	1.00
Test of significance	F (1, 3674)= 12.995, p<0.001		
Employment status			
Full-time	1,708	1.14	1.00
Part-time	668	1.14	1.06
Retired	511	0.92	0.90
Not employed	549	1.13	1.03
Total	3,437	1.10	1.00
Test of significance	F (3, 3432)= 7.179, p< 0.001		
Householders aged 5+			
One person	439	0.99	0.95
Two persons	1,410	1.09	1.02
Three-four persons	1,429	1.14	1.01
More than four persons	394	1.09	0.94
Total	3,672	1.10	1.00
Test of significance	F (3, 3668)= 2.670, p= 0.046		
ARIA [(d)] **category**			
Highly accessible	3,048	1.12	1.02
Accessible	421	0.98	0.90
Moderately accessible	128	1.04	0.91
Remote	39	0.98	1.02
Very remote	30	1.08	1.09
Total	3,665	1.10	1.00
Test of significance	F (4, 3660)= 2.156, p= 0.072		

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage – Australian Bureau of Statistics' Socio-Economic Indexes for Areas
(d) The Accessibility/Remoteness Index of Australia (ARIA)

4.5 Self-rated oral health

Respondents gave an overall assessment of their oral health on a six-point scale coded 0=very poor to 5=excellent. Table 4.16 shows that self-rated oral health elicited generally positive responses, with almost one third of respondents reporting 'good' oral health (33.1%) and a further third rating it as 'very good' (32.5%). Very few respondents rated their oral health as poor or very poor, as these categories combined accounted for five percent of responses.

Table 4.16: Distribution in response categories for self-rated oral health (dentate persons, weighted data)

	Self-rated oral health							
	Very poor	Poor	Average	Good	Very good	Excellent	Missing	Total
N	21	163	641	1,217	1,196	436	5	3,678
Percent	0.6	4.4	17.4	33.1	32.5	11.9	0.1	100.0

Because few respondents rated their oral health as 'poor' and 'very poor', these categories were collapsed to produce a five-point ordinal scale. Associations between self-rated oral health and social characteristics were tested for significance using the Pearson's Chi-square statistic.

4.5.1 Self-rated oral health and socioeconomic indicators

As presented in Table 4.17, significant differences in self-reported oral health were apparent for each socioeconomic indicator. The percentage of adults rating their oral health as poor or worse decreased incrementally with increasing household income, from 9.3% in the lowest income group to 3.8% in the highest. Conversely, the proportion reporting very good or excellent oral health increased with increasing income, from about one third in the low income groups to about half of those in the highest income group (50.9%).

Higher proportions of adults with tertiary education rated their oral health as excellent (17.8%), compared with 9.7% with vocational training and 6.4% of those with secondary education. While 16.0% of managers/administrators rated their oral health as excellent, as few as 3.3% rated it as poor or worse. This contrasted with the distribution of tradespersons, of whom 8.3% perceived their oral health as excellent and 9.7% rated it as poor or very poor. Similar trends were observed for variation in occupational prestige.

Fewer than a third of cardholders rated their oral health as very good or better (30.8%), while for the non-cardholders the proportion approached half (47.5%). Significant inverse associations between area disadvantage and self-rated oral health were also observed.

4.5.2 Self-rated oral health and demographic characteristics

Pearson's Chi-square analysis was also used to examine the relationship of self-rated oral health to other social characteristics. Females rated their oral health better than males. Respondents aged 18-29 years rated their oral health more favourably than other age groups, and perceptions of wellness declined with increasing age, before recovering among those aged 70 years and over. Full-time workers rated their oral health better than part-time workers, but all workers reported better oral health than retirees, and those not employed self-rated their oral health poorest. Australian-born residents and persons who spoke English at home reported significantly better ratings of oral health than their Overseas-born counterparts. There was also a significant difference based on household size. Adults living in larger households rated their oral health better.

Table 4.17: Self-rated oral health by socioeconomic indicators (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
						Pearson's Chi-square		
	Very poor/ or poor	Average	Good	Very good	Excellent	Value	df	Sig.
	Row percentages							
Household income						49.455	16	<0.001
n	**178**	**599**	**1,151**	**1,121**	**379**			
<$12,000	9.3	22.0	32.2	27.1	9.3			
$12-20,000	8.5	22.4	39.9	22.7	6.4			
$20-30,000	7.2	18.8	38.9	27.1	8.0			
$30-40,000	4.4	14.6	36.9	32.0	12.1			
$40-50,000	3.9	20.0	32.5	31.6	12.0			
>$50,000	3.8	15.2	30.1	38.2	12.7			
Total	5.2	17.5	33.6	32.7	11.1			
Educational Attainment						129.234	8	<0.001
n	**181**	**626**	**1,199**	**1,183**	**425**			
Secondary or less	4.1	18.9	37.3	33.3	6.4			
Vocation or Other	7.4	20.6	31.9	30.4	9.7			
Tertiary	3.3	13.0	31.3	34.6	17.8			
Total	5.0	17.3	33.2	32.7	11.8			
Occupational Group [(a)]						93.324	28	<0.001
n	**114**	**389**	**760**	**793**	**283**			
Manager/Administrator	3.3	17.9	26.9	35.9	16.0			
Professional	4.0	15.5	26.6	40.6	13.3			
Paraprofessional	5.2	10.8	34.0	42.3	7.7			
Tradesperson	9.7	16.0	33.3	32.6	8.3			
Clerk	2.3	16.8	36.2	31.1	13.7			
Sales/Personal services	4.8	18.1	39.0	24.8	13.2			
Plant/machine operator; Driver	6.0	23.9	33.3	30.8	6.0			
Labourers/related	7.4	17.3	40.7	24.7	9.9			
Total	4.9	16.6	32.5	33.9	12.1			
Occupational Prestige [(b)]						47.732	16	<0.001
n	**118**	**398**	**781**	**848**	**302**			
Low	4.9	19.0	33.3	32.1	10.7			
Low-moderate	7.0	14.8	37.5	30.6	10.1			
Moderate	4.6	18.6	32.5	30.9	13.4			
Moderate-high	4.9	12.1	31.5	36.9	14.6			
High	2.9	17.5	25.7	41.5	12.4			
Total	4.8	16.3	31.9	34.7	12.3			
Concession status						63.316	4	<0.001
n	**184**	**639**	**1215**	**1196**	**435**			
Card holder	7.0	21.3	40.9	23.1	7.7			
No card	4.6	16.5	31.4	34.7	12.8			
Total	5.0	17.4	33.1	32.6	11.9			
Area disadvantage [(c)]						49.455	16	<0.001
n	**183**	**634**	**1,203**	**1176**	**429**			
Quintile 1 most disadvantaged	6.6	20.5	37.0	27.8	8.1			
Quintile 2	4.6	18.9	33.2	32.6	10.7			
Quintile 3	5.2	15.1	36.4	32.2	11.0			
Quintile 4	5.8	16.8	30.3	33.2	14.0			
Quintile 5	3.4	16.9	30.0	35.4	14.3			
Total	5.0	17.5	33.2	32.4	11.8			

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First Edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage – Australian Bureau of Statistics' Socio-Economic Indexes for Areas

Table 4.18: Self-rated oral health by demographic characteristics (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
	Very poor or poor	Average	Good	Very good	Excellent	Pearson's Chi-square		
	Row percentages					Value	df	Sig.
Sex						14.705	4	0.005
n	**184**	**641**	**1,217**	**1,196**	**435**			
Male	5.7	18.0	34.4	29.8	12.1			
Female	4.4	16.9	31.9	35.3	11.6			
Total	5.0	17.5	33.1	32.6	11.8			
Age group						121.364	20	<0.001
n	**184**	**640**	**1,217**	**1,196**	**436**			
18-29 years	2.0	11.3	33.6	38.6	14.5			
30-39 years	6.5	16.3	30.0	33.1	14.0			
40-49 years	7.1	21.1	32.7	30.8	8.2			
50-59 years	5.0	22.8	31.1	29.9	11.1			
60-69 years	7.4	21.8	36.8	24.8	9.2			
70+ years	2.8	16.7	39.9	29.4	11.1			
Total	5.0	17.4	33.1	32.6	11.9			
Employment status						44.450	12	<0.001
n	**175**	**617**	**1115**	**1129**	**397**			
Full-time	4.9	16.8	30.1	36.2	12.1			
Part-time	4.0	16.8	34.0	34.3	10.9			
Retired	4.7	19.4	37.8	28.4	9.8			
Not employed	7.5	21.9	33.2	25.1	12.4			
Total	5.1	18.0	32.5	32.9	11.6			
Country of birth						12.710	4	0.013
n	**177**	**631**	**1,201**	**1,193**	**436**			
Australia	4.9	16.6	32.8	34.1	11.6			
Other	4.6	20.1	33.9	28.0	13.3			
Total	4.9	17.3	33.0	32.8	12.0			
Language at home						31.380	4	<0.001
n	**184**	**641**	**1,217**	**1,196**	**436**			
LOTE	2.8	23.7	36.0	22.6	14.9			
English	5.3	16.7	32.8	33.7	11.5			
Total	5.0	17.4	33.1	32.6	11.9			
Householders aged 5+						23.924	12	0.021
n	**185**	**641**	**1,215**	**1,193**	**436**			
One	3.9	16.4	34.7	31.3	13.7			
Two	5.7	18.4	34.4	29.7	11.9			
Three or four	4.8	16.6	30.8	35.3	12.5			
More than four	5.1	18.5	35.0	34.0	7.4			
Total	5.0	17.5	33.1	32.5	11.9			
ARIA category								
n	**184**	**641**	**1,214**	**1,189**	**435**	24.643	16	0.076
Highly accessible	5.0	16.7	32.8	33.3	12.2			
Accessible	4.7	21.3	35.3	27.5	11.1			
Moderately accessible	4.7	25.0	30.5	32.0	7.8			
Remote	5.3	13.2	39.5	34.2	7.9			
Very remote	13.8	13.8	41.4	17.2	13.8			
Total	5.0	17.5	33.1	32.5	11.9			

4.6 Summary of bivariate associations

A summary of the bivariate associations between socioeconomic and demographic indicators and oral health is presented in Table 4.19. Significant relationships are identified, and where there is clear direction, so too are the directions of relationships. The investigation of six socioeconomic indicators with five oral health measures produced 30 bivariate associations, and 27 of these were statistically significant at the 0.05 threshold. High household income, tertiary education, occupation in highly skilled work and high occupational prestige were negatively associated with decayed teeth, missing teeth, social impact score, oral symptoms and average or poorer self-rated oral health. Eligibility for concession and increasing area disadvantage were positively associated with oral morbidity.

There was no variation in oral health between males and females, and except for social impact, country of birth was also not significantly associated with oral health. However, an unequal distribution of oral health in the population was observed based on language at home. Compared with those who spoke a LOTE, English at home was positively associated with missing teeth and negatively associated with decayed teeth, social impact, oral symptoms and poor self-rated oral health. Oral health also differed significantly between social groups based on four levels of employment status. Differences based on household size for evident for social impact, oral symptoms and self-rated oral health, although the direction of these differences was not clear. Decayed and missing teeth were higher in geographic areas with limited accessibility to community services.

Table 4.19: Summary of bivariate associations between socioeconomic and demographic indicators and oral health

	Decayed	Missing	Social impact	Symptoms	Self-rated (average/poor)
Socioeconomic					
Household income	p<0.001 (-)	p<0.001 (-)	p<0.001 (-)	p>0.05	p<0.001 (-)
Educational attainment	p<0.001 (-)	p<0.001 (-)	p<0.05 (-)	p<0.001 (-)	p<0.001 (-)
Occupational group	p<0.001 (-)	p<0.01 (-)	p<0.001 (-)	p<0.05 (-)	p<0.05 (-)
Occupational prestige	p<0.01 (-)	p>0.05	p<0.001 (-)	p<0.05 (-)	p<0.05 (-)
Eligible for concession	p<0.001 (+)	p<0.001 (+)	p<0.001 (+)	p<0.001 (+)	p<0.001 (-)
Area disadvantage	p<0.001 (+)	p<0.001 (+)	p<0.001 (+)	p>0.0505	p<0.05 (+)
Demographic					
Sex (male)	p>0.05	p>0.05	p>0.05	p>0.05	p>0.05
Age	p>0.05	p<0.001 (+)	p<0.001	p<0.001	p<0.001
Country of birth (Australia)	p>0.05	p>0.05	p<0.001 (-)	p>0.05	p>0.05
Language at home (English)	p<0.001 (-)	p<0.05 (+)	p<0.001 (-)	p<0.001 (-)	p<0.05 (-)
Employment status	p<0.01	p<0.001	p<0.01	p<0.01	p<0.01
Householders aged 5+	p>0.05	p<0.001 (-)	p<0.05	p<0.05	p>0.05
Accessibility to services	p<0.01 (-)	p<0.05 (-)	p>0.05	p>0.05	p>0.05

4.7 Multivariate analysis

The relationship between socioeconomic and demographic indicators with oral health was examined with multivariate analysis. Hierarchical multiple linear regression was used for continuous dependent variables of decayed teeth, missing teeth, social impact and oral symptom experience. Logistic regression was used to estimate odds ratios with 95% confidence intervals for self-rated oral health.

Key independent variables were entered into models even if their association was not significant in bivariate tests. The rationale for retaining these variables was that because multiple regression is concerned with establishing joint relationships, a variable that appears unrelated in bivariate associations may be significant after accounting for one or more of the other variables. Conversely, a significant association between one of the predictors and the outcome measure may be negated in the presence of other factors. Dichotomous variables were relabelled for easier interpretation and recoded '0' or '1' to indicate presence or absence of the attribute. Labels and codes were Male (Female: 0, Male: 1), Australian-born (Overseas-born: 0, Australian-born: 1), English at home (LOTE: 0, English: 1).

To incorporate categorical variables, a series of indicator 'dummy' variables was computed using 0/1 coding. This process was performed for employment status, household income and educational attainment. Reference categories excluded from the model were full-time employment, income >$50,000 and tertiary education respectively. Where possible, continuous variables were substituted for categorical variables (age in years, ARIA scores, Daniel's prestige scores, number of house occupants aged 5+ years, SEIFA IRSD scores). Because of the high correlation between ASCO codes and Daniel's prestige scores (rho= 0.74), only prestige scores were entered into models.

The hierarchical method of entering variables in blocks permitted an estimation of the net effect of each factor, and the independent contribution of each block of variables to explaining variation in the outcome measure. In the first block, sex, age and ethnicity (country of birth, language at home), employment status, number of householders, and ARIA value were entered and the change in R^2 observed. In the second block, socioeconomic variables were entered. These were categories of income and education, and IRSD area disadvantage values assigned to postcodes. This procedure enabled identification of the importance of socioeconomic factors once the effect of age and other demographic factors had been established.

In presenting results, the unstandardised regression coefficients (β) are reported with their standard errors. To allow for a direct comparison of their relative explanatory power of the dependent variable, standardised coefficients (beta) for independent variables are presented. For cross-sectional data like these, the coefficient for the independent variable is the difference in response per unit difference in the dependent variable. The observed p-values are reported and those less than 0.05 are taken as statistically significant.

Regression coefficients are reported only for the final model, ie on entry of the final block of independent variables. In this case, regression coefficients after entry of the second block of variables which were the socioeconomic indicators.

Decayed teeth

Findings for decayed teeth are presented in Table 4.20. Overall, the model accounted for 5.8% of the variation in decayed teeth, of which socioeconomic variables contributed 4.0%. Each block of variables resulted in a significant increase in the R-squared statistic. Of the demographic variables entered in block 1, male sex and increasing remoteness to services were positively associated with decayed teeth. Compared with the reference category of full-time employment, other employment categories were positively associated with decayed teeth. A negative association was observed between speaking English at home and decayed teeth. In the presence of socioeconomic indicators entered in the second block, employment status was no longer significant. Lower income relative to higher income was positively associated with decayed teeth, as was area disadvantage. Age, country of birth and number of householders were not significant predictors in the model. Neither were education or prestige.

Table 4.20: Multiple linear regression model: Decayed teeth (dentate, weighted data, all persons)

Model summary	R^2	Adjusted R^2	Change statistics			
Block			R^2 change	F change	df	Sig. F change
1	0.027	0.022	0.027	5.453	9, 1781	<0.001
2	0.066	0.058	0.039	12.281	6, 1775	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	2.765	0.582		<0.001
	Male	0.298	0.074	0.100	<0.001
	Age in years	-0.002	0.003	-0.019	0.451
	Australia	-0.027	0.093	-0.007	0.770
	English	-0.451	0.133	-0.081	0.001
	Employed full-time (ref)				
	Employed part-time	0.075	0.093	0.021	0.422
	Retired	0.537	0.301	0.043	0.075
	Not employed	0.257	0.164	0.037	0.116
	Householders aged 5+	0.037	0.029	0.030	0.208
	ARIA score	0.004	0.022	0.004	0.864
Step 2	Income <$20,000	0.424	0.162	0.066	0.009
	Income $20 to $50,000	0.416	0.077	0.136	<0.001
	Income >$50,000 (ref)				
	Up to secondary education	0.094	0.098	0.026	0.337
	Vocation or other education	<0.001	0.084	<0.001	0.996
	Tertiary education (ref)				
	Occupational prestige †	0.004	0.003	0.030	0.261
	IRSD area disadvantage ‡	-0.002	0.001	-0.102	<0.001

* Low ARIA scores indicate greater remoteness

† Low prestige scores indicate higher prestige

‡ Low IRSD values indicate more disadvantaged areas

Missing teeth

Findings of multivariate analysis with missing teeth as the dependent variable are presented in Table 4.21. The model explained 23.1% of the variation in missing teeth. The greatest effect was for age (beta = 0.47). Being Australian-born was positively associated with missing teeth, but there was a negative association with speaking English at home. The effect for language did not remain significant in the presence of socioeconomic indicators. Overall, the risk factors for missing teeth were age, followed by area disadvantage, education limited to secondary school, being Australian-born, low income and low occupational prestige. A larger household size was negatively associated with missing teeth.

Table 4.21: Multiple linear regression model: Missing teeth (dentate, weighted data, all persons)

Model summary

Block	R^2	Adjusted R^2	Change Statistics			
			R^2 change	F change	df	Sig. F change
1	0.208	0.204	0.208	59.345	9, 2034	<0.001
2	0.237	0.231	0.029	12.860	6, 2028	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	-0.005	1.494		0.997
	Male	0.311	0.188	0.035	0.098
	Age in years	0.172	0.008	0.472	<0.001
	Australia	0.555	0.238	0.048	0.020
	English	-0.522	0.333	-0.032	0.117
	Employed full-time (ref)				
	Employed part-time	0.141	0.238	0.013	0.553
	Retired	-0.175	0.688	-0.005	0.800
	Not employed	-0.174	0.434	-0.008	0.688
	Householders aged 5+	-0.198	0.074	-0.054	0.008
	ARIA score	0.002	0.056	0.001	0.977
Step 2	Income <$20,000	0.847	0.395	0.046	0.032
	Income $20 to $50,000	0.240	0.196	0.026	0.222
	Income >$50,000 (ref)				
	Up to secondary education	0.519	0.245	0.049	0.034
	Vocation or other education	0.106	0.213	0.011	0.618
	Tertiary education (ref)				
	Occupational prestige †	0.033	0.008	0.088	<0.001
	IRSD area disadvantage ‡	-0.006	0.001	-0.094	<0.001

* Low ARIA scores indicate greater remoteness

† Low prestige scores indicate higher prestige

‡ Low IRSD values indicate more disadvantaged areas

Social impact

Results are presented in Table 4.22. For all persons, demographic and socioeconomic factors explained only 4.6% of the variance in social impact scores, indicating that other factors contributed to population differences in oral health-related quality of life. Factors that were positively associated with social impact were age, LOTE, income <$20,000, low occupational prestige and area disadvantage. Compared with full-time workers, being not employed or retired was negatively associated with impact.

Table 4.22: Multiple linear regression model: Social impact (dentate, weighted data, all persons)

Model summary			Change Statistics			
Block	R^2	Adjusted R^2	R^2 change	F change	df	Sig. F change
1	0.037	0.032	0.037	8.716	9, 2066	<0.001
2	0.053	0.046	0.017	5.991	6, 2060	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	1.071	0.194		<0.001
	Male	-0.023	0.024	-0.022	0.351
	Age in years	0.003	0.001	0.078	0.001
	Australia	-0.041	0.031	-0.031	0.179
	English	-0.283	0.043	-0.148	<0.001
	Employed full-time (ref)				
	Employed part-time	0.040	0.030	0.032	0.187
	Retired	-0.168	0.089	-0.043	0.059
	Not employed	-0.134	0.054	-0.055	0.013
	Householders aged 5+	-0.001	0.009	-0.002	0.939
	ARIA score *	0.002	0.007	0.007	0.755
Step 2	Income <$20,000	0.133	0.051	0.063	0.009
	Income $20 to $50,000	0.015	0.025	0.014	0.546
	Income >$50,000 (ref)				
	Up to secondary education	-0.061	0.032	-0.049	0.056
	Vocation or other education	0.007	0.027	0.007	0.790
	Tertiary education (ref)				
	Occupational prestige †	0.003	0.001	0.076	0.002
	IRSD area disadvantage ‡	-0.001	<0.001	-0.071	0.003

* Low ARIA scores indicate greater remoteness

† Low prestige scores indicate higher prestige

‡ Low IRSD values indicate more disadvantaged areas

Oral symptom experience

Table 4.23 presents findings for oral symptom experience. For all persons, demographic and socioeconomic variables contributed little to explaining population differences in oral symptom experience, with the estimated total effects contributing to an adjusted R^2 of 1.4%.

Table 4.23: Multiple linear regression model: Oral symptom experience (dentate, weighted data, all persons)

Model summary			Change statistics			
Block	R^2	Adjusted R^2	R^2 change	F change	df	Sig. F change
1	0.007	0.003	0.007	1.749	9, 2096	0.073
2	0.021	0.014	0.014	4.818	6, 2090	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	2.297	0.384		<0.001
	Male	0.017	0.048	0.008	0.727
	Age in years	-0.002	0.002	-0.027	0.266
	Australia	-0.087	0.061	-0.033	0.153
	English	-0.062	0.084	-0.017	0.460
	Employed full-time (ref)				
	Employed part-time	0.049	0.061	0.020	0.426
	Retired	-0.079	0.175	-0.011	0.650
	Not employed	-0.107	0.108	-0.022	0.321
	Householders aged 5+	-0.024	0.019	-0.028	0.206
	ARIA score *	-0.036	0.014	-0.057	0.012
Step 2	Income <$20,000	0.159	0.101	0.038	0.116
	Income $20 to $50,000	0.013	0.050	0.006	0.792
	Income >$50,000 (ref)				
	Up to secondary education	-0.256	0.063	-0.105	<0.001
	Vocation or other education	0.014	0.054	0.007	0.792
	Tertiary education (ref)				
	Occupational prestige †	0.001	0.002	0.008	0.756
	IRSD area disadvantage ‡	-0.001	<0.001	-0.058	0.015

* Low ARIA scores indicate greater remoteness

† Low prestige scores indicate higher prestige

‡ Low IRSD values indicate more disadvantaged areas

Self-rated oral health

Results of binary logistic regression analysis were summarised using odds ratios with 95% confidence intervals. The analysis was performed to predict the probability, or odds, that a particular group would rate their oral health as average or poorer in comparison to a reference.

Setting a cut-point for favourable oral health as above 'average', self-rated oral health was dichotomised as average/ poor/ very poor, versus good/very good/ excellent. The split produced unequal-sized groups, with 2,849 adults (77.4%) rating their oral health as good or better and 825 adults (22.5%) rating their oral health as average or poorer. The unequal-sized groups have implication for reporting a summary statistic for the model. Cox and Snell R-square and Nagelkerke pseudo R-square statistics are roughly analogous to R-square in linear regression, but need to be interpreted cautiously because the variance of a binary dependent variable depends on the frequency distribution across the two groups examined. Variance is lowered as the distribution becomes increasingly unequal. The implication of this is that R-square values obtained in linear multiple regression are not directly comparable with those obtained through logistic regressions. However, as only one dependent variable was tested with logistic regression in this study, R-square values for different logistic regression models are comparable. In this study the Nagelkerke R-Square value for the model was reported. For both categorical and continuous independent variables, odds ratios are calculated per unit increase in the variable.

P-values were included mainly to report the joint effect of a group of dummy variables that formed the categorical variable – in this case employment status, household income and educational attainment. This enabled the testing of the entire 'construct' as well as the individual dummies, in order to correctly interpret the relationship with the outcome variable.[12] In addition, the statistical significance of the construct is independent of a nominated reference group – the selection of which influences the significance level of the indicator variables.

Results presented in Table 4.24 show the likelihood of an adult with given sociodemographic characteristics rating their oral health as average or poorer. Once all other factors in the model were taken into account, household income had the largest effect on the odds of self-rating oral health as unfavourable. For those with least income, the odds of reporting poor oral health were almost two and half times higher for those adults with household income >$50,000. The odds of rating oral health poorly were more than twice as high (2.14) for adults with vocational education compared with those with tertiary education.

Those adults who spoke a LOTE at home had almost twice the odds (1.92) for rating their oral health poorly than those who spoke English. Sex, country of birth, employment status, household size, geographical remoteness, prestige, concession status, and area disadvantage did not significantly alter the odds of a person rating their oral health poorly.

The odds of rating oral health poorly increased with age (1.03). Although the construct of employment status was not significant, being retired was negatively associated with a poor self-rating in comparison to being in full-time work (0.35).

The Nagelkerke R-Square statistic for the model was 0.093

Table 4.24: Odds ratios and 95% C.I. for self-rating oral health as average or poorer (dentate only, weighted data)

	Odds ratio	95% C.I.		Sig.
Female	0.789	0.620	1.004	0.054
Male (ref)				
Age in years	1.030	1.020	1.040	<0.001
Overseas-born	1.047	0.789	1.388	0.752
Australian-born (ref)				
LOTE	1.924	1.325	2.792	0.001
English at home (ref)				
Employment status				0.102
Not employed	0.860	0.499	1.481	0.586
Retired	0.348	0.148	0.821	0.016
Part-time	1.013	0.752	1.365	0.934
Full-time (ref)				
Householders aged 5+	1.075	0.983	1.176	0.114
ARIA score *	1.058	0.992	1.128	0.087
Household income				0.001
<$20,000	2.454	1.529	3.937	<0.001
$20-50,000	1.128	0.884	1.438	0.333
>$50,000 (ref)				
Educational attainment				<0.001
Secondary or less	1.219	0.886	1.676	0.223
Vocational or other	2.136	1.639	2.785	<0.001
Tertiary (ref)				
Occupational prestige †	1.007	0.997	1.017	0.186
Card holder	1.046	0.672	1.628	0.842
No card (ref)				
Area disadvantage ‡	1.000	0.998	1.002	0.924
Constant	0.029			<0.001

* Low ARIA scores indicate greater remoteness

† Low prestige scores indicate higher prestige

‡ Low IRSD values indicate more disadvantaged areas

4.8 References to Chapter 4

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5. Dental Behaviours and Beliefs

Chapter 4 described the social distribution in the oral health of dentate Australian adults. A consistent pattern showed that those who were less advantaged experienced poorer outcomes. However, the relationship could not be reduced to a social gap between disadvantaged groups and the rest of the population. Rather, an increase in the level of morbidity and a decrease in the proportion that self-rated oral health favourably was observed with each successive step down the social hierarchy. This gradient suggested that inequality in oral health can not be explained by economic factors alone.

A major pathway through which SEP affects health is behaviour. This relationship reached prominence in the UK Black Report, where behaviour was posited to be a leading explanation for social inequality in health. According to this explanation, SEP impacts on behaviour in several ways that have consequences for health. Most notably, people who live in disadvantaged circumstances face barriers to health care services. This scenario is strikingly exemplified among disadvantaged adults seeking public dental care in Australia.[1] The co-payment required to purchase public dental care and the prohibitive cost of private care, together with the organisational barriers to restrict access, discourage preventive care-seeking and reinforce dependency on emergency care.

Apart from differences in the utilisation of services and appropriateness of care received, adults with better literacy skills access more information from health care professionals and through printed and electronic sources. Moreover, they are better equipped to judge the quality of that information. By contrast, disadvantaged groups receive less information and respond more slowly to health care messages. Having assessed this information, advantaged groups are said to be more future-oriented in their outlook, more perceptive of the benefit to future health of current behaviour, and therefore more receptive to health messages. Further, they are more vigilant in responding to changes in their own health. In addition, they are more likely to hold self-efficacious beliefs about their ability to adopt change and adhere to new behaviours. Thus, socioeconomic patterns in health behaviour augment social patterns in health outcome. Advantaged groups adopt better behaviour because they are more aware of them, better positioned to afford them, better subsidised when they do purchase them,* hold stronger self-efficacy beliefs and better appreciate the long-term advantages of health care practices.

Chapter 5 examines behaviour relevant to oral health and the cognitive factors thought to influence decisions that determine dental behaviour. One objective is to determine whether dental utilisation and self-care is associated with significant differences in oral health. A second objective is to investigate whether these behaviours are socially distributed, for example, whether advantaged adults are more committed to an oral hygiene routine.

* The Commonwealth Government, through its 30% rebate, is providing five times the subsidy to adults with private dental insurance receiving dental care than to those using public dental health care.[1]

The hypothesis tested is that a socioeconomic gradient in dental behaviour contributes independently to explaining socioeconomic variation in adult oral health.

Dental behaviour was evaluated with a 10-item adaptation of the 7-item Dental Neglect Scale[2] that was developed in Australia for children. Items on this scale assess attitudinal as well as behavioural factors that relate to dental visiting and personal dental self-care. In this research it is referred to as the Dental Behaviour Scale. This scale was supplemented with a series of five additional items that examined the utilisation of dental services. Three items assessed care-seeking behaviour directly – average time between dental visits, perceived need for a dental visit and usual reason for dental visits. The two remaining items evaluated factors that influence care-seeking. These addressed private dental insurance and continuity of care (usual dentist). Also examined in this chapter were cognitive factors associated with dental behaviour. Health self-efficacy beliefs were measured with the 8-item Perceived Health Competence Scale.[3] This scale evaluates the sense of competence that individuals perceive to manage their own health. Lastly, satisfaction with dental care was evaluated with a 5-item subset of the 31-item Dental Satisfaction Survey. Although satisfaction is usually regarded as an outcome of dental care, this study investigates whether levels of satisfaction with past dental care were associated with dental visiting and personal dental self-care behaviours.

Univariate distributions

Responses to the three scales evaluating dental behaviour, health self-efficacy and satisfaction with dental care were examined. Univariate estimates of central tendency and dispersion are presented in Table 5.1. Each scale was coded 0 to 4, with high scores indicating more favourable behaviour, higher health self-efficacy and greater satisfaction. The mean scale scores were 2.5 for dental behaviour, 2.8 for health competency, and 3.0 for dental satisfaction.

Each distribution was negatively skewed, reflecting an overall positive response orientation. Greatest symmetry was observed for the dental behaviour scale, while the positive kurtosis values of the other scales indicate that scores cluster more and have longer tails than those in a normal distribution. Using the guideline of a skewness value more than twice its standard error as an indication of departure from symmetry, the dental satisfaction scale approached asymmetry. No floor scores were reported for dental behaviour, or perceived health competence in the dataset. A substantial ceiling effect was recorded for dental satisfaction, where 15.6% of respondents reported the highest possible score.

Table 5.1: Summary statistics for behaviour scales (dentate persons, weighted data)

	Dental behaviour	Perceived health competence	Dental satisfaction
N	3,635	3,627	3,642
Missing	43	51	36
N of items	10	8	5
Mean	2.50	2.75	3.00
Median	2.50	2.88	3.00
Mode	2.70	3.00	4.00
Std. deviation	0.64	0.58	0.78
Skewness	-0.03	-0.40	-0.73
SE skewness	0.04	0.04	0.04
Kurtosis	-0.58	0.47	0.43
SE kurtosis	0.08	0.08	0.08
Percent floor	0.00	0.00	0.20
Percent ceiling	0.25	2.37	15.57
Minimum	0.30	0.50	0.00
Maximum	4.00	4.00	4.00

5.1 Dental behaviour

The commonly held view that the poor oral health of disadvantaged people is attributed to poor behavioural practices makes two assumptions. The first is that 'the poor behave poorly' and the second is that professional dental care and personal dental self-care are positively associated with oral health. These associations are examined in this chapter.

Dental behaviour was examined with ten items that expanded the original seven items of the Dental Neglect Scale. People were asked to indicate their level of agreement with items evaluating dental attitude and behaviour. Responses are presented in Table 5.2. Scores for items #2, #7, and #8 were reversed in computing an overall scale score to produce a unidirectional measure.

Attitudinally, a substantial majority of respondents (90.8%) agreed that regular check-ups were good practice, although behaviourally only 36.4% agreed that they arranged examination appointments even on occasions when there was no presenting problem. Only a small minority (3.0%) disagreed that they brushed daily, and a minority (7.5%) disagreed that they carefully followed home-care instructions issued by a dental professional.

While daily toothbrushing was almost universally practised (93.8% agreement), the majority (63.2%) disagreed that they flossed daily, and nearly half the sample (44.6%) disagreed that they controlled snacking. While most disagreed that they avoided dental services, nearly a quarter (24.0%) acknowledged that they did avoid seeking care when a problem presented.

Table 5.2: Response to the dental behaviour scale (dentate persons, weighted data)

#	Item	Response category						
		Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree	Valid	Missing
		Row percentages						
1	Value of regular check-ups	0.7	1.0	6.3	40.5	50.3	98.8	1.2
2	Avoid care with problem	30.3	32.9	11.4	19.1	4.9	98.6	1.4
3	Appointment even no problem	20.4	29.4	12.5	23.0	13.4	98.6	1.4
4	Brush daily	0.9	2.1	1.8	21.8	72.0	98.6	1.4
5	Succeed in efforts	1.60	7.7	26.3	41.4	21.6	98.6	1.4
6	Follow home instructions	0.5	7.0	22.7	48.0	20.5	98.6	1.4
7	Dental problem not priority	23.8	34.9	15.1	20.2	4.6	98.7	1.3
8	Deal with toothache myself	23.8	24.8	10.8	30.0	9.4	98.8	1.2
9	Floss daily	28.6	34.6	13.7	13.6	8.1	98.7	1.3
10	Control snacking	13.8	30.8	21.9	24.4	8.0	98.8	1.2

5.1.1 Factor analysis of the dental behaviour items

A principal components factor analysis was performed on the ten dental behaviour items. The objective was to examine the correlations among items, determine the presence of common factors, and reduce the number of individual items. One procedure for determining the number of factors is Kaiser's Criterion, which states that, as many factors should be extracted as variables with eigenvalues greater than or equal to one. As presented in Table 5.3, three such factors were extracted. Examination of the three-factor solution (not shown) revealed factor one pertained to dental visiting and factors two and three pertained to self-care. Items #9 'daily flossing' and #10 'control snacking' formed the second self-care factor (α=0.368). While it might be argued that these represent a higher order of self-care behaviour than routine maintenance, a two-factor solution of dental visiting and self-care was conceptually more fitting. Hence, a two-factor solution was fitted and the resulting factor loadings are presented. The first factor explained 34.9% of the variance and was labelled 'visiting' and the second factor 'self-care' explained a further 12.7%. Internal consistency of the visiting subscale items showed acceptable reliability (α=0.76), but reliability was lower than the recommended level for self-care (α=0.48). Item #1 loaded similarly onto both factors, and because it related to visiting behaviour it was included on the visiting subscale. Thus each subscale comprised five items. Higher mean scores for the overall scale and subscales indicate a greater preventive orientation to dental care utilisation, and greater commitment to personal oral health practices.

Table 5.3: Factor analysis of the dental behaviour scale items (dentate persons, weighted data)

Initial statistics [a]				Final statistics [b]			
		Variance				Factor loadings	
Factor	Eigenvalue	%	Cum. %	Item #	Item label	Visiting	Self-care
1	3.49	34.92	34.92	1	Good practice to have regular check-ups	-0.32	0.30
2	1.27	12.67	47.59	* 2	Avoid care when I have dental problem	0.79	-0.19
3	1.07	10.72	58.31	3	Make appointments when no problem	-0.73	0.20
4	0.88	8.79	67.10	4	Brush daily	0.07	0.70
5	0.75	7.47	74.57	5	Succeed in efforts for dental health	-0.29	0.69
6	0.66	6.57	81.14	6	Follow instructions of dental professional	-0.24	0.77
7	0.56	5.57	86.72	* 7	Dental problem not priority	0.77	-0.11
8	0.52	5.24	91.96	* 8	Deal with toothache myself	0.72	-0.12
9	0.42	4.23	96.19	9	Floss daily	-0.32	0.45
10	0.38	3.81	100.00	10	Control snacking	-0.10	0.41
					Cronbach's alpha	0.76	0.48
					N of cases	3,608	3,608

(a) Extraction method: principal component analysis.
(b) Rotation method: varimax with Kaiser normalization. Rotation converged in 3 iterations.
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.82
* Direction reversed in computing an overall summary statistic

5.1.2 Dental behaviour and socioeconomic indicators

Table 5.4 presents the distribution of oral health behaviour by socioeconomic indicators. On the overall scale, mean dental behaviour scores did not differ significantly by income, but were significantly different for the two subscales. Those reporting lowest visiting scores were not the lowest income households, but rather those with incomes between $20,000 and 40,000. Highest visiting scores were reported by those with household income greater than $50,000. Self-care scores tended to decrease with increasing income, but the relationship trend was inconsistent. Significant differences in dental behaviour by educational attainment were observed, with lowest behavioural scores associated with vocational education for each scale/subscale. Adults with secondary school or less education reported higher self-care scores than did those with tertiary education.

Plant/machine operators and drivers reported lowest visiting scores (1.94), while labourers and related workers reported lowest self-care scores (2.11). Highest visiting scores were reported by paraprofessionals (2.72), while clerks reported highest self-care scores (2.50). These findings were reflected in behaviour scores by occupational prestige, with highest scores for visiting and self-care being reported by those with prestige scores in the moderate–high and moderate ranges respectively. Although concession cardholders reported significantly lower visiting scores (2.45) than non-cardholders (2.52), self-care scores were higher among cardholders, although differences failed to reach statistical significance.

An inverse social gradient in dental behaviour by area disadvantage was observed. Adults living in areas with least socioeconomic disadvantage reported highest scores for both visiting (2.73) and self-care (2.49).

Table 5.4: Dental behaviour by socioeconomic indicators (dentate persons, weighted data)

		Dental behaviour		Visiting		Self-care	
	N	Mean	SD	Mean	SD	Mean	SD
Household income							
<$12,000	227	2.53	0.65	2.50	0.79	2.44	0.78
$12-20,000	370	2.53	0.67	2.54	0.88	2.44	0.70
$21-30,000	387	2.42	0.62	2.41	0.86	2.35	0.63
$31-40,000	451	2.49	0.66	2.43	0.90	2.46	0.62
$41-50,000	456	2.49	0.64	2.52	0.86	2.38	0.66
>$50,000	1,504	2.50	0.63	2.57	0.84	2.35	0.65
Total	3,396	2.49	0.64	2.52	0.86	2.39	0.66
Test of significance		F(5,3390)=1.449, p= 0.203		F(5,3390)=3.319, p= 0.005		F(5,3390)=2.971, p= 0.011	
Educational attainment							
Secondary or less	985	2.50	0.66	2.51	0.88	2.42	0.66
Vocation or other	1,268	2.44	0.63	2.42	0.87	2.35	0.64
Tertiary	1,323	2.56	0.62	2.63	0.80	2.41	0.66
Total	3,576	2.50	0.64	2.52	0.85	2.39	0.66
Test of significance		F(5,3573)=12.133, p<0.001		F(5,3573)=19.571, p< 0.001		F(5,3573)=3.283, p= 0.038	
Occupational group [(a)]							
Manager/administrator	368	2.55	0.64	2.58	0.87	2.45	0.69
Professional	551	2.56	0.62	2.64	0.84	2.42	0.64
Paraprofessional	193	2.61	0.56	2.72	0.72	2.42	0.66
Tradesperson	290	2.29	0.63	2.29	0.81	2.18	0.66
Clerk	347	2.63	0.64	2.68	0.84	2.50	0.65
Sales/Personal services	311	2.35	0.61	2.34	0.83	2.24	0.63
Plant/machine op; Driver	117	2.09	0.49	1.94	0.78	2.15	0.53
Labourer/related	162	2.14	0.56	2.11	0.82	2.11	0.51
Total	2,339	2.46	0.63	2.49	0.85	2.35	0.65
Test of significance		F(7,2330)=26.092, p<0.001		F(7,2330)=24.117, p<0.001		F(7,2330)=14.457, p<0.001	
Occupational prestige [(b)]							
Low	467	2.28	0.55	2.29	0.79	2.17	0.60
Low-Moderate	444	2.34	0.63	2.32	0.87	2.28	0.62
Moderate	456	2.46	0.66	2.47	0.84	2.36	0.70
Moderate-high	565	2.62	0.63	2.70	0.85	2.47	0.64
High	511	2.52	0.62	2.59	0.81	2.38	0.67
Total	2,444	2.45	0.63	2.49	0.85	2.34	0.66
Test of significance		F(4,2438)=23.895, p<0.001		F(4,2438)=22.103, p<0.001		F(4,2438)=15.121, p<0.001	
Concession status							
Card holder	648	2.45	0.63	2.39	0.83	2.41	0.68
No card	2,984	2.52	0.64	2.55	0.85	2.39	0.65
Total	3,632	2.50	0.64	2.53	0.85	2.39	0.66
Test of significance		F(1,3629)=6.194, p= 0.013		F(1,3629)=18.767, p< 0.001		F(1,3629)=0.347, p= 0.556	
Area disadvantage [(c)]							
Quintile 1 (highest)	669	2.41	0.66	2.35	0.89	2.39	0.66
Quintile 2	536	2.50	0.67	2.52	0.86	2.40	0.69
Quintile 3	758	2.45	0.56	2.45	0.78	2.37	0.63
Quintile 4	724	2.46	0.63	2.51	0.85	2.30	0.64
Quintile 5	900	2.64	0.65	2.73	0.85	2.49	0.66
Total	3,586	2.50	0.64	2.52	0.85	2.39	0.66
Test of significance		F(4,3581)=16.454, p< 0.001		F(4,3581)=21.408, p< 0.001		F(4,3581)=9.124, p< 0.001	

(e) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(f) Daniel Prestige Scale
(g) Index of Relative Socio-Economic Disadvantage – Australian Bureau of Statistics' Socio-Economic Indexes for Areas

5.1.3 Dental behaviour and demographic characteristics

While the relationship between dental behaviour and socioeconomic position was not consistent, clearer relationships were found for demographic factors. Results are presented in Table 5.5.

Dental visiting scores for males (2.41) were lower than those for females (2.64). In addition, dental self-care scores were lower for males (2.27) than for females (2.52). Monotonic increases in dental behaviour scores were observed across successive age groups. Mean visiting scores increased from 2.31 for the 18-29-year-olds to 2.93 for those aged 70+years. Dental self-care also increased across age groups from a low of 2.26 in the 18-29 years age group to 2.71 in the 70+ years age group. Australian-born adults reported significantly lower scores on both subscales than Overseas-born respondents. People who spoke a LOTE reported lower visiting scores and significantly higher self-care scores than those who spoke English in the home.

Reflecting age-related influences, retirees reported higher scores for both behaviours than other groups based on employment status. Part-time workers had lowest behavioural scores. People living in households of more than four occupants reported lowest scores on both dental behaviours, while people in single occupant households reported highest scores. Differences based on accessibility to services were significant only on the visiting subscale. Compared with those in highly accessible areas, people resident in accessible areas reported lower visiting scores.

Table 5.5: Dental behaviour by demographic characteristics (dentate persons, weighted data)

	N	Behaviour		Visiting		Self-care	
		Mean	SD	Mean	SD	Mean	SD
Sex							
Male	1,825	2.39	0.64	2.41	0.84	2.27	0.67
Female	1,810	2.62	0.62	2.64	0.85	2.52	0.62
Total	3,635	2.50	0.64	2.53	0.85	2.39	0.66
Test of significance		F(1,3633)=127.669, p< 0.001		F(1,3633)=64.802, p< 0.001		F(1,3633)=139.194, p< 0.001	
Age group							
18-29 years	945	2.33	0.59	2.31	0.77	2.26	0.62
30-39 years	811	2.43	0.64	2.41	0.87	2.36	0.65
40-49 years	742	2.51	0.63	2.55	0.87	2.38	0.64
50-59 years	519	2.60	0.65	2.66	0.85	2.45	0.71
60-69 years	318	2.68	0.63	2.78	0.86	2.49	0.66
70+ years	301	2.87	0.56	2.93	0.74	2.71	0.63
Total	3,635	2.50	0.64	2.53	0.85	2.39	0.66
Test of significance		F(5,3629)=44.975, p< 0.001		F(5,3629)=38.238, p< .001		F(5,3629)=24.550, p< 0.001	
Country of birth							
Australia	2,846	2.48	0.64	2.50	0.86	2.37	0.65
Overseas	752	2.57	0.63	2.58	0.84	2.48	0.64
Total	3,598	2.50	0.64	2.52	0.85	2.39	0.65
Test of significance		F(1,3596)=10.322, p= 0.001		F(1,3596)=5.247,p=0.022		F(1,3596)=18.093; p<0.001	
Language at home							
Other than English	383	2.50	0.66	2.46	0.82	2.46	0.73
English	3,252	2.50	0.64	2.53	0.86	2.39	0.65
Total	3,635	2.50	0.64	2.53	0.85	2.39	0.66
Test of significance		F(1,3633)=0.025, p= 0.874		F(1,3633)=2.358, p= 0.125		F(1,3633)=4.028, p= 0.045	
Employment status							
Full-time	1,701	2.47	0.65	2.50	0.86	2.36	0.65
Part-time	665	2.43	0.59	2.43	0.83	2.33	0.62
Retired	482	2.76	0.63	2.83	0.81	2.58	0.69
Not employed	547	2.48	0.65	2.46	0.84	2.40	0.69
Total	3,395	2.50	0.64	2.53	0.85	2.39	0.66
Test of significance		F(3,3390)=31.128, p<0.001		F(3,3390)=25.995, p<0.001		F(3,3390)=17.488, p<0.001	
Householders aged 5+							
One person	431	2.62	0.63	2.64	0.81	2.52	0.69
Two persons	1,381	2.54	0.65	2.60	0.86	2.41	0.66
Three-four persons	1,427	2.46	0.64	2.47	0.85	2.37	0.66
More than four	392	2.39	0.58	2.35	0.84	2.31	0.59
Total	3,631	2.50	0.64	2.52	0.85	2.39	0.66
Test of significance		F(3,3626)=12.723, p<0.001		F(3,3626)=13.626, p<0.001		F(3,3626)=8.104, p<0.001	
ARIA [(a)] category							
Highly accessible	3,014	2.51	0.64	2.54	0.85	2.40	0.66
Accessible	414	2.42	0.61	2.38	0.86	2.36	0.62
Mod accessible	126	2.48	0.64	2.48	0.86	2.39	0.65
Remote	39	2.51	0.60	2.55	0.89	2.37	0.57
Very remote	30	2.61	0.62	2.71	0.79	2.46	0.63
Total	3,624	2.50	0.64	2.52	0.85	2.39	0.66
Test of Significance		F(4,3618)=2.070, p= 0.082		F(4,3618)=3.625, p= 0.006		F(4,3618)=0.388, p= 0.818	

(a) Accessibility/Remoteness Index of Australia (ARIA)

5.1.4 Dental behaviour and oral health

Decayed and missing teeth

The Dental behaviour scale and subscales were used to investigate the relationship between dental behaviour and oral health status. One-way analysis of variance (ANOVA) was used to test whether differences in means scores were statistically significant. Table 5.6 presents a one-way ANOVA table where self-assessed decayed and missing teeth are the outcome variables. F-ratios indicated a significant effect for the overall scale and two derived subscales on both outcomes. To further examine these relationships, mean scale/subscale scores were divided into quintiles, with quintile 1 representing lowest scores for each scale/subscale and quintile 5 the highest scores. (Because of clustering in the distribution of mean scores, it was not possible to achieve an equal 20% assignment of cases, so group sizes approximate quintiles.) Scores in quintiles 1 to 5 were labeled low, low-moderate, moderate, moderate-high, and high respectively.

Descriptive statistics are reported along with the ANOVA F statistic, degrees of freedom, and p value. Significant differences in mean decayed teeth remained after quintile formation. Adults with scores in the low range for dental behaviour reported significantly more decayed teeth. Importantly, as dental behaviour scores increased from low to low–moderate, the mean number of decayed teeth almost halved from 1.55 to 0.84 teeth. However, as scores increased from moderate-high to high, no further oral health gains were achieved (mean decayed teeth =0.46 for both quintile ranges).

A fourfold difference in the number of decayed teeth was observed across quintile ranges for dental visiting from 1.60 teeth for those with problem-oriented visiting (low), to 0.41 for who visit regularly (high). Again, no oral health gains were apparent in the shift from moderate–high to high scores. A significant inverse gradient in decayed teeth by self-care was also observed, although less variation in mean impact scores across quintiles was observed compared with the variation associated with visiting.

Mean differences in visiting behaviour were not significantly associated with missing teeth. Mean differences in missing teeth across self-care quintiles were statistically significant but not simple to interpret.

Table 5.6: Decayed and missing teeth by dental behaviour (dentate persons, weighted data)

	Decayed teeth			Missing teeth		
	df	F	Sig.	df	F	Sig.
Dental behaviour scale	57, 2906	7.626	<0.001	58, 3463	2.963	<0.001
Visiting subscale	28, 2939	17.252	<0.001	29, 3497	2.324	<0.001
Self-care subscale	22, 2941	5.446	<0.001	24, 3497	3.626	<0.001

	Decayed teeth					Missing teeth				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Dental behaviour										
Low	674	1.55	1.77	1.42	1.69	756	3.58	6.32	3.13	4.03
Low-moderate	643	0.84	1.39	0.73	0.95	721	3.16	6.07	2.72	3.61
Moderate	606	0.52	1.28	0.42	0.62	754	3.35	6.28	2.90	3.80
Moderate-high	547	0.46	1.24	0.36	0.56	664	3.28	5.50	2.86	3.70
High	495	0.46	1.39	0.34	0.59	628	3.29	5.66	2.85	3.74
Total	2,964	0.80	1.50	0.75	0.86	3,522	3.34	5.99	3.14	3.54
Test of significance	F (4, 2959) = 66.479; p < 0.001					F (4, 3517) = 0.491; p = 0.742				
Visiting subscale										
Low	603	1.60	1.82	1.46	1.75	682	3.67	6.40	3.19	4.15
Low-moderate	653	0.95	1.49	0.84	1.07	732	3.13	6.14	2.69	3.58
Moderate	650	0.55	1.25	0.46	0.65	818	3.35	6.08	2.93	3.76
Moderate-high	622	0.41	1.13	0.32	0.50	761	3.18	5.67	2.77	3.58
High	437	0.41	1.38	0.28	0.54	530	3.42	5.57	2.95	3.90
Total	2,964	0.80	1.50	0.75	0.86	3,522	3.34	5.99	3.14	3.54
Test of significance	F (4, 2959) = 73.720; p < 0.001					F (4, 3517) = 0.896; p = 0.465				
Self-care subscale										
Low	651	1.18	1.58	1.06	1.30	726	3.19	5.80	2.77	3.61
Low-moderate	856	0.79	1.43	0.70	0.89	1,015	3.61	6.40	3.22	4.01
Moderate	466	0.73	1.47	0.60	0.86	546	3.88	6.42	3.34	4.42
Moderate-high	616	0.61	1.54	0.49	0.73	756	2.74	5.28	2.36	3.11
High	375	0.59	1.39	0.45	0.73	479	3.31	5.87	2.78	3.84
Total	2,964	0.80	1.50	0.75	0.86	3,522	3.34	5.99	3.14	3.54
Test of significance	F (4, 2959) = 15.096; p < 0.001					F (4, 3517) = 3.665; p = 0.006				

Social impact and oral symptoms

Behaviour scores were next investigated for their relationship with social impact and oral symptoms. Table 5.7 presents the results of one-way ANOVA. There was a significant effect on the overall scale and the two subscales for both oral health outcome measures. There was a twofold difference in the magnitude of social impact scores across quintiles of dental behaviour. Impact decreased from 0.71 for people with low scores on the overall scale to 0.35 for those with high behaviour scores. There was similar variation across quintiles of dental visiting, with impact scores ranging from 0.72 for low visiting to 0.38 for high visiting scores. While differences in impact were less pronounced on the self-care subscale, an inverse gradient in impact by self-care was clear, and the relationship was significant. Unlike decayed teeth, where no further gains in oral health were achieved among those with high behaviour scores, oral health-related quality of life continued to improve with higher behaviour scores. The previous chapter, which addressed social inequality in oral health, found no relationship between socioeconomic position and oral symptom experience. As shown in Table 5.7, however, there is an inverse relationship between dental behaviour and symptom experience. Again, greater variation was found by visiting than by self-care.

Table 5.7 Social impact and oral symptoms by dental behaviour (dentate persons, weighted data)

	Social impact			Oral symptom experience		
	df	F	Sig.	df	F	Sig.
Dental behaviour scale	58, 3527	4.813	<0.001	58, 3575	4.148	<0.001
Visiting subscale	29, 3556	8.524	<0.001	29, 3556	5.722	<0.001
Self-care subscale	24, 3561	7.055	<0.001	20, 3609	5.127	<0.001

	Social impact					Oral symptom experience				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Dental behaviour										
Low	771	0.71	0.60	0.66	0.75	782	1.38	1.10	1.31	1.46
Low-moderate	742	0.61	0.54	0.57	0.65	750	1.17	0.97	1.10	1.24
Moderate	767	0.47	0.51	0.43	0.50	777	1.03	0.99	0.96	1.10
Moderate-high	673	0.49	0.51	0.45	0.53	679	1.07	0.98	0.99	1.14
High	634	0.35	0.46	0.32	0.39	648	0.81	0.84	0.74	0.87
Total	3,586	0.53	0.54	0.51	0.55	3,634	1.10	1.00	1.07	1.13
Test of Significance	F (4, 3581) = 46.503; p < 0.001					F (4, 3629) = 32.827; p < 0.001				
Visiting subscale										
Low	700	0.72	0.61	0.68	0.77	711	1.38	1.07	1.30	1.46
Low-moderate	747	0.59	0.56	0.55	0.63	757	1.15	0.98	1.08	1.22
Moderate	838	0.52	0.53	0.48	0.55	848	1.00	1.01	0.93	1.07
Moderate-high	770	0.42	0.46	0.39	0.45	776	1.07	0.98	1.00	1.14
High	531	0.38	0.46	0.34	0.42	542	0.86	0.86	0.79	0.93
Total	3,586	0.53	0.54	0.51	0.55	3,634	1.10	1.00	1.07	1.13
Test of Significance	F (4, 3581) = 44.456; p < 0.001					F (4, 3629) = 24.845; p < 0.001				
Self-care subscale										
Low	737	0.68	0.02	0.64	0.73	740	1.34	0.04	1.26	1.42
Low-moderate	1028	0.56	0.02	0.52	0.59	1,049	1.16	0.03	1.10	1.22
Moderate	566	0.47	0.02	0.43	0.51	569	1.05	0.04	0.97	1.13
Moderate-high	768	0.48	0.02	0.44	0.52	787	0.99	0.03	0.92	1.06
High	487	0.41	0.02	0.36	0.46	489	0.86	0.04	0.78	0.93
Total	3,586	0.53	0.01	0.51	0.55	3,634	1.10	0.02	1.07	1.13
Test of Significance	F (4, 3581) = 25.459; p < 0.001					F (4, 3629) = 22.243; p < 0.001				

Self-rated oral health

There was a positive relationship between dental behaviour and self-rated oral health (Table 5.8). Less than a quarter (24.3%) of those with low scores rated their oral health as very good or excellent, compared with 63.3% of those with high scores. Moreover, of those with scores in the low quintile, 41.4% rated their oral health as average or worse, compared with only 11.3% with behaviour scores in the high quintile. Results were similar for the visiting and self-care subscales.

Table 5.8: Self-rated oral health by dental behaviour (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
						Pearson's Chi-square		
	Very poor or poor	Average	Good	Very good	Excellent			
	Row %	Row %	Row %	Row %	Row %	Value	df	Asymp. sig. (2-sided)
Dental behaviour						433.759	16	<0.001
n	**182**	**631**	**1,204**	**1,183**	**429**			
Low	11.6	29.8	34.3	20.6	3.7			
Low-moderate	6.7	17.2	38.4	31.1	6.7			
Moderate	1.8	15.5	33.9	32.9	15.9			
Moderate-high	2.4	12.9	32.8	40.6	11.4			
High	1.7	9.6	25.4	40.1	23.2			
Total	5.0	17.4	33.2	32.6	11.8			
Visiting subscale						304.672	16	<0.001
n	**183**	**631**	**1,205**	**1,183**	**430**			
Low	10.8	26.7	34.5	23.9	4.1			
Low-moderate	6.1	20.5	38.0	26.8	8.6			
Moderate	3.7	14.8	35.9	32.7	12.9			
Moderate-high	2.3	14.3	28.7	40.9	13.8			
High	2.0	9.2	26.8	39.7	22.2			
Total	5.0	17.4	33.2	32.6	11.8			
Self-care subscale						273.546	16	<0.001
n	**182**	**630**	**1,206**	**1,183**	**429**			
Low	10.4	27.7	34.5	23.6	3.8			
Low-moderate	4.8	16.1	35.8	32.6	10.7			
Moderate	3.2	19.8	32.6	29.5	14.9			
Moderate-high	3.8	11.7	34.0	37.8	12.6			
High	1.4	10.5	25.2	41.4	21.5			
Total	5.0	17.4	33.2	32.6	11.8			

In summary, a strong positive association was observed between dental visiting and self-care behaviour and oral health.

5.2 Dental service utilisation

The dental visiting subscale evaluated factors that motivate people to seek dental care when they have a dental problem. Six additional items examined factors related to the utilisation of dental services. These addressed attendance frequency, perceived need for visit, usual reason for visit, continuity in a dentist-patient relationship and investment in private dental insurance. As shown in Table 5.9, response to attendance frequency was distributed approximately equally across the four response categories. Almost a quarter (24.1%) attended twice yearly, a little over a quarter attended annually (29.0%), just over a quarter attended less often than once in two years (26.6%) and the remainder (17.5%) attended once in two years. Equal proportions perceived a need for a dental visit as did not perceive a need. More than half the sample (54.0%) attended for a check-up rather than because they had a dental problem. Three-quarters (75.8%) visited the same dentist on an ongoing basis, although for nearly 40% of these persons, continuous care had been for a period of less than five years. Over a third (37.9%) of the sample had invested in private dental insurance.

Table 5.9: Response to dental service utilisation items (dentate persons, weighted data)

	Count	%	Cum %		Count	%	Cum %
Average visit frequency [(a)]				**Continuity of care** [(d)]			
Twice or more annually	885	24.1	24.8	Usual dentist	2,788	75.8	76.0
Once a year	1,067	29.0	54.6	No usual dentist	880	23.9	100.0
Once in two years	643	17.5	72.6	Missing	11	0.3	
Gap >2 years	978	26.6	100.0	Total	3,678	100.0	
Missing, Don't know	104	2.8					
Total	3,678	100.0					
				Dental insurance [(e)]			
				Has dental insurance	1,392	37.9	
Perceived need for visit [(b)]				No dental insurance	2,248	61.1	
Yes	1,835	49.9	50.1	Missing	38	1.0	38.2
No	1,827	49.7	100.0	Total	3,678	100.0	100.0
Missing, Don't know, Never	16	0.4					
Total	3,678	100.0					
Usual reason for visit [(c)]							
Check-up	1,985	54.0	54.2				
Problem	1,674	45.5	100.0				
Missing	20	0.5					
Total	3,678	100.0					

(a) How often on average would you seek care from a dental professional?
(b) Do you need a dental visit?
(c) Which is your usual reason for visiting a dental professional, for check-ups or when you have a dental problem?
(d) Is there a dentist you usually go to for dental care?
(e) Do you have private insurance cover for dental expenses?

5.2.1 Dental utilisation and socioeconomic indicators

Dental utilisation items were examined for their relationship with socioeconomic factors. Results are reported in Table 5.10. To simplify reporting for average visit frequency, results are shown for the category 'twice or more annually'. For variables with binary response categories, ie need visit?, usual reason, continuity of care, and dental insurance, affirmative responses are reported. Differences between percentages calculated for each variable (all response categories included) were tested for significance with Pearson's Chi-square and p values are reported.

There were significant associations between socioeconomic position and dental utilisation items. Compared with adults on higher income, a smaller proportion of people with household income <$12,000 usually visited for a check-up, had a usual dentist and had private dental insurance. A significantly greater proportion of people with tertiary education compared with those without visited twice or more yearly, usually attend for a check-up, had a regular dentist and had dental insurance.

There were differences in dental utilisation by occupational group. Compared with other occupational groups, a smaller proportion of labourers and related workers usually visited for a check-up, had a usual dentist, and had dental insurance. Similarly, a higher proportion of workers with prestige scores in the high quintile range reported an average visit frequency of twice or more yearly and a check-up as their usual reasons for visiting. In addition, a higher proportion of those with high prestige scores had a usual dentist and had dental insurance.

Of note, there were no differences between cardholders and non-cardholders in the perception of need for a dental visit. For each other dental utilisation item variable, a significantly smaller proportion of concession cardholders responded affirmatively. Differences based on area disadvantage were also significant, with higher proportions of adults with IRSD scores in the least disadvantaged quintile responding affirmatively to each of these items.

Table 5.10: Dental utilisation by socioeconomic indicators (dentate persons, weighted data)

	Average visit 2+ yearly (row %)	Need visit Yes (row %)	Usual reason Check-up (row %)	Continuity Usual dentist (row %)	Insurance Insured (row %)
Household income					
<$12,000	22.5	53.2	39.0	55.3	13.9
$12-20,000	24.1	52.8	46.9	61.7	23.8
$21-30,000	19.0	47.1	47.7	71.6	30.4
$31-40,000	22.7	43.8	52.0	78.6	33.8
$41-50,000	21.3	55.8	58.3	79.2	39.3
>$50,000	27.1	50.4	57.8	81.8	47.6
Total	24.2	50.3	53.4	75.8	37.7
Test of significance χ^2	p<0.001	p=0.006	p<0.001	p<0.001	p<0.001
Educational attainment					
Secondary or less	25.3	47.7	49.1	73.6	37.4
Vocation or other	20.2	53.8	49.2	74.3	34.4
Tertiary	27.4	47.8	63.1	79.3	42.6
Total	24.3	49.9	54.2	75.9	38.2
Test of significance χ^2	p<0.001	p=0.002	p<0.001	p=0.001	p<0.001
Occupational group [(a)]					
Manager/administrator	24.9	54.5	57.3	82.1	54.6
Professional	28.3	54.1	67.9	80.3	44.7
Paraprofessional	30.7	50.0	56.7	86.6	38.1
Tradesperson	17.3	49.5	41.9	76.9	33.1
Clerk	21.5	52.3	60.3	80.6	42.1
Sales/Personal services	18.1	50.5	48.7	71.7	32.3
Plant/machine op; Driver	21.1	52.6	51.3	70.1	41.2
Labourer/related	27.5	53.8	39.8	60.7	29.8
Total	23.8	52.4	55.6	77.7	41.1
Test of significance χ^2	p<0.001	p<0.858	p<0.001	p<0.001	p<0.001
Occupational prestige [(b)]					
Low	24.1	46.1	54.7	67.7	36.0
Low-moderate	17.1	53.4	46.2	73.7	29.1
Moderate	22.1	53.3	49.6	78.8	39.1
Moderate-high	25.0	47.6	63.0	79.8	42.3
High	28.1	59.1	61.1	81.0	54.2
Total	23.5	51.8	55.4	76.5	40.6
Test of significance χ^2	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001
Concession status					
Card holder	23.1	50.0	43.8	60.6	21.3
No card	25.1	50.1	56.6	79.5	42.1
Total	24.8	50.1	54.2	76.0	38.3
Test of significance χ^2	p<0.001	p=0.963	p<0.001	p<0.001	p<0.001
Area disadvantage [(b)]					
Quintile 1 (highest)	21.6	51.4	41.7	67.0	29.4
Quintile 2	20.8	49.5	47.8	73.8	41.5
Quintile 3	22.5	52.2	55.5	73.1	36.4
Quintile 4	26.5	49.1	59.4	77.2	35.0
Quintile 5	30.3	48.7	62.0	86.3	46.7
Total	24.8	50.2	54.2	76.2	38.1
Test of significance χ^2	p<0.001	p=0.569	p<0.001	p<0.001	p<0.001

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage – Australian Bureau of Statistics' Socio-Economic Indexes for Areas

5.2.2 Dental utilisation and demographic characteristics

There were no differences between males and females in the perceived need for a dental visit (Table 5.11). On other items, a significantly higher proportion of females responded affirmatively. The greatest difference between the sexes was in the usual reason for attending, where 47.8% of males usually attended for a check-up rather than with a problem, compared with 60.7% of females.

Differences in service utilisation varied significantly between age groups. A higher proportion of the 70+ years age group than younger adults reported an average of 2+ visits per year, and reported usually visiting for a check-up. Perceived need was lower among older adults. A smaller proportion of adults aged 18-29 years had a usual dentist, and reported having dental insurance. The percentages reporting frequent, asymptomatic visiting, a usual dentist, and dental insurance tended to increase across successive age groups.

A significantly greater proportion of adults born overseas compared with Australian-born adults reported frequent dental visiting. However, a comparison of those speaking a LOTE compared with those speaking English revealed that a smaller proportion of LOTE speakers had visited within 12 months, had a usual dentist and had dental insurance.

A comparison of employment status groups revealed that compared with retirees and the employed, a smaller proportion of adults who were not employed usually attended for a check-up, had a usual dentist and had dental insurance. Differences were particularly apparent for insurance, where 24.9% of the not employed were dentally insured compared with 41.3% of full-time workers, 40.6% of part-time workers, and 39.7% of retirees.

A higher proportion of adults living in highly accessible areas reported visiting twice yearly or more frequently on average, and reported that a check-up was their usual reason for a visit.

Table 5.11: Dental utilisation by demographic characteristics (dentate persons, weighted data)

	Average visit 2+ yearly (row %)	Need visit Yes (row %)	Usual reason Check-up (row %)	Continuity Usual dentist (row %)	Insurance Insured (row %)
Sex					
Male	23.9	48.7	47.8	72.6	36.3
Female	25.6	51.5	60.7	79.5	40.2
Total	24.8	50.1	54.2	76.0	38.3
Test of significance χ^2	p<0.001	p=0.086	p<0.001	p<0.001	p=0.014
Age group					
18-29 years	26.0	47.8	58.9	69.0	31.0
30-39 years	17.2	52.1	54.9	73.8	35.0
40-49 years	23.4	52.6	49.3	80.0	39.4
50-59 years	26.3	56.1	49.1	87.1	49.1
60-69 years	29.3	48.0	53.5	78.4	49.8
70+ years	36.3	39.1	59.3	72.7	35.8
Total	24.8	50.1	54.3	76.0	38.3
Test of significance χ^2	p<0.001	p<0.001	p<0.001	p<0.001	p<0.001
Country of birth					
Australia	23.1	50.6	53.5	76.1	38.9
Overseas	31.4	48.6	56.3	75.3	36.1
Total	24.8	50.2	54.1	75.9	38.3
Test of significance χ^2	p<0.001	p=0.320	p=0.171	p=0.679	p=0.152
Language at home					
Other than English	28.3	45.7	50.9	63.0	28.6
English	24.4	50.6	54.6	77.5	39.4
Total	24.8	50.1	54.2	76.0	38.2
Test of significance χ^2	p=0.148	p=0.070	p=0.166	p<0.001	p<0.001
Employment status					
Full-time	23.6	51.0	53.4	78.1	41.3
Part-time	18.1	52.5	56.4	75.8	40.6
Retired	32.0	41.5	56.6	74.7	39.7
Not employed	27.5	53.7	48.4	70.0	24.9
Total	24.4	50.3	53.7	75.8	38.3
Test of significance χ^2	p<0.001	p<0.001	p=0.019	p=0.002	p<0.001
Householders aged 5+					
One person	29.8	46.0	55.9	73.0	34.4
Two persons	24.5	48.4	53.9	74.9	40.8
Three-four persons	22.4	52.0	55.4	76.5	36.1
More than four persons	28.1	54.6	49.4	81.0	41.1
Total	24.7	50.2	54.2	76.0	38.2
Test of significance χ^2	p=0.028	p=0.020	p=0.169	p=0.033	p=0.014
ARIA [(a)] category					
Highly accessible	26.3	50.1	56.4	23.1	39.0
Accessible	17.1	49.0	44.0	29.2	31.3
Mod accessible	17.7	49.2	41.3	23.4	43.8
Remote	24.3	51.3	43.6	25.6	33.3
Very remote	16.7	69.0	43.3	33.3	37.9
Total	24.8	50.1	54.2	24.0	38.2
Test of significance χ^2	p<0.001	p=0.357	p<0.001	p=0.061	p=0.024

(a) Accessibility/Remoteness Index of Australia (ARIA)

5.2.3 Dental utilisation and oral health

Decayed and missing teeth

Dental service utilisation was examined for its association with oral health (Table 5.12). Estimates of decayed teeth increased with increasing average time between visits, from 0.65 for those who visit twice a year or more, to 0.99 for those visiting less frequently than biennially on average. Those who perceived a need for a dental visit estimated 1.14 decayed teeth compared with 0.47 affected teeth by those who perceived no need.

People who usually visited with a dental problem estimated more than twice the number of mean decayed teeth (1.15) than did those who usually attended for a check-up (0.52).

In absolute units, those with a usual dentist reported a mean of 0.69 decayed teeth, compared with 1.13 decayed teeth reported by those without a usual dentist. Non-insured adults had a mean of 0.94 decayed teeth compared to insured adults, who reported 0.57 mean decayed teeth. Mean differences in missing teeth were also significant across categories.

More missing teeth was reported by the following groups: those who usually visit biennially; those whose last visit was more than 10 years ago; those without a usual dentist; and those without private dental insurance. In addition, those who usually attend with a dental problem had more missing teeth (4.53) than did those usually attending for a check-up (2.46).

Table 5.12: Decayed and missing teeth by dental utilisation (dentate persons, weighted data)

	Decayed teeth					Missing teeth				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Average visit frequency										
Twice or more annually	701	0.65	1.39	0.55	0.75	863	3.37	5.54	3.00	3.74
Once a year	845	0.69	1.38	0.59	0.78	1,024	2.74	5.13	2.42	3.05
Once in two years	518	0.85	1.70	0.71	1.00	617	3.97	6.80	3.43	4.50
Gap >2 years	849	0.99	1.55	0.89	1.10	957	3.72	6.70	3.29	4.14
Total	2,912	0.80	1.50	0.74	0.85	3,460	3.38	6.02	3.18	3.58
Test of significance	F (3, 2908) = 8.874; p < 0.001					F (3, 3455) = 6.869; p < 0.001				
Perceived need for visit										
Yes	1,500	1.14	1.65	1.05	1.22	1,765	3.46	6.03	3.18	3.74
No	1,481	0.47	1.27	0.40	0.53	1,778	3.34	6.06	3.06	3.62
Total	2,982	0.81	1.51	0.75	0.86	3,543	3.40	6.05	3.20	3.60
Test of significance	F (1, 2979) = 153.25; p < 0.001					F (1, 3540) = 0.364; p = 0.546				
Usual reason for visit										
Check-up	1,600	0.52	1.25	0.46	0.58	1,927	2.46	5.00	2.24	2.69
Problem	1,377	1.15	1.70	1.06	1.24	1,612	4.53	6.94	4.19	4.87
Total	2,978	0.81	1.51	0.75	0.86	3,540	3.41	6.05	3.21	3.60
Test of significance	F (1, 2975) = 47.552; p < 0.001					F (1, 3537) = 105.588; p < 0.001				
Continuity of care										
Usual dentist	2,237	0.69	1.41	0.64	0.75	2,687	3.19	5.66	2.97	3.40
No usual dentist	750	1.13	1.73	1.01	1.25	862	4.05	7.08	3.58	4.53
Total	2,987	0.80	1.51	0.75	0.86	3,549	3.40	6.04	3.20	3.60
Test of Significance	F (1, 2984) = 47.552; p < 0.001					F (1, 3547) = 13.438; p < 0.001				
Length continuous care										
Less than 12 months	174	0.76	1.44	0.55	0.98	225	2.72	5.47	2.00	3.44
One to <2 years	202	0.68	1.65	0.45	0.91	241	3.03	5.41	2.34	3.71
Two to < 5 years	512	0.66	1.32	0.55	0.78	599	2.84	5.46	2.40	3.27
Five <10 years	578	0.75	1.39	0.63	0.86	687	3.04	5.23	2.65	3.43
Ten years or more	770	0.67	1.41	0.57	0.76	932	3.68	6.14	3.28	4.07
Total	2,236	0.70	1.41	0.64	0.75	2,683	3.19	5.65	2.97	3.40
Test of significance	F (4, 2230) = 0.461; p = 0.765					F (4, 2678) = 2.886; p = 0.021				
Dental insurance										
Has dental insurance	1,148	0.57	1.26	0.50	0.65	1,350	2.99	5.39	2.70	3.27
No dental insurance	1,809	0.94	1.62	0.86	1.01	2,171	3.70	6.44	3.43	3.97
Total	2,957	0.80	1.50	0.74	0.85	3,521	3.42	6.07	3.22	3.62
Test of significance	F (1, 2955) = 41.783; p < 0.001					F (1, 3518) = 11.493; p = 0.001				

Social impact and oral symptom experience

Table 5.13 shows mean social impact scores and mean oral symptom experience by categories of dental utilisation. In terms of frequency of visits, those whose average visit frequency was twice yearly reported highest impact scores. Problem-oriented visiting was associated with greater impact (0.67) than check-up oriented visiting (0.42). A perceived need for dental care was associated with greater social impact. People without a usual dentist reported greater impact (1.13) than did those with a usual dentist (0.69), and those without dental insurance reported greater impact (0.94) than those with insurance (0.57).

These factors were less clearly associated with oral symptom experience. Those whose average visit frequency was greater than two years reported the highest number of symptoms, but differences across categories were not significant. Adults who perceived a need for a dental visit reported significantly more oral symptoms (1.25) than did those with no need (0.96). Those who usually made check-up appointments reported significantly fewer oral symptoms (1.00) than problem-oriented attendees (1.22). Although those with a usual dentist reported fewer symptoms, differences failed to reach statistical significance. Those whose continuity with a usual dentist had been for less than 12 months reported significantly more symptoms (1.27) than those with a longer relationship.

Table 5.13: Social impact and oral symptom experience by dental utilisation (dentate persons, weighted data)

	Social impact					Oral symptom experience				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Average visit frequency										
Twice or more annually	871	0.59	0.59	0.55	0.63	883	1.07	0.97	1.01	1.14
Once a year	1,048	0.50	0.51	0.47	0.54	1,067	1.09	1.02	1.03	1.15
Once in two years	637	0.48	0.47	0.44	0.51	643	1.06	0.97	0.99	1.14
Gap >2 years	964	0.54	0.57	0.50	0.57	978	1.14	1.02	1.07	1.20
Total	3,520	0.53	0.54	0.51	0.55	3,573	1.09	1.00	1.06	1.13
Test of significance	F (3, 3515) = 6.395; p < 0.001					F (3, 3568) = 0.929; p = 0.426				
Perceived need for visit										
Yes	1,811	0.61	0.58	0.58	0.63	1,834	1.25	1.03	1.20	1.30
No	1,797	0.46	0.49	0.43	0.48	1,827	0.96	0.95	0.91	1.00
Total	3,607	0.53	0.54	0.51	0.55	3,661	1.10	1.00	1.07	1.14
Test of significance	F (4, 3605) = 70.756; p < 0.001					F (4, 3659) = 80.087; p <0.001				
Usual reason for visit										
Check-up	1,963	0.42	0.44	0.40	0.44	1,985	1.00	0.97	0.96	1.04
Problem	1,640	0.67	0.62	0.64	0.70	1,673	1.22	1.03	1.17	1.27
Total	3,603	0.53	0.54	0.51	0.55	3,657	1.10	1.00	1.07	1.13
Test of significance	F (1, 3601) = 196.606; p < 0.001					F (4, 3655) = 44.575; p < 0.001				
Continuity of care										
Usual dentist	2,754	0.51	0.50	0.49	0.53	2,786	1.09	0.99	1.05	1.13
No usual dentist	858	0.61	0.63	0.57	0.65	880	1.12	1.03	1.06	1.19
Total	3,612	0.53	0.54	0.51	0.55	3,666	1.10	1.00	1.07	1.13
Test of significance	F (4, 3610) = 23.837; p < 0.001					F (4, 3629) = 0.715; p = 0.398				
Length continuous care										
Less than 12 months	238	0.72	0.64	0.64	0.80	239	1.27	0.95	1.14	1.39
One to <2 years	242	0.52	0.50	0.45	0.58	243	1.06	1.01	0.93	1.19
Two to < 5 years	603	0.54	0.54	0.50	0.58	613	1.07	0.95	1.00	1.15
Five <10 years	707	0.48	0.46	0.44	0.51	717	1.12	1.03	1.05	1.20
Ten years or more	960	0.45	0.46	0.42	0.48	969	1.04	1.00	0.98	1.11
Total	2,750	0.51	0.50	0.49	0.53	2,782	1.09	0.99	1.05	1.13
Test of significance	F (4, 2744) = 14.896; p < 0.001					F (4, 2776) = 2.673; p = 0.031				
Dental insurance										
Has dental insurance	1,374	0.48	0.48	0.46	0.51	1,392	1.10	0.99	1.05	1.15
No dental insurance	2,211	0.57	0.58	0.54	0.59	2,247	1.10	1.01	1.05	1.14
Total	3,585	0.53	0.54	0.52	0.55	3,639	1.10	1.00	1.06	1.13
Test of significance	F (1, 3582) = 21.620; p < 0.001					F (1, 3636) = 0.005; p = 0.942				

Self-rated oral health

The proportion that rated their oral health as average or worse increased with increasing time between visits. A greater proportion of adults with no perceived need rated their oral health as very good or excellent compared with those without. Having a usual dentist was associated with better self-rated oral health. Of note, 53.6% of problem-oriented attendees rated their dental health as average or worse, compared with 12.9% of those who usually attend for a check-up. A higher percentage of those without dental insurance rated their oral health as poor or very poor.

Table 5.14: Self-rated oral health by dental utilisation (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
						Pearson's Chi-square		
	Very poor or poor	Average	Good	Very good	Excellent			
	Row %	Row %	Row %	Row %	Row %	Value	df	Asymp. sig. (2-sided)
Average visit frequency						70.611	12	<0.001
n	177	629	1,170	1,166	429			
Twice or more annually	5.2	18.2	28.4	38.1	10.2			
Annually	2.6	14.8	34.5	33.1	15.0			
Biennially	4.4	19.0	33.8	32.7	10.1			
Gap >2 years	7.7	19.3	34.2	27.2	11.7			
Total	5.0	17.6	32.8	32.7	12.0			
Perceived need for visit						256.308	4	<0.001
n	181	637	1212	1193	434			
Yes	8.9	22.0	32.9	29.7	6.6			
No	1.0	12.9	33.4	35.6	17.2			
Total	4.9	17.4	33.1	32.6	11.9			
Usual reason for visit								
n	184	632	1,213	1,194	431	407.873	4	<0.001
Check-up	1.2	11.7	29.7	40.0	17.4			
Problem	9.6	24.0	37.4	24.0	5.1			
Total	5.0	17.3	33.2	32.7	11.8			
Continuity of care						45.785	4	<0.001
n	184	637	1,213	1,193	435			
Usual dentist	4.0	16.8	32.2	34.4	12.5			
No usual dentist	8.3	19.2	35.9	26.7	9.9			
Total	5.0	17.4	33.1	32.6	11.9			
Length continuous care						69.817	16	<0.001
n	112	469	897	957	347			
Less than 12 months	9.2	17.2	33.5	31.4	8.8			
From 1 to <2 years	5.8	25.9	29.2	24.3	14.8			
2 to less than 5 years	4.6	16.3	28.9	35.4	14.8			
5 to less than 10 years	3.6	17.4	32.3	37.5	9.2			
10 years or more	2.3	14.5	34.7	34.7	13.8			
Total	4.0	16.9	32.2	34.4	12.5			
Dental insurance						48.974	4	<0.001
n	184	636	1214	1174	428			
Has dental insurance	3.1	15.7	31.3	38.2	11.7			
No dental insurance	6.3	18.6	34.7	28.6	11.8			
Total	5.1	17.5	33.4	32.3	11.8			

5.3 Health self-efficacy

Bandura defined the self-efficacy component of his 1986 social cognitive theory as a judgment of one's capability to accomplish a certain level of performance. Thus, the capacity to perform health-relevant behaviour is enhanced or impaired by an individual's self-efficacy beliefs.

The Perceived health competence scale measures self-efficacy with eight items that combine both health outcome and behavioural expectancies. Outcome expectancies refer to a perception of the possible consequences of one's action, and behavioural expectancies refer to the belief in one's capability to initiate change. This scale is more specific than a general measure of self-efficacy, as it relates directly to health, and yet is not confined to a specific health outcome. Table 5.15 presents the distribution in response for the eight items.

Table 5.15: Response to the perceived health competence scale (dentate persons, weighted data)

Item	Response category					Valid	Missing
	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree		
	Row percentages						
I take responsibility in caring for my health	0.2	1.5	4.3	58.1	34.3	98.5	1.5
No matter how hard I try, my health doesn't	13.7	47.6	19	14.8	3.3	98.5	1.5
Difficult to find solutions to health problems	16.1	52.4	17.6	10.1	2.1	98.3	1.7
I succeed in projects to improve my health	0.6	6.3	32.5	51.7	7.4	98.5	1.5
Able to achieve goals with respect to my health	0.6	6.5	20	62.6	8.8	98.6	1.4
Efforts to change my health don't work	9.5	51.0	26.7	10.2	1.1	98.4	1.6
Plans for my health don't work	11.8	54.8	22.4	8.7	0.8	98.5	1.5
I can do things for my health as well as most	1.0	3.7	17.8	61.0	14.8	98.4	1.6

5.3.1 Factor analysis of the perceived health competency scale items

Using principal components factor analysis with orthogonal (varimax) rotation, one factor was extracted that accounted for 51.4% of the variance in perceived health competence. A potential second factor presented with an eigenvalue close to one (0.99) that explained an additional 12.3% of variance. Retaining the two factors was a valid option, as a two-factor solution made good conceptual sense and was not contraindicated by the break in the slope of the scree plot. The first factor 'diffidence' is a measure of low-expectancy beliefs to positively influence health outcomes. Therefore high scores on the 'diffidence' subscale reflect a lack of confidence or fear of failure toward achieved positive health outcomes. This is an important distinction from measurement of apathy or indifference toward adopting and adhering to health practices. Conversely, high 'assurance' subscale scores indicate a cognitive orientation that health can be effectively managed through goal setting, self-regulation and perseverance.

Table 5.16 reports the factor loadings on the items after rotation and shows acceptable internal consistency Cronbach alpha statistics of 0.84 for the diffidence subscale and 0.74 for the assurance subscale.

Table 5.16: Factor analysis of the perceived health competence scale items (dentate persons, weighted data)

Initial statistics [a]				Final statistics [b]			
		Variance				Factor loadings	
Factor	Eigenvalue	%	Cum. %		Item number and label	Diffidence	Assurance
1	4.11	51.39	51.39	1	I take responsibility in caring for my health	0.05	0.77
2	0.99	12.32	63.71	* 2	No matter how hard I try, my health doesn't	0.84	-0.07
3	0.75	9.35	73.07	* 3	Difficult to find solutions to health problems	0.80	-0.18
4	0.63	7.92	80.99	4	Succeed in projects to improve health	-0.42	0.65
5	0.49	6.13	87.12	5	Generally able to achieve health goals	-0.46	0.69
6	0.37	4.62	91.74	* 6	Efforts to change health don't work	0.73	-0.37
7	0.35	4.39	96.13	* 7	Plans for my health don't work out well	0.70	-0.46
8	0.31	3.87	100.00	8	Able to do health things as well as most	-0.32	0.61
					Cronbach's alpha	0.84	0.74
					N of cases	3,599	3,609

(a) Extraction method: principal component analysis
(b) Rotation method: varimax with Kaiser normalization. Rotation converged in 3 iterations
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.88
* direction reversed in full scale scoring

5.3.2 Health self-efficacy and socioeconomic indicators

Associations between health self-efficacy beliefs and socioeconomic indicators are presented in Table 5.17. Unlike the performance of health behaviours, beliefs about health self-efficacy are strongly associated with social position. Each increase in household income was associated with decreased 'diffidence'. The range in absolute units was greater on the diffidence subscale (0.43) than the assurance subscale (0.04) for income and all other social position indicators. Similar trends emerged for educational attainment. Adults with less education expressed less assurance to effect behaviour changes to improve health outcomes. From among occupational groups, tradespersons expressed greatest diffidence (1.52), and paraprofessionals had the highest assurance score (2.97), followed by professionals and then managers and administrators. Concession cardholders reported greatly elevated diffidence scores. Irrespective of indicator used to measure health self-efficacy, persons with greater social advantage were more assured of their ability to manage and modify their health.

5.3.3 Health self-efficacy and demographic characteristics

Health self-efficacy beliefs were socially patterned by other characteristics shown in Table 5.18. Females reported higher assurance, but differences according to sex were not significant for diffidence or the overall scale. Diffidence tended to increase across age groups and was also higher for Overseas-born persons and those speaking a language other than English at home.

Australian-born adults held significantly greater self-efficacy beliefs than their Overseas-born counterparts. Differences were also significant for employment status on each scale, with the non-employed least likely to see the circumstances of their health as being amenable to their direction and management.

Table 5.17: Health self-efficacy by socioeconomic indicators (dentate persons, weighted data)

	N	Health competence		Diffidence subscale		Assurance subscale	
		Mean	SD	Mean	SD	Mean	SD
Household income							
<$12,000	230	2.58	0.60	1.67	0.83	2.83	0.57
$12-20,000	376	2.63	0.64	1.54	0.82	2.80	0.62
$21-30,000	384	2.65	0.56	1.50	0.73	2.80	0.54
$31-40,000	446	2.72	0.58	1.42	0.76	2.85	0.54
$41-50,000	457	2.77	0.58	1.34	0.74	2.88	0.50
>$50,000	1,493	2.82	0.55	1.24	0.67	2.89	0.52
Total	3,385	2.74	0.58	1.37	0.74	2.86	0.54
Test of significance		F (5,3379)=14.826, p< 0.001		F(5,3379)=24.006, p< 0.001		F(5,3379)= 2.911, p< 0.001	
Educational attainment							
Secondary or less	994	2.59	0.55	1.59	0.76	2.78	0.52
Vocation or Other	1,266	2.74	0.56	1.38	0.72	2.87	0.53
Tertiary	1,307	2.87	0.58	1.20	0.69	2.93	0.54
Total	3,567	2.75	0.58	1.37	0.74	2.86	0.54
Test of significance		F(2,3564)= 65.413, p< 0.001		F(2,3564)= 84.521, p< 0.001		F(2,3564)= 22.167, p< 0.001	
Occupational group [(a)]							
Manager/administrator	368	2.82	0.58	1.26	0.73	2.89	0.50
Professional	548	2.86	0.50	1.20	0.61	2.92	0.49
Paraprofessional	192	2.91	0.52	1.15	0.63	2.97	0.49
Tradesperson	289	2.61	0.60	1.52	0.79	2.74	0.54
Clerk	348	2.73	0.59	1.36	0.72	2.82	0.57
Sales/Personal services	310	2.81	0.55	1.29	0.67	2.91	0.52
Plant/machine op; Driver	116	2.67	0.47	1.42	0.66	2.77	0.40
Labourer/related	161	2.65	0.49	1.47	0.62	2.76	0.46
Total	2,333	2.78	0.56	1.31	0.69	2.86	0.51
Test of significance		F(7,2324)=9.956, p< 0.001		F(2,2324)= 9.717, p< 0.001		F(7,2324)= 6.981, p< 0.001	
Occupational prestige [(b)]							
Low	466	2.72	0.52	1.38	0.67	2.82	0.47
Low-moderate	443	2.74	0.58	1.36	0.68	2.85	0.57
Moderate	456	2.74	0.57	1.33	0.70	2.82	0.54
Moderate-high	564	2.82	0.54	1.26	0.71	2.91	0.46
High	509	2.83	0.54	1.25	0.66	2.90	0.51
Total	2,438	2.78	0.55	1.31	0.69	2.86	0.51
Test of significance		F(2,2433)=4.061, p= 0.003		F(2,2433)= 3.831, p= 0.004		F(2,2433)= 3.212, p= 0.012	
Concession status							
Card holder	653	2.65	0.62	1.52	0.80	2.83	0.59
No card	2,970	2.77	0.57	1.33	0.72	2.88	0.52
Total	3,623	2.75	0.58	1.37	0.74	2.87	0.54
Test of significance		F(1,3621)=23.508, p< 0.001		F(1,3621)= 35.897, p< 0.001		F(1,3621)= 4.760, p= 0.029	
Area disadvantage [(c)]							
Quintile 1 (highest)	664	2.68	0.57	1.46	0.75	2.82	0.52
Quintile 2	537	2.69	0.59	1.46	0.78	2.84	0.56
Quintile 3	755	2.73	0.57	1.36	0.71	2.82	0.54
Quintile 4	721	2.76	0.57	1.36	0.71	2.88	0.55
Quintile 5	901	2.84	0.58	1.26	0.75	2.95	0.51
Total	3,578	2.75	0.58	1.37	0.74	2.87	0.54
Test of significance		F(4,3572)= 9.979, p< 0.001		F(4, 3572)= 9.403, p< 0.001		F(4, 3572)= 8.205, p< 0.001	

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage – Australian Bureau of Statistics' Socio-Economic Indexes for Areas

Table 5.18: Health self-efficacy by demographic characteristics (dentate persons, weighted data)

	N	Health competence		Diffidence subscale		Assurance subscale	
		Mean	SD	Mean	SD	Mean	SD
Sex							
Male	1,825	2.74	0.58	1.36	0.73	2.84	0.54
Female	1,802	2.76	0.57	1.37	0.75	2.89	0.53
Total	3,627	2.75	0.58	1.37	0.74	2.87	0.54
Test of significance		F(1,3625)= 0.965; p=0.326		F(1,3625)=0.207; p=0.649		F(1,3625)=7.721; p=0.005	
Age group							
18-29 years	945	2.74	0.58	1.34	0.72	2.82	0.55
30-39 years	808	2.80	0.54	1.28	0.66	2.87	0.51
40-49 years	727	2.72	0.55	1.37	0.68	2.82	0.53
50-59 years	517	2.76	0.65	1.36	0.83	2.88	0.56
60-69 years	320	2.77	0.58	1.40	0.78	2.94	0.51
70+ years	310	2.68	0.58	1.64	0.86	3.01	0.53
Total	3,627	2.75	0.58	1.37	0.74	2.87	0.54
Test of significance		F(5,3621)=2.189; p=0.053		F(5,3621)=11.159; p< 0.001		F(5,3621)=7.927; p< 0.001	
Country of birth							
Australia	2,839	2.76	0.57	1.35	0.73	2.88	0.53
Overseas	751	2.71	0.60	1.40	0.77	2.83	0.57
Total	3,590	2.75	0.58	1.36	0.74	2.87	0.54
Test of significance		F(1,3588)= 4.849; p< 0.001		F(1,3588)= 2.795; p< 0.001		F(1,3588)= 5.607; p< 0.018	
Language at home							
Other than English	386	2.64	0.64	1.51	0.80	2.79	0.60
English	3,241	2.76	0.57	1.35	0.73	2.88	0.53
Total	3,627	2.75	0.58	1.37	0.74	2.87	0.54
Test of significance		F(1,3625)= 16.173; p< 0.001		F= 17.228; p< 0.001		F= 8.704; p= 0.003	
Employment status							
Full-time	1,697	2.78	0.53	1.30	0.67	2.86	0.50
Part-time	658	2.78	0.60	1.31	0.72	2.86	0.56
Retired	496	2.70	0.61	1.55	0.85	2.96	0.56
Not employed	540	2.65	0.64	1.50	0.82	2.79	0.59
Total	3,391	2.75	0.57	1.37	0.74	2.87	0.53
Test of significance		F(3,3386)=9.290; p< 0.001		F(3,3386)=22.446; p< 0.001		F(3,3386)= 9.510; p< 0.001	
Householders aged 5+							
One person	424	2.74	0.55	1.43	0.76	2.91	0.50
Two persons	1,392	2.78	0.56	1.34	0.73	2.90	0.51
Three-four persons	1,421	2.73	0.60	1.37	0.74	2.83	0.57
More than four	386	2.73	0.59	1.37	0.75	2.84	0.52
Total	3,623	2.75	0.58	1.37	0.74	2.87	0.54
Test of significance		F(3,3618)=1.956; p=0.119		F(3,3618)=1.741; p=0.157		F(3,3618)=4.543; p=0.004	
ARIA [(a)] category							
Highly accessible	3,014	2.76	0.59	1.35	0.74	2.87	0.55
Accessible	409	2.72	0.53	1.41	0.72	2.85	0.48
Mod accessible	125	2.73	0.54	1.43	0.74	2.89	0.47
Remote	37	2.60	0.42	1.54	0.62	2.75	0.38
Very remote	30	2.71	0.73	1.54	0.99	2.96	0.59
Total	3,615	2.75	0.58	1.37	0.74	2.87	0.54
Test of Significance		F(4,3610)= 1.011; p=0.400		F(4,3610)= 1.637; p=0.162		F(4,3610)= 0.798; p=0.527	

(a) Accessibility/Remoteness Index of Australia (ARIA)

5.3.4 Health self-efficacy and oral health

Decayed and missing teeth

So that the relationship between health self-efficacy beliefs and oral health could be observed, mean scale and subscale scores were divided into quintiles and labelled from low to high. A one-way ANOVA procedure revealed health self-efficacy was related to oral health outcomes (Table 5.19). There was an almost threefold difference in mean decayed teeth across quintiles on the overall scale (0.45 to 1.32), with untreated caries increasing with decreasing health self-efficacy. For missing teeth, a 1.8-fold difference in affected teeth was observed across quintiles. Although health outcomes tended to worsen incrementally across quintiles, outcomes were considerably poorer in Quintile 1, among those with lowest health efficacy scores for both decayed and missing teeth. Adults with diffidence scores in the highest quintile range reported 1.98 decayed teeth and 7.49 missing teeth. Adults with high assurance, by contrast, reported 1.14 mean decayed teeth and 5.88 mean missing teeth.

Table 5.19: Decayed and missing teeth by health self-efficacy (dentate persons, weighted data)

	Decayed teeth			Missing teeth		
	df	F	Sig.	df	F	Sig.
Health self-efficacy beliefs	40, 2928	6.682	<0.001	40, 3476	2.209	<0.001
Diffidence subscale	20, 2948	14.685	<0.001	20, 3496	5.367	<0.001
Assurance subscale	17, 2951	9.701	<0.001	17, 3499	1.092	0.355

	Decayed teeth					Missing teeth				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Health self-efficacy										
Low	636	1.32	1.84	1.18	1.46	783	4.48	6.90	3.99	4.96
Low-moderate	774	0.82	1.55	0.71	0.93	900	3.08	5.54	2.72	3.44
Moderate	742	0.68	1.39	0.58	0.78	906	3.44	6.11	3.04	3.84
Moderate-high	269	0.59	1.10	0.45	0.72	293	2.91	5.44	2.28	3.53
High	549	0.45	1.14	0.35	0.54	636	2.45	5.30	2.04	2.87
Total	2,970	0.80	1.51	0.75	0.86	3,517	3.36	6.00	3.16	3.56
Test of significance	F (4, 2964) = 30.151; p < 0.001					F (4, 3512) = 11.496; p < 0.001				
Diffidence										
Low	554	0.51	1.32	0.40	0.62	625	2.45	5.36	2.03	2.87
Low-moderate	859	0.65	1.24	0.56	0.73	1,025	3.19	5.88	2.83	3.55
Moderate	656	0.77	1.46	0.66	0.88	771	2.76	5.16	2.39	3.12
Moderate-high	478	0.97	1.59	0.83	1.12	574	3.62	5.98	3.13	4.11
High	424	1.36	1.98	1.17	1.55	523	5.38	7.49	4.73	6.02
Total	2,970	0.80	1.51	0.75	0.86	3,517	3.36	6.00	3.16	3.56
Test of significance	F (4, 2964) = 24.303; p < 0.001					F (4, 3512) = 21.284; p < 0.001				
Low	488	1.20	1.66	1.06	1.35	598	3.38	6.08	2.90	3.87
Low-moderate	812	0.91	1.74	0.79	1.03	940	3.45	5.87	3.07	3.82
Moderate	779	0.79	1.43	0.69	0.89	959	3.63	6.28	3.23	4.02
Moderate-high	495	0.56	1.15	0.46	0.66	553	2.87	5.73	2.40	3.35
High	396	0.41	1.14	0.29	0.52	468	3.17	5.88	2.63	3.70
Total	2,970	0.80	1.51	0.75	0.86	3,517	3.36	6.00	3.16	3.56
Test of significance	F (4, 2964) = 20.276; p < 0.001					F (4, 3512) = 1.544; p = 0.187				

Social impact and oral symptom experience

Statistically significant differences in social impact scores and oral symptom experience were observed according to health self-efficacy beliefs (Table 5.20). A 2.4-fold difference in social impact scores was observed across quintiles of perceived health competency, with impact decreasing abruptly from the first to the second quintile range for the overall scale. On the diffidence subscale, a range of .51 absolute units was observed across quintiles representing a 2.5-fold difference in social impact. Again persons in the most disadvantaged quintile reported considerable poorer health than the preceding quintile. A two-fold difference in social impact was observed on the assurance subscale, with health outcomes declining with lessening assurance. Differences in oral symptom experience were also important but of lesser magnitude. Persons in quintile 5 for the overall scale reported a mean of one symptom experienced, compared with a mean of 1.23 reported in quintile 2. Greater variability was observed on the diffidence subscale, with mean symptom experience ranging from 1.02 for quintile 2 to 1.30 for quintile 5. People who most strongly perceived that they could influence their health outcomes experienced considerably less negative impact from oral conditions and considerably fewer oral symptoms.

Table 5.20: Social impact and oral symptom experience by health self-efficacy (dentate persons, weighted data)

	Social impact			Oral symptom experience		
	df	F	Sig.	df	F	Sig.
Health self-efficacy	41, 3540	11.336	<0.001	41, 3583	4.482	<0.001
Diffidence subscale	20, 3561	18.765	<0.001	20, 3604	4.372	<0.001
Assurance subscale	17, 3564	16.196	<0.001	17, 3607	5.559	<0.001

	Social impact					Oral symptom experience				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Health self-efficacy										
Low	791	0.78	0.67	0.73	0.83	814	1.17	1.09	1.09	1.24
Low-moderate	921	0.53	0.52	0.50	0.57	928	1.23	1.01	1.16	1.29
Moderate	924	0.48	0.48	0.45	0.51	932	0.98	0.95	0.92	1.04
Moderate-high	301	0.45	0.43	0.41	0.50	301	1.06	0.96	0.95	1.17
High	646	0.33	0.39	0.30	0.36	651	1.00	0.93	0.93	1.07
Total	3,583	0.53	0.54	0.51	0.55	3,626	1.10	1.00	1.06	1.13
Test of significance	F (4, 3577) = 72.235; p < 0.001					F (4, 3620) = 9.747; p < 0.001				
Diffidence										
Low	638	0.34	0.35	0.31	0.37	642	1.03	0.95	0.96	1.10
Low-moderate	1049	0.48	0.49	0.45	0.51	1051	1.02	0.96	0.96	1.08
Moderate	788	0.49	0.51	0.45	0.53	800	1.11	1.00	1.04	1.18
Moderate-high	590	0.61	0.53	0.57	0.66	594	1.09	0.99	1.01	1.17
High	517	0.85	0.72	0.79	0.91	539	1.30	1.12	1.21	1.40
Total	3583	0.53	0.54	0.51	0.55	3626	1.10	1.00	1.06	1.13
Test of significance	F (4, 3577) = 78.466; p < 0.001					F (4, 3620) = 7.913; p < 0.001				
Assurance										
Low	605	0.76	0.69	0.70	0.81	618	1.25	1.11	1.16	1.33
Low-moderate	956	0.58	0.54	0.55	0.62	969	1.10	1.01	1.04	1.17
Moderate	978	0.50	0.49	0.47	0.53	988	1.10	0.98	1.04	1.16
Moderate-high	569	0.38	0.42	0.35	0.42	571	0.95	0.85	0.88	1.02
High	475	0.38	0.44	0.34	0.42	480	1.06	1.02	0.97	1.15
Total	3,583	0.53	0.54	0.51	0.55	3,626	1.10	1.00	1.06	1.13
Test of significance	F (4, 3577) = 52.412; p < 0.001					F (4, 3620) = 6.686; p < 0.001				

In addition, people who perceived that they could influence their health rated their oral health more favourably. Most notably, a greater than sevenfold variation in the percentage reporting excellent oral health was observed on the diffidence subscale (Table 5.21).

Table 5.21: Self-rated oral health by health self-efficacy (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
	Very poor or Poor	Average	Good	Very good	Excellent	Pearson's Chi-square		
	Row %	Row %	Row %	Row %	Row %	Value	df	Asymp. sig. (2-sided)
Health self-efficacy						354.831	16	<0.001
n	**179**	**629**	**1,195**	**1,185**	**433**			
Low	9.0	27.0	35.9	23.8	4.3			
Low-moderate	5.4	17.9	38.1	31.6	7.0			
Moderate	3.3	14.6	32.2	38.8	11.1			
Moderate-high	3.7	9.3	32.0	34.7	20.3			
High	2.2	12.3	23.8	35.8	26.0			
Total	4.9	17.4	33.0	32.7	12.0			
Diffidence						307.831	16	<0.001
n	**178**	**629**	**1,194**	**1187**	**434**			
Low	2.2	12.8	23.5	35.4	26.2			
Low-moderate	3.8	12.7	34.0	36.5	13.0			
Moderate	4.3	17.4	34.6	36.1	7.5			
Moderate-high	6.6	21.3	36.5	27.2	8.4			
High	9.5	27.5	35.9	23.6	3.5			
Total	4.9	17.4	33.0	32.8	12.0			
Assurance						286.245	16	<0.001
n	**178**	**631**	**1,194**	**1187**	**433**			
Low	7.8	25.7	36.2	26.5	3.7			
Low-moderate	6.8	20.7	33.9	31.5	7.0			
Moderate	3.8	16.8	36.2	32.7	10.5			
Moderate-high	2.5	10.0	27.2	38.7	21.6			
High	2.5	10.2	26.9	36.5	24.0			
Total	4.9	17.4	33.0	32.8	12.0			

In summary, health self-efficacy beliefs were positively related to both social position and oral health. Respondents who occupy a high position on the social hierarchy are more likely to believe that their health is responsive to their management, and they are inclined to proactively set goals and achieve them with respect to their health. Consistent with this view, people with high health self-efficacy beliefs report less untreated decay, less negative impact from oral health conditions and fewer oral symptoms and rate their overall oral health more favourably.

By inference, the poorer oral health of people with low self-efficacy beliefs, reflects a disinclination to persevere with health self-management. This orientation is consistent with the notion that one's health outcome is under the control of powerful others such as dental professionals or is determined by fate, luck or chance.

5.4 Dental satisfaction

In the final section to this chapter, levels of consumer satisfaction with dental care services are examined for their relations with social position and oral health outcomes.

Newton [4] has argued that the evaluation of satisfaction with dental care should not be confined to the views of current patients, but should incorporate the perceptions of the general public. Perceptions of satisfaction with dental care in this study are drawn from a nationally representative sample, some of whom have used dental services within the last twelve months, and others whose most recent visit was several years ago. While satisfaction with dental care is usually evaluated as an outcome measure, in this study it was examined for its associations with attendance patterns and with oral health outcomes.

Presented in Table 5.22 is the truncated five-item Dental Satisfaction Index. Two items negatively worded (#17, #29) were reversed when computing an overall mean scale score. Respondents were generally satisfied with the content and outcome of their last dental visit, indicated by percentage agreement with #13, #19,, and #28 exceeding 83%. Lower levels of satisfaction were expressed with the two negatively posed items that addressed adequacy of the explanation of treatment options, and scope for improvement in the standard of dental care provided.

Table 5.22: Response to the abbreviated dental satisfaction scale (dentate persons, weighted data)

		Response category						
#	Item	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree	Valid	Missing
		Row percentages						
13	Professional explained need well	1.6	3.7	7.5	36.1	49.5	98.4	1.6
17	Wanted more explanation of options	26.9	29.7	21.7	13.5	7.0	98.7	1.3
19	Satisfied with care	2.3	3.4	9.9	41.2	42.0	98.8	1.2
28	Confident received good care	2.1	3.2	10.0	40.1	43.5	98.8	1.2
29	Care received could have been better	29.6	32.3	20.3	11.3	5.0	98.5	1.5

5.4.1 Factor analysis of the dental satisfaction items

A principal components factor analysis of the Dental Satisfaction Scale resulted in the extraction of a single factor that explained 59.5% of the variance as shown in Table 5.23. The single factor had good internal consistency (α=0.82). Based on this result, a single summary variable was derived, obtained by computing a mean scale score with greater values indicating higher levels of satisfaction with dental care received.

Table 5.23: Factor analysis of the dental satisfaction scale items (dentate persons, weighted data)

Initial statistics [(a)]					
		Variance			
Factor	**Eigenvalue**	**%**	**Cum. %**		**Item number and label**
1	2.96	59.26	59.26	13	Professional explained well the treatment needed
2	0.69	13.73	72.99	*17	Would have liked more explanation of options
3	0.58	11.51	84.50	19	Satisfied with the care I received
4	0.45	9.05	93.55	28	Confident received good dental care
5	0.32	6.45	100.00	*29	Things about dental care received could have been better
					Cronbach's alpha =0.82
					N of cases = 3,576

(a) Extraction method: principal component analysis
(b) Only one component extracted – the solution could not be rotated
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.82
* direction reversed in computing overall summary score

5.4.2 Dental satisfaction and socioeconomic indicators

In Table 5.24, dental satisfaction scores are described in terms of their relationship with socioeconomic indicators. Except for educational attainment, where differences were not significant, dental satisfaction was significantly associated with socioeconomic position.

People with income >$50,000 reported greater satisfaction (3.04) than those with household incomes up to $30,000 (2.90 or 2.91). Managers and administrators reported highest satisfaction among occupational groups (3.15), and labourers and related workers reported least satisfaction (2.70). Concession cardholders reported significantly less satisfaction (2.80) with dental care than non-cardholders (3.04). Adults living in areas with least disadvantage reported highest levels of satisfaction (3.09), while those with greatest disadvantage were least satisfied (2.89).

5.4.3 Dental satisfaction and demographic characteristics

Females reported higher satisfaction with their last dental visit (3.03) than did males (2.97). Satisfaction scores increased across successive age groups, before declining slightly from the age group of 60-69 years. Differences in dental satisfaction according to country of birth did not reach statistical significance, although mean scores were higher for the Australian-born. There were significant differences according to language spoken at home, with those who spoke English reporting higher satisfaction (3.02) than those who spoke a LOTE (2.82).Reflecting age trends, retirees reported highest satisfaction among employment status groups (3.09), followed by full-time workers (3.04). Adults in two-person households reported highest satisfaction (3.08), and those in largest households were least satisfied (2.78).

Table 5.24: Dental satisfaction by socioeconomic and demographic factors (dentate persons, weighted data)

	Dental satisfaction		
	N	Mean	SD
Household income			
<$12,000	231	2.90	0.88
$12-20,000	378	2.91	0.87
$21-30,000	383	2.90	0.84
$31-40,000	451	2.98	0.74
$41-50,000	456	3.01	0.77
>$50,000	1,501	3.04	0.74
Total	3,400	2.99	0.78
Test of significance	F(5,3393) = 3.887, p= 0.002		
Educational attainment			
Secondary or less	994	2.97	0.79
Vocation or other	1,267	2.99	0.78
Tertiary	1,321	3.01	0.77
Total	3,582	3.00	0.78
Test of significance	F(3579) = 0.793, p= 0.452		
Occupational group [(a)]			
Manager/administrator	367	3.15	0.71
Professional	551	3.00	0.71
Paraprofessional	194	3.04	0.70
Tradesperson	290	2.96	0.79
Clerk	345	3.04	0.77
Sales/Personal services	310	2.92	0.86
Plant/machine op; Driver	117	2.77	0.73
Labourer/related	162	2.70	0.96
Total	2,336	2.98	0.78
Test of significance	F(7,2327) = 7.823, p< 0.001		
Occupational prestige [(b)]			
Low	465	2.86	0.84
Low-moderate	444	2.96	0.81
Moderate	454	2.98	0.78
Moderate-high	565	3.10	0.71
High	511	3.02	0.70
Total	2,439	2.99	0.77
Test of significance	F(4,2434) = 6.549, p< 0.001		
Concession status			
Card holder	658	2.80	0.87
No card	2,981	3.04	0.75
Total	3,638	3.00	0.78
Test of significance	F(1,3636) = 52.534, p< 0.001		
Area disadvantage [(c)]			
Quintile 1 (highest)	675	2.89	0.82
Quintile 2	539	3.01	0.81
Quintile 3	757	2.95	0.75
Quintile 4	721	3.00	0.78
Quintile 5	900	3.09	0.73
Total	3,593	2.99	0.78
Test of significance	F(4,3587) = 7.359, p< 0.001		

	Dental satisfaction		
	N	Mean	SD
Sex			
Male	1,829	2.97	0.78
Female	1,813	3.03	0.78
Total	3,642	3.00	0.78
Test of significance	F(1,3639) = 5.528, p= 0.019		
Age group			
18-29 years	944	2.84	0.74
30-39 years	810	2.95	0.84
40-49 years	741	3.04	0.75
50-59 years	517	3.14	0.76
60-69 years	320	3.12	0.73
70+ years	310	3.10	0.76
Total	3,642	3.00	0.78
Test of significance	F(5,3635) = 16.004, p< 0.001		
Country of birth			
Australia	2,855	3.01	0.77
Overseas	750	2.95	0.78
Total	3,605	3.00	0.78
Test of significance	F(1,3602) = 3.683, p= 0.055		
Language at home			
Other than English	383	2.82	0.78
English	3,258	3.02	0.78
Total	3,642	3.00	0.78
Test of significance	F(1,3639) = 22.945, p< 0.001		
Employment status			
Full-time	1,702	3.04	0.73
Part-time	662	2.92	0.82
Retired	492	3.09	0.77
Not employed	547	2.92	0.84
Total	3,403	3.00	0.77
Test of significance	F(3,3398) = 7.800, p< 0.001		
Householders aged 5+			
One person	434	3.03	0.77
Two persons	1,387	3.08	0.75
Three-four persons	1,424	2.96	0.78
More than four persons	392	2.78	0.86
Total	3,637	3.00	0.78
Test of significance	F(3,3633) = 16.160, p< 0.001		
ARIA category			
Highly accessible	3,020	3.00	0.77
Accessible	415	2.97	0.80
Mod accessible	127	3.00	0.82
Remote	39	2.87	0.60
Very remote	29	2.67	0.94
Total	3,630	3.00	0.78
Test of significance	F(4,3625) = 1.706, p= 0.146		

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage – Australian Bureau of Statistics' Socio-Economic Indexes for Areas

5.4.4 Dental satisfaction and oral health

Decayed and missing teeth

Dental satisfaction was examined for its relation with oral health outcomes. A mean scale score was computed and this range was then divided into quintiles labelled low to high. High scores reflect greatest satisfaction, with scores in the top 20%. On this particular scale, scores in the low quintile range do not necessarily reflect true dissatisfaction, as only 8.0% of people had a mean scales score of less than 2 (on a range of 0-4) indicating they disagreed or strongly disagreed with statements, and thus expressed dissatisfaction. People who were more satisfied with the professional care they receive might be expected to report better health outcomes than those for whom dental services failed to meet expectations. Table 5.25 presents a significant *F* statistic for both decayed and missing teeth.

An inverse gradient in decayed teeth by quintiles of satisfaction was observed. Persons with least satisfaction reported an additional 0.88 mean decayed teeth than those who were most satisfied. The greatest decrease in mean decayed teeth occurred as satisfaction scores increased from low (1.26 decayed teeth) to low-moderate levels (0.79 decayed teeth). Although differences in missing teeth according to levels of dental satisfaction were significant, no clear relationship was observed.

Table 5.25: Decayed teeth by dental satisfaction (dentate persons, weighted data)

	Decayed teeth			Missing teeth		
	df	F	Sig.	df	F	Sig.
Dental Satisfaction scale	30, 2938	8.099	<0.001	30, 3497	1.481	0.044

	Decayed teeth					Missing teeth				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Dental satisfaction										
Low	732	1.26	1.66	1.14	1.38	860	3.05	5.76	2.66	3.43
Low-moderate	482	0.79	1.44	0.66	0.92	578	2.92	5.81	2.44	3.39
Moderate	633	0.94	1.84	0.80	1.09	756	3.75	6.30	3.30	4.20
Moderate-high	668	0.47	1.09	0.39	0.55	779	3.44	6.14	3.00	3.87
High	455	0.38	1.01	0.29	0.47	557	3.62	5.89	3.13	4.11
Total	2,970	0.80	1.51	0.75	0.86	3,529	3.35	6.00	3.15	3.55
Test of significance	F (4, 2964) =36.998, p<0.001					F (4, 3523) =2.487, p= 0.042				

Social impact and oral symptom experience

Table 5.26 presents findings of the relationship between dental satisfaction and the oral health outcomes of social impact and oral symptom experience. An almost twofold decrease in mean impact scores was observed, with increasing satisfaction. Impact scores ranged from 0.71 for those with low satisfaction to 0.37 for those who were most satisfied. Although the gradient was less consistent in oral symptom experience, people who were less satisfied experienced significantly more oral symptoms. The mean of summed oral symptoms ranged from 1.09 for those with low satisfaction to 0.91 for those with high satisfaction.

Table 5.26: Social impact and oral symptom experience by dental satisfaction (dentate persons, weighted data)

	Social impact			Oral symptom experience		
	df	F	Sig.	df	F	Sig.
Dental satisfaction scale	30, 3559	10.395	<0.001	30, 3609	4.163	<0.001

	Social impact					Oral symptom experience				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Dental satisfaction										
Low	864	0.71	0.63	0.67	0.76	885	1.25	1.09	1.18	1.33
Low-moderate	604	0.57	0.54	0.53	0.62	606	1.07	0.98	0.99	1.15
Moderate	761	0.50	0.49	0.46	0.53	771	1.01	0.94	0.95	1.08
Moderate-high	801	0.45	0.52	0.42	0.49	805	1.19	1.01	1.12	1.26
High	560	0.37	0.39	0.33	0.40	573	0.88	0.91	0.81	0.96
Total	3,591	0.53	0.54	0.51	0.55	3,641	1.10	1.00	1.07	1.13
Test of significance	F (4, 3585) =45.848, p<0.001					F (4, 3635) =15.692, p< 0.001				

Self-rated oral health

Of those adults with low satisfaction, 30.0% rated their oral health as average or poorer, compared with 16.6% of those with high satisfaction. In all, 53.4% of those with high satisfaction rated their oral health as either very good or excellent, compared with 32.1% of those with low satisfaction (Table 5.27).

Table 5.27: Self-rated oral health by dental satisfaction (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
						Pearson's Chi-square		
	Very poor or Poor	Average	Good	Very good	Excellent	Value	df	Asymp. sig. (2-sided)
	Row %	Row %	Row %	Row %	Row %			
Dental satisfaction						164.378	16	<0.001
n	**180**	**630**	**1,210**	**1,183**	**434**			
Low	8.3	21.7	37.9	25.1	7.0			
Low-moderate	4.6	22.6	31.6	34.1	7.1			
Moderate	3.0	15.2	35.0	29.6	17.2			
Moderate-high	4.9	13.2	30.1	39.1	12.8			
High	3.0	13.6	30.0	37.0	16.4			
Total	4.9	17.3	33.3	32.5	11.9			

As illustrated in Table 5.28, there was a significant main effect for both health self-efficacy and dental satisfaction as well as a significant interaction effect. Together these accounted for 32.8% of the variation in dental behaviour scores.

Table 5.28: Interaction of health self-efficacy and dental satisfaction on dental behaviour (dentate persons, weighted data)

Source	Type III Sum of Squares (a)	df	Mean Square	F	Sig.
Corrected Model	556.146	351	1.584	5.711	<0.001
Intercept	952.200	1	952.200	3431.952	<0.001
Health self-efficacy	68.246	40	1.706	6.149	<0.001
Dental satisfaction	41.103	27	1.522	5.487	<0.001
Health self-efficacy x Dental satisfaction	227.464	284	0.801	2.887	<0.001
Error	842.897	3,038	0.277		
Total	22641.134	3,390			
Corrected Total	1399.043	3,389			

Dependent variable: Dental behaviour score
(a) R^2 = 0.398 (Adjusted R^2 =0 .328)

5.5 Summary of bivariate associations

A summary of bivariate associations between behavioural variables and oral health is reported in Table 5.29. There was strong evidence for an association between ways in which people behave relevant to oral health and their oral health status. There was a clear positive gradient between episodic visiting and two outcomes - social impact and the proportion rating their dental health poorly. People with low scores for dental visiting and people with low scores for dental self-care had poorest oral health for all outcomes except missing teeth. Problem-oriented visiting was associated with worse oral health on all five oral health outcomes. People with a usual dentist reported significantly fewer decayed teeth, fewer missing teeth and lower social impact, and a smaller proportion rated their oral health poorly. Similarly, those with dental insurance had better oral health than the uninsured on these four outcomes. All seven behavioural variables were associated with significant differences in decayed teeth and social impact scores.

Bivariate associations for cognitive factors and oral health are also summarised in Table 5.29. All but one of the associations (assurance and missing teeth) was statistically significant. There was a clear positive gradient between levels of diffidence and decayed teeth, social impact and the proportion rating their oral health poorly. People with the greatest sense of diffidence had poorer oral health for all five outcomes. People with a low sense of assurance had the worst oral health for four out of five oral health outcomes. People who were least satisfied with their dental care had more decayed teeth, greater social impact and more oral symptoms, and a greater proportion rated their dental health poorly than other adults.

Table 5.29: Summary of bivariate associations between dental behaviour and cognitive factors and oral health

	Decayed	Missing	Social impact	Symptoms	Self-rated (average/poor)
Dental behaviour scale					
Visiting	p<0.001 (-)	p>0.05 (-)	p<0.001 (-)	p<0.001 (-)	p<0.001 (-)
Self-care	p<0.001 (-)	p<0.01 (-)	p<0.001 (-)	p<0.001 (-)	p<0.001 (-)
Dental utilisation					
Time between visits (<6 mo)	p<0.01 (-)	p>0.05 (-)	p<0.001 (+)	p>0.05	p>0.05
Perceived need (need visit)	p<0.001 (+)	p>0.05	p<0.001 (+)	p<0.001 (+)	p<0.001 (+)
Usual reason (check-up)	p<0.001 (-)	p<0.001 (-)	p<0.001 (-)	p<0.001 (-)	p<0.001 (-)
Continuity (usual dentist)	p<0.001 (-)	p<0.001 (-)	p<0.001 (-)	p>0.05	p<0.001 (-)
Dental Insurance (insured)	p<0.001 (-)	p<0.01 (-)	p<0.001 (-)	p>0.05	p<0.001 (-)
Cognitive factors					
Diffidence	p<0.001 (+)	p<0.001 (+)	p<0.001 (+)	p<0.001 (+)	p<0.001 (+)
Assurance	p<0.001 (-)	p>0.05	p<0.001 (-)	p<0.001 (-)	p<0.001 (-)
Dental satisfaction	p<0.001 (-)	p<0.05 (-)	p<0.001 (-)	p<0.001 (-)	p<0.001 (-)

A correlation analysis (Table 5.30) was conducted to evaluate the relationship between the independent variables. The subscale 'visiting' was moderately correlated with the subscale 'self-care' (rho =0.446) and the item 'need visit?' (rho=0.479) indicating that they were not independent of each another. However, because all correlation coefficients were less than 0.5, the problem of multicollinearity, one variable (last visit) was not anticipated in multivariate analysis.

Table 5.30: Correlation matrix (Spearman's rho) for dental behavioural items (dentate persons, weighted data)

		Dental visiting	Self-care	Average visits	Need visit?	Usual reason	Usual dentist	Dental insurance	Diffidence	Assurance	Satisfaction
Visiting	rho	1.000	0.446 **	-0.479 **	0.206 **	-0.465 **	0.317 **	-0.233 **	-0.206 **	0.296 **	0.362 **
	Sig.	.	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	N	3620	3620	3517	3603	3599	3612	3581	3576	3576	3602
Self-care	rho		1.000	-0.227 **	0.156 **	-0.242 **	0.142 **	-0.079 **	-0.205 **	0.340 **	0.203 **
	Sig.		.	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	N		3620	3517	3603	3599	3612	3581	3576	3576	3602
Average	rho			1.000	-0.065 **	0.461 **	-0.422 **	0.240 **	0.056 **	-0.114 **	-0.190 **
	Sig.			.	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001
	N			3559	3542	3539	3553	3529	3511	3511	3529
Need visit	rho				1.000	-0.096 **	0.081 **	-0.051 **	-0.044 **	0.075 **	0.122 **
	Sig.				.	<0.001	<0.001	0.002	0.008	<0.001	<0.001
	N				3652	3632	3644	3613	3603	3603	3610
Reason	rho					1.000	-0.280 **	0.180 **	0.149 **	-0.179 **	-0.154 **
	Sig.					.	<0.001	<0.001	<0.001	<0.001	<0.001
	N					3648	3641	3609	3599	3599	3607
Dentist	rho						1.000	-0.251 **	-0.052 **	0.072 **	0.238 **
	Sig.						.	<0.001	0.002	<0.001	<0.001
	N						3661	3622	3612	3612	3620
Insurance	rho							1.000	0.037 **	-0.027 **	-0.120 **
	Sig.							.	0.026	0.110	<0.001
	N							3630	3581	3581	3589
Diffidence	rho								1.000	-0.634 **	-0.256 **
	Sig.								.	<0.001	<0.001
	N								3620	3620	3580
Assurance	rho									1.000	0.268 **
	Sig.									.	<0.001
	N									3620	3580

5.6 Multivariate analysis

A series of hierarchical multiple linear regression analyses was constructed to identify from the set of sociodemographic and health behavioural factors those simultaneously associated with the outcome measures examined and to estimate the net effect of each factor. Independent variables were entered in two steps. In the first step demographic factors and socioeconomic demographic factors were entered, followed by behavioural factors in the second step.

Decayed teeth

The model explained 19.3% of the variance in decayed teeth, of which behavioural factors contributed 13.0%, as indicated by the change in R^2 (Table 5.31). The greatest effect was for dental visiting, followed by perceived need for a visit, and then diffidence. Of note, assurance (health self-efficacy) did not have a significant effect. Also noteworthy was the observation that self-care, usual dentist and dental insurance were not significant in the regression model. Of the sociodemographic factors, LOTE and household income between $20,000 and $50,000 had the greatest effects and were positively associated with decayed teeth.

Table 5.31: Multiple linear regression model: Decayed teeth (dentate persons, weighted data)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F Change
1	0.075	0.067	0.075	9.177	15, 1702	<0.001
2	0.205	0.193	0.130	27.689	10, 1692	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	4.905	3.157		0.123
	Male	-0.512	0.361	-0.162	0.159
	Age in years	0.005	0.013	0.054	0.700
	Australian-born	-0.623	0.427	-0.157	0.148
	Speaks English at home	0.468	0.559	0.090	0.405
	Employed full-time (ref)				
	Employed part-time	-0.565	0.393	-0.182	0.154
	Retired	-1.021	0.693	-0.172	0.144
	Not employed	-0.682	0.485	-0.151	0.162
	Householders aged 5+	-0.061	0.139	-0.050	0.665
	ARIA score *	-0.072	0.071	-0.105	0.312
	Income <$20,000	-0.356	0.539	-0.113	0.511
	Income $20 to $50,000	0.152	0.504	0.044	0.763
	Income >$50,000 (ref)				
	Up to secondary eduction	0.175	0.379	0.046	0.645
	Vocational education or other	-0.226	0.400	-0.072	0.574
	Tertiary education (ref)				
	Occupational prestige †	-0.003	0.012	-0.023	0.815
	IRSD area disadvantage ‡	-0.001	0.002	-0.035	0.747
Step 2	Visiting	-0.422	0.227	-0.223	0.065
	Self-care	-0.325	0.369	-0.103	0.381
	Average time 2+ yearly	0.351	0.382	0.091	0.361
	Need dental visit	-1.072	0.343	-0.340	0.002
	Usual reason – check-up	0.213	0.368	0.068	0.564
	Usual dentist	0.080	0.362	0.026	0.825
	Has dental insurance	-0.635	0.388	-0.176	0.105
	Diffidence	-0.016	0.320	-0.007	0.961
	Assurance	0.286	0.420	0.093	0.497
	Satisfaction with services	-0.143	0.167	-0.096	0.392

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Missing teeth

Behavioural variables contributed an additional 3.9% to the 23.2% of variance in missing teeth accounted for by sociodemographic factors (Table 5.32). As indicated by the beta coefficient (0.478), age had the largest effect and was positively related to missing teeth. Dental self-care, but not dental visiting, was significant in the model. Also significant were average time between check-ups, usual reason for visiting, sense of diffidence and satisfaction with dental care. The largest effect was for self-care, which was negatively associated with missing teeth. As observed with decayed teeth, having dental insurance and having a usual dentist were not significant.

Table 5.32: Multiple linear regression model: Missing teeth (dentate persons, weighted data)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1	0.238	0.232	0.238	40.189	15, 1933	<0.001
2	0.281	0.271	0.043	11.480	10, 1923	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	-0.005	1.740		0.998
	Male	-0.136	0.194	-0.015	0.483
	Age in years	0.174	0.008	0.478	<0.001
	Australian-born	0.354	0.238	0.031	0.137
	Speaks English at home	-0.490	0.341	-0.030	0.151
	Employed full-time (ref)				
	Employed part-time	0.098	0.238	0.009	0.682
	Retired	-0.392	0.694	-0.012	0.573
	Not employed	-0.616	0.456	-0.027	0.177
	Householders aged 5+	-0.215	0.074	-0.059	0.004
	ARIA score *	0.016	0.056	0.006	0.767
	Income <$20,000	0.712	0.395	0.039	0.072
	Income $20 to $50,000	0.333	0.197	0.036	0.091
	Income >$50,000 (ref)				
	Up to secondary eduction	0.296	0.246	0.028	0.229
	Vocational education or other	-0.176	0.214	-0.019	0.411
	Tertiary education (ref)				
	Occupational prestige †	0.028	0.009	0.075	0.001
	IRSD area disadvantage ‡	-0.005	0.001	-0.083	<0.001
Step 2	Visiting	-0.246	0.137	-0.047	0.072
	Self-care	-1.006	0.155	-0.148	<0.001
	Average time 2+ yearly	0.507	0.229	0.048	0.027
	Need dental visit	0.041	0.183	0.005	0.822
	Usual reason – check-up	-0.766	0.205	-0.086	<0.001
	Usual dentist	-0.123	0.228	-0.012	0.590
	Has dental insurance	-0.102	0.190	-0.011	0.590
	Diffidence	0.592	0.179	0.091	0.001
	Assurance	0.457	0.244	0.052	0.061
	Satisfaction with services	0.415	0.125	0.071	0.001

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Social impact

For all persons, the model explained 20.9% of the variance in social impact (Table 5.33). As indicated by the R^2 change, 15.7% was explained by the behavioural variables. All but two of the behavioural factors were significant. Those that were not significant were dental insurance and sense of assurance. Of the sociodemographic factors, higher social impact scores were positively associated with female sex, age, LOTE, low education, low occupational prestige and area disadvantage. Of the behavioural factors, higher impact was negatively associated with dental visiting, dental self-care, visits less frequent than twice annually, perceived need for visit, check-up (relative to problem visiting), having a usual dentist and dental satisfaction. A sense of diffidence was positively related to social impact scores.

Table 5.33: Multiple linear regression model: Social impact (dentate persons, weighted data)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1	0.062	0.055	0.062	8.647	15, 1965	<0.001
2	0.219	0.209	0.157	39.330	10, 1955	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	1.591	0.209		<0.001
	Male	-0.092	0.023	-0.089	<0.001
	Age in years	0.004	0.001	0.095	<0.001
	Australian-born	-0.050	0.028	-0.037	0.081
	Speaks English at home	-0.288	0.040	-0.150	<0.001
	Employed full-time (ref)				
	Employed part-time	0.036	0.028	0.029	0.203
	Retired	-0.161	0.083	-0.042	0.052
	Not employed	-0.179	0.052	-0.071	0.001
	Householders aged 5+	-0.008	0.009	-0.019	0.355
	ARIA score *	0.004	0.007	0.013	0.555
	Income <$20,000	0.066	0.047	0.032	0.163
	Income $20 to $50,000	-0.003	0.023	-0.003	0.901
	Income >$50,000 (ref)				
	Up to secondary eduction	-0.107	0.030	-0.087	<0.001
	Vocational education or other	-0.031	0.025	-0.029	0.220
	Tertiary education (ref)				
	Occupational prestige †	0.003	0.001	0.075	0.001
	IRSD area disadvantage ‡	<0.001	<0.001	-0.047	0.034
Step 2	Visiting	-0.069	0.016	-0.113	<0.001
	Self-care	-0.072	0.018	-0.091	<0.001
	Average time 2+ yearly	0.266	0.028	0.216	<0.001
	Need a visit	-0.076	0.022	-0.073	0.001
	Usual reason – check-up	-0.153	0.025	-0.148	<0.001
	Usual dentist	0.086	0.027	0.071	0.002
	Has dental insurance	-0.014	0.023	-0.013	0.542
	Diffidence	0.095	0.022	0.122	<0.001
	Assurance	-0.052	0.029	-0.051	0.076
	Satisfaction with services	-0.084	0.015	-0.125	<0.001

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Oral symptom experience

The model accounted for only 6.0% of the variance, of which behavioural factors contributed 4.8% (Table 5.34). Sociodemographic factors that were significant in block 2 were Australian-born (negative association), geographical remoteness (positive) secondary education relative to tertiary (negative) and area disadvantage (positive).

Of the behavioural factors, self-care and dental satisfaction were negatively associated with oral symptoms, and usual dentist, dental insurance and frequent visiting were positively related to oral symptom experience. Diffidence and assurance were not significant.

Table 5.34: Multiple linear regression model: Oral symptom experience (dentate persons, weighted data)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1	0.022	0.014	0.022	2.939	15, 1992	<0.001
2	0.071	0.060	0.050	10.584	10, 1982	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	3.298	0.448		<0.001
	Male	-0.048	0.050	-0.024	0.332
	Age in years	-0.002	0.002	-0.023	0.361
	Australian-born	-0.129	0.061	-0.049	0.034
	Speaks English at home	-0.145	0.086	-0.039	0.093
	Employed full-time (ref)				
	Employed part-time	0.012	0.061	0.005	0.846
	Retired	-0.062	0.177	-0.008	0.725
	Not employed	-0.152	0.113	-0.030	0.178
	Householders aged 5+	-0.034	0.019	-0.040	0.075
	ARIA score *	-0.029	0.014	-0.047	0.041
	Income <$20,000	0.137	0.102	0.033	0.177
	Income $20 to $50,000	0.028	0.050	0.013	0.582
	Income >$50,000 (ref)				
	Up to secondary eduction	-0.268	0.063	-0.111	<0.001
	Vocational education or other	-0.046	0.055	-0.021	0.406
	Tertiary education (ref)				
	Occupational prestige †	0.002	0.002	0.020	0.430
	IRSD area disadvantage ‡	-0.001	<0.001	-0.070	0.004
Step 2	Visiting	-0.040	0.035	-0.033	0.256
	Self-care	-0.241	0.040	-0.154	<0.001
	Average time 2+ yearly	0.109	0.059	0.045	0.065
	Need dental visit	-0.234	0.047	-0.115	<0.001
	Usual reason – check-up	-0.046	0.053	-0.022	0.382
	Usual dentist	0.117	0.059	0.049	0.046
	Has dental insurance	0.102	0.049	0.049	0.037
	Diffidence	-0.025	0.046	-0.016	0.588
	Assurance	0.070	0.062	0.035	0.261
	Satisfaction with services	-0.076	0.032	-0.057	0.017

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Self-rated oral health

A binary logistic regression analysis was performed to predict the probability, or odds, that a particular type of person would rate their oral health as average or poorer in comparison to a reference (Table 5.35).

Income and educational attainment, but not employment status, were significant constructs in the model. Of the dummy variables within the employment construct, retirees had significantly lower odds of rating their oral health poorly relative to the full-time employed. The odds of rating oral health as average or poorer for adults with household income <$20,000 were estimated to be 2.4 times the odds for adults with income >$50,000. The estimated 95% confidence interval for this odds ratio was 1.4 to 4.2. Other sociodemographic variables associated with increased odds of rating oral health as average or poorer were age, LOTE, household size, geographical remoteness and vocational education (relative to tertiary).

Six of the ten behavioural factors were significant in the model. Those not significant were usual dentist, dental insurance, diffidence and dental satisfaction. Dental visiting, dental self-care, frequent visits and assurance were associated with reduced odds of reporting poor oral health, and problem-oriented visiting was associated with increased odds. The Nagelkerke R-square statistic for this model was 23.4%.

Table 5.35: Odds ratios and 95% C.I. for self-rating oral health as average, or poorer (dentate only, weighted data)

	Odds ratio	95% C.I.		Sig.
Female	1.120	0.852	1.472	0.418
Male (ref)	1.000			
Age in years	1.034	1.023	1.046	<0.001
Overseas-born	0.989	0.719	1.361	0.948
Australia (ref)	1.000			
LOTE at home	2.317	1.518	3.536	<0.001
English at home (ref)				
Employment status				0.164
Not employed	0.788	0.430	1.444	0.440
Retired	0.351	0.134	0.924	0.034
Part-time	1.027	0.740	1.426	0.872
Full-time (ref)	1.000			
Householders aged 5+ years	1.120	1.015	1.236	0.024
ARIA score	1.085	1.009	1.166	0.027
Household income				0.006
<$20,000	2.421	1.409	4.161	0.001
$20,000-$50,000	1.168	0.889	1.535	0.264
>$50,000 (ref)	1.000			
Educational attainment				<0.001
Secondary or less	1.078	0.762	1.524	0.673
Vocational or other	2.211	1.648	2.968	<0.001
Tertiary (ref)	1.000			
Occupational prestige †	1.005	0.993	1.017	0.396
Concession card	0.863	0.521	1.430	0.568
No card (ref)	1.000			
Area disadvantage ‡	1.001	1.000	1.003	0.129
Dental visiting	0.694	0.577	0.834	<0.001
Dental self-care	0.544	0.438	0.677	<0.001
Average time between visits <2 per year	0.323	0.232	0.450	<0.001
Average time between visits ≥2 per year (ref)	1.000			
Need dental visit	2.310	1.781	2.997	<0.001
No need for dental visit (ref)	1.000			
Usual reason for visit – problem	1.880	1.419	2.491	<0.001
Usual reason for visit – check-up (ref)	1.000			
No usual dentist	0.841	0.617	1.146	0.273
Usual dentist (ref)	1.000			
No private dental insurance	0.884	0.680	1.149	0.356
Dental insurance (ref)	1.000			
Diffidence	1.105	0.873	1.398	0.407
Assurance	0.665	0.484	0.914	0.012
Dental satisfaction	0.983	0.835	1.157	0.835
Constant	0.162			0.137

Nagelkerke R square = 0.261

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

This chapter described the impact of oral health-related attitudes and behaviours, health self-efficacy beliefs, and respondents' levels of satisfaction with dental care services on a range of oral health outcomes. As expected, findings showed strong relationships between each of these factors and each measure of oral health. People who expressed less satisfaction with dental services, those who actively avoided services and those who did not consider that health was amenable to their efforts reported more caries and missing teeth, fewer restored teeth, more frequent social impact, a wider range of oral symptoms and poorer overall self-rated oral health.

A significant graded association was found between dental satisfaction and health self-efficacy beliefs and social position. While these factors may contribute to social pathways explaining oral health inequality, the relation between indicators of social position and oral health behaviours was less clearly patterned.

In this study, it is suggested that differences in dental behaviour are not determined solely by social position. Rather, social contextual factors and a range of psychosocial determinants also shape behavioural patterns. Chapter 6 will address those mediating psychosocial determinants operating further upstream.

5.7 References to Chapter 5

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6. Psychosocial Factors

In Chapter 5, dental behaviour was shown to be strongly associated with oral health outcomes. In addition, perceived health competency and satisfaction with dental care were positively related to the dental behaviour of individuals. However, evidence for a socioeconomic gradient in dental behaviour was inconsistent, suggesting that the pathway connecting socioeconomic position to oral health is mediated by other factors. The objective of Chapter 6 therefore is to investigate potential mediating factors.

Chapter 6 examines selected psychosocial factors shown in previous health research to be associated with behaviour, socioeconomic position and health outcomes. These are personal control, social support and networks, and perceived stress. Added to these is life satisfaction. It is argued that a global sense of satisfaction with life is an adaptive orientation that enables individuals to live comfortably with their lot in life irrespective of their level of socioeconomic resource. As such it may mediate the burden of social disadvantage.

Two hypotheses are tested in this chapter. The first is that psychosocial resources are unequally distributed in the population, so that the socioeconomically disadvantaged perceive less personal control, access less social support, interact with fewer social networks, experience more frequent daily stresses and are less satisfied with their life. The second hypothesis is that psychosocial resources are independently associated with oral health outcomes even after controlling for socioeconomic resources.

A secondary focus is the concept of relative inequality, which contends that socioeconomic differentials within a reference group (such as a postcode area) are more important to health, especially in affluent societies, than is absolute deprivation.

Univariate distributions

Table 6.1 presents summary estimates of central tendency, dispersion and distribution of scores for scales measuring some of these factors. More than 3,500 respondents completed each scale, with fewer than two invalid responses per scale. Potential response options ranged from 0 to 4 on each scale and subscale. No ceiling scores were reported for perceived stress, and floor scores were absent for the personal control scale, and the mastery subscale. A substantial ceiling effect was recorded for Social Support with 37.9% of individuals scoring the highest possible score.

Distributions on the constraint subscale, perceived stress scale, and distress subscale had negative skewness values, indicating that fewer respondents scored highly on these dimensions. Marked asymmetry was observed for the social support scale, where the modal score was 4.0 and the positive kurtosis value was very high (3.06).

Table 6.1: Summary statistics for psychosocial scales and subscales (dentate persons, weighted data)

	Personal control			Social support	Perceived stress			Life satisfaction
		Subscales				Subscales		
		Constraint	Mastery			Distress	Coping	
N	3,637	3,637	3,637	3,623	3,584	3,584	3,584	3,611
Missing	41	41	41	55	94	94	94	67
N of Items	12	8	4	4	14	7	7	5
Mean	2.78	1.32	2.97	3.44	1.57	1.79	2.65	2.42
Median	2.83	1.25	3.00	3.50	1.57	1.71	2.71	2.60
Mode	3.00	1.00	3.00	4.00	1.43	1.57	2.86	3.00
Std. deviation	0.58	0.68	0.59	0.63	0.50	0.59	0.56	0.77
Skewness	-0.27	0.37	-0.51	-1.52	0.25	0.25	-0.25	-0.41
SE skewness	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Kurtosis	0.05	0.16	0.81	3.06	0.64	0.56	0.63	-0.08
SE kurtosis	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Percent floor	0.00	2.12	0.00	0.12	0.03	0.03	0.01	0.40
Percent ceiling	1.42	0.01	8.07	37.94	0.00	0.05	1.23	1.94
Minimum	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00
Maximum	4.00	4.00	4.00	4.00	3.71	4.00	4.00	4.00

6.1 Personal control

Although the terms are often used interchangeably, personal control and self-efficacy are different constructs. Personal control beliefs arise from judgements about whether or not self-initiated action will result in a particular outcome. Self-efficacy beliefs arise from judgments about whether or not one can successfully perform the action (that is believed will result in a particular outcome). A body of research concludes that both of these expectancies operate along a pathway through which social disadvantage is transformed via a chain of adversity into chronic health problems.

The chapter proceeds to test the view that persons who occupy lower positions on the social hierarchy perceive less personal control over their environment and have poorer oral health. Personal control was measured with Lachman and Weaver's 12-item battery [1] developed from Pearlin and Schooler's 7-item 'Personal Mastery Scale'. Participants were asked to express how strongly they agreed or disagreed with each of the 12 statements. Table 6.2 presents the percentage response distribution on each item. Four items (#1, #3, #4, and #11) were positively worded and agreement with these items was high – at 82.1%, 85.3%, 70.0% and 83.4% respectively. Percentage disagreement with the eight negatively worded items was lower. Disagreement ranged from 42.8% for #7 ' There are many things that interfere with what I want to do' to 76.8% for item #2 'Other people determine most of what I can and cannot do'.

Table 6.2: Response to the mastery and constraint scale items (dentate persons, weighted data)

	Item	Response category					Valid	Missing
		Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree		
		Row percentages						
1	I can do anything	0.5	5.3	10.8	59.2	22.9	98.8	1.2
2	Others determine most	26.6	50.2	14.0	6.2	1.6	98.7	1.3
3	Usually find a way	0.2	2.5	10.6	62.9	22.4	98.7	1.3
4	In my own hands	1.0	8.0	19.6	51.8	18.2	98.5	1.5
5	Little I can do	19.8	49.9	12.9	13.8	1.8	98.3	1.7
6	Often feel helpless	22.0	47.8	17.1	9.8	2.1	98.7	1.3
7	Many things interfere	8.5	34.3	23.6	28.6	3.7	98.8	1.2
8	I have little control	19.4	54.3	16.2	7.2	1.6	98.7	1.3
9	Can't solve problems	19.7	47.3	16.5	12.8	2.4	98.7	1.3
10	Being pushed around	20.2	43.3	16.5	16.7	2.2	98.9	1.1
11	Mostly depends on me	1.2	4.8	9.5	57	26.4	98.8	1.2
12	Beyond my control	18.1	46.7	20.0	11.7	2.2	98.8	1.2

6.1.1 Factor analysis of the mastery and constraint scale items

Principal components factor analysis using varimax rotation empirically substantiated the two underlying dimensions of internal mastery and external constraint that together explained 51.4% of the variance. Factor loadings are presented in Table 6.3. Eight items loaded onto the factor labelled 'constraint' and these were reverse coded for computation of the personal control scale score. The remaining four items loaded onto the 'mastery' factor. Estimates of internal consistency, based on the average inter-item correlation, were adequate for the two subscales, with Cronbach alpha coefficients of 0.76 and 0.74 respectively.

Table 6.3: Factor analysis of the mastery and constraint scale items (dentate persons, weighted data)

Initial statistics [a]				Final statistics [b]		
		Variance			Factor loadings	
Factor	Eigenvalue	%	Cum. %	Item number and label	Constraint	Mastery
1	4.75	39.62	39.62	1 Do anything	- 0.19	0.76
2	1.41	11.75	51.37	* 2 Others determine most	0.45	- 0.37
3	0.87	7.25	58.62	3 Usually find a way	- 0.11	0.80
4	0.73	6.12	64.74	4 In my own hands	- 0.22	0.71
5	0.72	5.98	70.71	* 5 Little I can do	0.61	-0.25
6	0.60	5.01	75.73	* 6 Often feel helpless	0.69	-0.19
7	0.55	4.55	80.27	* 7 Many things interfere	0.70	-0.05
8	0.53	4.4	84.67	* 8 I have little control	0.73	-0.20
9	0.50	4.16	88.83	* 9 Can't solve problems	0.71	-0.21
10	0.50	4.15	92.98	* 10 Being pushed around	0.69	-0.15
11	0.46	3.81	96.79	11 Mostly depends on me	- 0.22	0.64
12	0.39	3.21	100.00	* 12 Beyond my control	0.68	-0.25
				Cronbach's alpha	**0.76**	**0.74**
				N of cases	**3,575**	**3,611**

(c) Extraction Method: principal component analysis
(d) Rotation method: varimax with Kaiser normalization. Rotation converged in 3 iterations
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.90
* direction reversed in full scale scoring

6.1.2 Personal control and socioeconomic indicators

The association between socioeconomic position and personal control was examined and results are presented in Table 6.4. Findings revealed a positive relationship between socioeconomic position and personal control. On the overall scale, individuals in the lowest income category reported lowest mean control scores (2.56), and scores increased incrementally with successive income categories to a high of 2.87 for individuals with household income greater than $50,000. The variation across income categories was greater on the constraint subscale, where scores ranged from 1.58 to 1.21, than was observed for the mastery subscale, where scores ranged from 2.84 to 3.02. Educational attainment was positively associated with scores on the overall scale. Adults for whom school was their highest level of education reported highest constraint scores (1.48), and scores decreased to 1.19 for those with tertiary education. Of the occupational groups, managers and administrators reported highest mastery scores (3.09) and labourers and related workers reported the lowest (2.84) followed by plant or machine operators and drivers (2.88). There was a significance difference in control beliefs between adults who were eligible for government concessions and those who were not. Concession cardholders reported higher constraint (1.57) than non-cardholders (1.27) and lower mastery scores (2.84), than non-cardholders (3.00). The range in scores was reduced when socioeconomic position was aggregated to an area level, but a significance difference in personal control beliefs was observed across quintiles of area disadvantage on the overall scale and individual subscales.

6.1.3 Personal control and demographic characteristics

The distribution of personal control scores was also patterned by demographic characteristics Table 6.5). Males reported slightly higher control scores than females, but these differences were not significant. Much more important was the inverse relationship between age and control beliefs. Perceptions of personal control decreased incrementally across successive age groups, from 2.92 for the 18-29-year-olds to 2.56 for those aged 70+ years. Again, there was greater variability on the constraint subscale than on the mastery subscale. Although the perception of constraint increased with age, the greatest increase was recorded between the 60-69 years group (1.48) and the oldest age group (1.56). Australian-born adults expressed a greater perception of control than did adults born overseas, although differences on the mastery subscale failed to reach statistical significance. However, there were no significant differences in personal control based on language spoken at home. Reflecting age-related effects, the retirees reported lowest levels of control among employment status groups. Full-time workers perceived greatest control followed by part-time workers, and then those not in the workforce. Differences in control perceptions did not differ significantly according to number of householders, although adults living in two-person households had highest mean control scores. Differences in perceived control did not significantly differ according to geographical remoteness.

Table 6.4 Personal control by socioeconomic indicators (dentate persons, weighted data)

	N	Personal control		Constraint subscale		Mastery subscale	
		Mean	SD	Mean	SD	Mean	SD
Household income							
<$12,000	232	2.56	0.68	1.58	0.82	2.84	0.70
$12-20,000	382	2.63	0.60	1.50	0.72	2.88	0.64
$21-30,000	386	2.65	0.56	1.49	0.66	2.92	0.60
$31-40,000	447	2.80	0.55	1.32	0.67	3.04	0.56
$41-50,000	459	2.83	0.57	1.23	0.66	2.96	0.55
>$50,000	1,491	2.87	0.54	1.21	0.62	3.02	0.57
Total	3,396	2.78	0.58	1.32	0.68	2.98	0.59
Test of significance		F(5, 3389)=25.360, p<0.001		F(5, 3389)=28.404, p<0.001		F(5, 3389)=7.995, p<0.001	
Educational attainment							
Secondary or less	997	2.63	0.57	1.48	0.70	2.87	0.58
Vocation or other	1,267	2.77	0.58	1.33	0.69	2.95	0.59
Tertiary	1,312	2.90	0.55	1.19	0.61	3.06	0.58
Total	3,577	2.78	0.58	1.32	0.67	2.97	0.59
Test of significance		F(2, 3573)= 60.964, p<0.001		F(2, 3573)=56.028, p<0.001		F(2, 3573)= 33.060, p<0.001	
Occupational group [(a)]							
Manager/administrator	365	2.88	0.55	1.22	0.67	3.09	0.52
Professional	551	2.93	0.49	1.13	0.57	3.05	0.54
Paraprofessional	191	2.92	0.55	1.16	0.63	3.08	0.62
Tradesperson	288	2.73	0.55	1.39	0.63	2.96	0.62
Clerk	349	2.78	0.58	1.31	0.71	2.97	0.50
Sales/Personal services	311	2.80	0.58	1.32	0.67	3.05	0.58
Plant/machine op; Driver	117	2.64	0.47	1.48	0.60	2.88	0.44
Labourer/related	161	2.67	0.58	1.41	0.66	2.84	0.60
Total	2,332	2.83	0.55	1.27	0.65	3.01	0.56
Test of significance		F(7, 2324)= 9.769, p<0.001		F(7, 2324)= 9.723, p<0.001		F (7, 2324)= 5.966, p<0.001	
Occupational prestige [(b)]							
Low	466	2.77	0.57	1.35	0.68	3.00	0.53
Low-moderate	444	2.76	0.61	1.36	0.71	2.99	0.61
Moderate	456	2.77	0.55	1.33	0.64	2.98	0.56
Moderate-high	563	2.86	0.54	1.22	0.65	3.03	0.57
High	508	2.95	0.49	1.11	0.56	3.07	0.51
Total	2,437	2.83	0.55	1.27	0.65	3.02	0.56
Test of significance		F(4, 2432)=10.826, p<0.001		F(4, 2432)=12.917, p<0.001		F(4, 2432)=2.134, p=0.074	
Concession status							
Card holder	659	2.59	0.59	1.54	0.69	2.84	0.65
No card	2,974	2.82	0.56	1.27	0.66	3.00	0.57
Total	3,633	2.78	0.58	1.32	0.68	2.97	0.59
Test of significance		F(1,3630)=93.536, p<0.001		F(1,3630)= 92.115, p<0.001		F(1,3630)= 40.389, p<0.001	
Area disadvantage [(c)]							
Quintile 1 (highest)	670	2.72	0.55	1.39	0.65	2.93	0.59
Quintile 2	540	2.71	0.59	1.40	0.70	2.92	0.61
Quintile 3	759	2.71	0.56	1.40	0.66	2.95	0.54
Quintile 4	723	2.87	0.60	1.22	0.70	3.05	0.59
Quintile 5	895	2.84	0.57	1.23	0.65	2.99	0.61
Total	3,587	2.78	0.58	1.32	0.68	2.97	0.59
Test of significance		F(4,3582)=13.384, p<0.001		F(4,3582)=14.137, p<0.001		F(4,3582)=5.408, p<0.001	

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage – Australian Bureau of Statistics' Socio-Economic Indexes for Areas

Table 6.5: Personal control by demographic characteristics (weighted data, dentate persons)

	N	Personal control		Constraint subscale		Mastery subscale	
		Mean	SD	Mean	SD	Mean	SD
Sex							
Male	1,823	2.79	0.57	1.31	0.66	2.98	0.60
Female	1,813	2.77	0.59	1.32	0.69	2.96	0.59
Total	3,637	2.78	0.58	1.32	0.68	2.97	0.59
Test of significance		F(1,3634)=0.663; p=0.416		F(1,3634)=0.378; p=0.539		F(1,3634)=0.899; p=0.343	
Age group							
18-29 years	947	2.92	0.55	1.20	0.64	3.14	0.52
30-39 years	807	2.82	0.56	1.25	0.65	2.98	0.57
40-49 years	728	2.75	0.55	1.32	0.63	2.90	0.59
50-59 years	516	2.73	0.57	1.37	0.67	2.93	0.62
60-69 years	325	2.64	0.61	1.48	0.73	2.88	0.62
70+ years	313	2.56	0.62	1.56	0.78	2.80	0.66
Total	3,637	2.78	0.58	1.32	0.68	2.97	0.59
Test of significance		F(5,3630)=26.491; p<0.001		F(5,3630)=20.701; p<0.001		F(5,3630)=25.809; p<0.001	
Country of birth							
Australia	2,844	2.79	0.58	1.30	0.67	2.98	0.60
Overseas	755	2.73	0.57	1.38	0.68	2.94	0.56
Total	3,600	2.78	0.58	1.32	0.68	2.97	0.59
Test of significance		F(1,3597)=7.494; p=0.006		F(1,3597)=7.276; p=0.007		F(1,3597)=3.293; p=0.070	
Language at home							
Other than English	388	2.74	0.63	1.37	0.71	2.95	0.67
English	3,249	2.79	0.57	1.31	0.67	2.98	0.58
Total	3,637	2.78	0.58	1.32	0.68	2.97	0.59
Test of significance		F(1,3634)=2.651; p=0.104		F(1,3634)=3.002; p=0.083		F(1,3634)= 0.607; p=0.436	
Employment status							
Full-time	1,692	2.84	0.54	1.24	0.63	3.01	0.55
Part-time	662	2.80	0.59	1.30	0.69	3.01	0.60
Retired	500	2.59	0.61	1.53	0.75	2.84	0.64
Not employed	542	2.70	0.59	1.39	0.68	2.88	0.64
Total	3,397	2.78	0.58	1.32	0.68	2.97	0.59
Test of significance		F(1,3634)=29.529; p<0.001		F(1,3634)=27.019; p<0.001		F(1,3634)=17.134; p<0.001	
Householders aged 5+							
One person	432	2.78	0.59	1.32	0.71	2.99	0.59
Two persons	1,390	2.80	0.59	1.29	0.69	2.99	0.58
Three-four persons	1,423	2.75	0.56	1.35	0.65	2.95	0.59
More than four	387	2.79	0.60	1.29	0.70	2.95	0.62
Total	3,632	2.78	0.58	1.32	0.68	2.97	0.59
Test of significance		F(3,3393)=1.748; p=0.155		F(3,3393)=1.748; p=0.155		F(3,3393)=1.55; p=0.225	
ARIA category [(a)]							
Highly accessible	3,020	2.79	0.58	1.30	0.68	2.97	0.60
Accessible	411	2.73	0.54	1.39	0.65	2.97	0.57
Moderately accessible	126	2.77	0.60	1.35	0.72	3.01	0.57
Remote	37	2.62	0.53	1.50	0.64	2.85	0.53
Very remote	30	2.84	0.59	1.29	0.78	3.12	0.51
Total	3,625	2.78	0.58	1.32	0.68	2.97	0.59
Test of significance		F(4,3619)=2.256; p=0.132		F(4,3619)=0.989; p=0.061		F(4,3619)=1.55; p=0.412	

(a) Accessibility/Remoteness Index of Australia

6.1.4 Personal control and oral health

Decayed and missing teeth

The next section examines the relationship between personal control and oral health outcomes. Consistent with the method used throughout bivariate analyses, explanatory variables based on a continuous scale of mean scores were partitioned into quintiles. The first quintile, labelled 'low', represents the lowest 20% of scores for the measured construct. Significance testing was conducted using one-way analysis of variance.

As shown in Table 6.6, significant *F* ratios on the overall personal control scale and subscales indicated that groups differed significantly in terms of mean decayed and missing teeth.

With each level of increasing personal control, respondents reported fewer decayed teeth. The mean number of affected teeth ranged from 1.21 for individuals with low levels of control to 0.55 for those with high control. Greater variability in decayed teeth was observed across constraint scores than across mastery scores. In terms of absolute units, the mean number of decayed teeth varied by 0.84 teeth on the constraint subscale, compared with 0.31 teeth on the mastery subscale. An important finding for oral health was the threshold effect at the moderate–high level of constraint. Across the low to moderate–high levels of constraint, the mean number of decayed teeth increased incrementally from 0.53 to 0.96 teeth (an increase of 0.43 teeth across four quintiles). However, the mean number of decayed teeth among adults with constraint scores in the high quintile was 1.37 (an increase of 0.41 teeth across one quintile).

There was a similar inverse relationship between control scores and missing teeth. A threshold effect was also observed in the shift from moderate–high to high constraint scores, where missing teeth increased from a mean of 3.91 to a mean of 5.27.

Table 6.6: Decayed and missing teeth by personal control (dentate persons, weighted data)

	Decayed			Missing teeth		
	df	F	Sig.	df	F	Sig.
Personal control scale	59, 2912	3.952	<0.001	59, 3467	4.563	<0.001
Constraint subscale	47, 2924	4.964	<0.001	47, 3479	4.154	<0.001
Mastery subscale	18, 2953	2.665	<0.001	18, 3508	2.976	<0.001

	Decayed teeth					Missing teeth				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Personal control										
Low	498	1.21	1.74	1.05	1.36	644	5.24	7.25	4.68	5.80
Low-moderate	670	1.04	1.77	0.91	1.18	791	3.82	6.27	3.38	4.25
Moderate	614	0.65	1.37	0.54	0.76	734	3.11	5.80	2.69	3.53
Moderate-high	665	0.60	1.21	0.51	0.69	760	2.53	5.23	2.15	2.90
High	525	0.55	1.24	0.44	0.65	599	2.25	4.98	1.85	2.65
Total	2,972	0.80	1.50	0.75	0.86	3,527	3.38	6.04	3.19	3.58
Test of significance	F (4, 2967) = 22.349; p < 0.001					F (4, 3522) = 4.563; p < 0.001				
Constraint										
Low	605	0.53	1.19	0.44	0.63	686	2.40	5.08	2.02	2.78
Low-moderate	775	0.63	1.27	0.54	0.72	902	2.76	5.43	2.40	3.11
Moderate	489	0.65	1.43	0.52	0.77	581	2.87	5.46	2.42	3.31
Moderate-high	617	0.96	1.59	0.83	1.09	750	3.91	6.56	3.44	4.38
High	486	1.37	1.93	1.19	1.54	609	5.27	7.22	4.69	5.84
Total	2,972	0.80	1.50	0.75	0.86	3,527	3.38	6.04	3.19	3.58
Test of significance	F (4, 2967) = 28.408; p < 0.001					F (4, 3522) = 4.154; p < 0.001				
Mastery										
Low	369	0.98	0.08	0.81	1.14	476	4.40	6.66	3.80	5.00
Low-moderate	688	0.97	0.06	0.85	1.09	821	3.96	6.42	3.52	4.40
Moderate	828	0.80	0.05	0.69	0.90	970	3.17	5.79	2.81	3.54
Moderate-high	676	0.63	0.05	0.52	0.74	779	2.78	5.47	2.39	3.16
High	410	0.67	0.06	0.54	0.79	482	2.81	5.95	2.28	3.34
Total	2,972	0.80	0.03	0.75	0.86	3,527	3.38	6.04	3.19	3.58
Test of significance	F (4, 2967) = 6.427; p < 0.001					F (4, 3522) = 2.976; p < 0.001				

Social impact and oral symptom experience

Differences were also statistically significant in the social impact of oral conditions and the number of oral symptoms experienced based on personal control (Table 6.7). There was an inverse relationship between personal control beliefs and the impact of dental conditions on oral health-related quality of life. Impact scores decreased incrementally with each quintile of increasing personal control. Mean scores ranged from 0.80 among those with low control to 0.35 among those with high control. Again, more variability in oral health was observed across constraint quintiles than across mastery quintiles. The sum of oral symptoms experienced also decreased with increasing personal control. People with low control reported a mean of 1.29 oral symptoms compared with a mean of 1.05 reported by those with high control.

Table 6.7: Social impact and oral symptom experience by personal control (dentate persons, weighted data)

	Social impact			Oral symptom experience		
	df	F	Sig.	df	F	Sig.
Personal control scale	60, 3538	7.457	<0.001	60, 3574	3.771	<0.001
Constraint subscale	47, 3551	8.250	<0.001	47, 3587	2.705	<0.001
Mastery subscale	18, 3580	8.752	<0.001	18, 3616	2.444	0.001

	Social impact					Oral symptom experience				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Personal Control										
Low	657	0.80	0.03	0.74	0.85	672	1.29	1.09	1.21	1.37
Low-moderate	805	0.56	0.02	0.53	0.60	816	1.19	0.99	1.12	1.26
Moderate	745	0.52	0.02	0.49	0.56	752	1.04	1.01	0.97	1.11
Moderate-high	778	0.43	0.02	0.40	0.46	779	0.94	0.91	0.87	1.00
High	614	0.35	0.02	0.32	0.38	616	1.05	0.97	0.97	1.13
Total	3599	0.53	0.01	0.51	0.55	3,635	1.10	1.00	1.07	1.13
Test of significance	F (4, 3594) = 66.849; p < 0.001					F (4, 3630) = 13.975; p < 0.001				
Constraint										
Low	707	0.33	0.01	0.30	0.36	710	1.01	0.92	0.94	1.08
Low-moderate	913	0.48	0.02	0.45	0.51	921	0.95	0.97	0.89	1.02
Moderate	591	0.53	0.02	0.49	0.57	595	1.12	1.00	1.04	1.20
Moderate-high	769	0.58	0.02	0.55	0.62	773	1.20	1.00	1.13	1.27
High	620	0.78	0.03	0.73	0.84	636	1.26	1.09	1.18	1.35
Total	3,,599	0.53	0.01	0.51	0.55	3,635	1.10	1.00	1.07	1.13
Test of significance	F (4, 3594) = 66.605; p < 0.001					F (4, 3630) = 12.881; p < 0.001				
Mastery										
Low	475	0.73	0.03	0.67	0.79	494	1.23	1.07	1.14	1.33
Low-moderate	838	0.57	0.02	0.53	0.60	842	1.14	0.99	1.07	1.21
Moderate	1,005	0.52	0.02	0.48	0.55	1,008	1.07	0.99	1.01	1.13
Moderate-high	783	0.47	0.02	0.43	0.50	793	1.02	0.98	0.95	1.09
High	498	0.41	0.02	0.37	0.46	500	1.08	0.98	1.00	1.17
Total	3,599	0.53	0.01	0.51	0.55	3,635	1.10	1.00	1.07	1.13
Test of significance	F (4, 3594) = 26.932; p < 0.001					F (4, 3630) = 3.996; p < 0.001				

Self-rated oral health

As presented in Table 6.8, there were significant differences in self-rated oral health according to individuals' perceptions of personal control. Overall, nearly half the sample (44.5%) rated their oral health as very good or excellent while less than a quarter (22.4%) rated it as average, poor or very poor. Of the cases with low control scores, only 6.1% rated their oral health as excellent. By contrast, of the cases with high control scores, 22.0% rated their oral health as excellent.

Table 6.8: Self-rated oral health by personal control (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
						Pearson's Chi-square		
	Very poor or poor	Average	Good	Very good	Excellent			
	Row %	Row %	Row %	Row %	Row %	Value	df	Asymp. sig. (2-sided)
Personal control						230.701	16	<0.001
n	**180**	**633**	**1,201**	**1,184**	**434**			
Low	7.7	27.4	35.4	23.4	6.1			
Low-moderate	6.0	19.8	36.2	30.8	7.2			
Moderate	5.0	16.3	34.5	33.2	10.9			
Moderate-high	2.7	12.5	32.9	36.8	15.1			
High	3.3	11.1	24.7	39.0	22.0			
Total	5.0	17.4	33.1	32.6	11.9			
Constraint subscale						224.810	16	<0.001
n	**180**	**633**	**1,201**	**1,185**	**436**			
Low	3.0	9.3	26.2	40.3	21.3			
Low-moderate	4.2	14.6	31.4	37.6	12.1			
Moderate	3.2	18.6	37.7	29.5	11.1			
Moderate-high	6.6	19.3	37.5	28.2	8.4			
High	7.9	27.2	33.2	25.0	6.8			
Total	5.0	17.4	33.0	32.6	12.0			
Mastery subscale						177.848	16	<0.001
n	**179**	**634**	**12,01**	**1,185**	**434**			
Low	9.7	23.6	34.9	25.7	6.1			
Low-moderate	4.4	18.3	35.4	35.7	6.2			
Moderate	3.8	18.6	36.5	30.8	10.3			
Moderate-high	4.4	14.4	28.0	35.1	18.1			
High	4.2	12.4	28.1	34.1	21.1			
Total	4.9	17.5	33.1	32.6	11.9			

6.2 Social support and support networks

The second psychosocial factor examined was social support and support networks. While social interaction may be either positive or aversive, social support is generally regarded as a positive resource for health. The literature shows that social support plays a role in adherence to self-care behaviour and buffers against stress. Socially isolated individuals with weak networks tend to have poorer health outcomes than those with supportive connections.

House defined four dimensions of social support. Each of these four dimensions was represented with a single item. Item #1 addressed emotional support, item #2 addressed appraisal support, item #3 addressed instrumental support and item #4 informational support. Individuals indicated their level of agreement that there were people in their lives from whom they could access each form of support.

Table 6.9 presents the response distribution for each item. As indicated by the percentage agreement, respondents overwhelmingly agreed that they could access each type of support. Only 3.1% disagree that were able to access help with certain activities if necessary. The greatest expressed deficit was for appraisal support – where 5.7% disagreed that there were people in their life who expressed an appreciation of their work. Emotional support received the lowest proportion of respondents who strongly agreed. While more than 60% of respondents strongly agreed on other dimensions, comparatively fewer (56.1%) strongly agreed that there were people who paid attention to their feelings.

Table 6.9: Response to the social support items (dentate persons, weighted data)

Item	Response category					Valid	Missing
	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree		
	Row percentages						
Attention to my feelings and problems	0.7	3.5	9.4	28.7	56.1	98.5	1.5
Appreciation of my work	1.0	4.7	12.7	19.3	60.7	98.4	1.6
Help with certain activities if needed	0.7	2.4	7.1	21.9	66.4	98.5	1.5
Advice on how to handle things	0.7	2.6	7.9	22.6	64.2	98.1	1.9

6.2.1 Factor analysis of the social support items

Principal components factor analysis extracted one factor with an eigenvalue of 2.23 that explained 55.7% of the variance. The scale had an internal consistency of α=0.73 (Table 6.10). When a two-factor solution was forced, items #1 and #2 loaded together as 'personal support' items (α= 0.63) and #3 and #4 loaded together as 'practical support' (α=0.72). While conceptually coherent, a decision was made to use a single summary statistic.

Table 6.10: Factor analysis of the social support items (dentate persons, weighted data)

Initial statistics [a]					
		Variance			
Factor	**Eigenvalue**	**%**	**Cum. %**		**Item number and label**
1	2.23	55.72	55.72	1	People pay attention to my feelings and problems
2	0.79	19.79	75.50	2	People express appreciation of my work
3	0.54	13.51	89.02	3	I can get help with certain activities if needed
4	0.44	10.98	100.00	4	I can get advice on how to handle things if needed
					Cronbach's alpha =0.73
					N of cases = 3,600

(a) Extraction method: principal component analysis
(b) Only one component was extracted – the solution could not be rotated
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.71

6.2.2 Social support and socioeconomic indicators

Social support was examined for its relationship with socioeconomic indicators (Table 6.11). There was a positive gradient in social support by socioeconomic position. For every increase in household income, there was a corresponding increase in social support. Mean social support scores increased from 3.35 in the lowest income group to 3.47 in the highest. Tertiary-educated adults accessed support more readily than those with secondary education, and adults with vocational/other training reported least support.

Managers, administrators and those in the top quintile range of occupational prestige scores reported the highest social support score of 3.59 – just 0.01 below a maximum score on this scale. The most vulnerable by occupation were tradespersons, who expressed least support with a mean score of 3.26. Dimensions of social supports were less accessible to adults who were eligible for government concessions than they were for other adults. Adults living in the most disadvantaged areas reported lowest social support scores.

6.2.3 Social support and demographic characteristics

Differences in social support by sex, country of birth and geographical remoteness were not statistically significant. However, language barriers appeared to contribute to the lower support scores reported by those who spoke a language other than English at home. There was a tendency for social support accessibility to increase across successive age groups before declining among the most senior adults. Overall, retired persons reported high levels of social support, and persons who were not employed reported significantly less social support. Persons living in two-person households reported higher levels of support than those living alone or in larger households.

Table 6.11: Social support by socioeconomic and demographic factors (dentate persons, weighted data)

	Social support		
	N	Mean	SD
Household income			
<$12,000	229	3.35	0.64
$12-20,000	377	3.40	0.71
$21-30,000	383	3.41	0.69
$31-40,000	443	3.45	0.68
$41-50,000	457	3.46	0.62
>$50,000	1,492	3.47	0.60
Total	3,381	3.44	0.64
Test of significance	F(5,3375) = 2.238, p= 0.048		
Educational attainment			
Secondary or less	994	3.45	0.65
Vocation or other	1,263	3.42	0.68
Tertiary	1,307	3.48	0.57
Total	3,564	3.45	0.63
Test of significance	F(2,3561) = 3.275, p = 0.038		
Occupational group [(a)]			
Manager/administrator	368	3.59	0.54
Professional	548	3.54	0.53
Paraprofessional	192	3.52	0.57
Tradesperson	289	3.26	0.78
Clerk	348	3.38	0.60
Sales/Personal services	310	3.44	0.59
Plant/machine op; Driver	116	3.36	0.70
Labourer/related	161	3.33	0.71
Total	2,333	3.45	0.62
Test of significance	F(7,2325) = 10.568, p < 0.001		
Occupational prestige [(b)]			
Low	466	3.40	0.63
Low-moderate	443	3.26	0.70
Moderate	456	3.49	0.60
Moderate-high	564	3.49	0.60
High	507	3.59	0.55
Total	2,438	3.45	0.62
Test of significance	F(4,2432) = 18.537, p < 0.001		
Concession status			
Card holder	652	3.37	0.74
No card	2,968	3.46	0.61
Total	3,620	3.44	0.64
Test of significance	F(1,3617) = 10.209, p = 0.001		
Area disadvantage [(c)]			
Quintile 1 (highest)	663	3.36	0.67
Quintile 2	534	3.40	0.64
Quintile 3	755	3.48	0.64
Quintile 4	721	3.39	0.64
Quintile 5	900	3.53	0.59
Total	3,574	3.44	0.64
Test of significance	F(4,3569) = 9.705, p < 0.001		

	Social support		
	N	Mean	SD
Sex			
Male	1,821	3.44	0.66
Female	1,802	3.45	0.61
Total	3,623	3.44	0.63
Test of significance	F(1,3621) = 0.272, p= 0.602		
Age group			
18-29 years	946	3.36	0.63
30-39 years	807	3.48	0.60
40-49 years	727	3.45	0.69
50-59 years	515	3.48	0.63
60-69 years	320	3.51	0.63
70+ years	308	3.48	0.61
Total	3,623	3.44	0.63
Test of significance	F(5,3617) = 5.390, p< 0.001		
Country of birth			
Australia	2,837	3.44	0.65
Overseas	749	3.46	0.60
Total	3,586	3.44	0.64
Test of significance	F(1,3584) = 1.187, p= 0.276		
Language at home			
Other than English	386	3.30	0.72
English	3,237	3.46	0.62
Total	3,623	3.44	0.63
Test of significance	F(1,3621) = 20.715, p< 0.001		
Employment status			
Full-time	1,694	3.48	0.62
Part-time	658	3.43	0.57
Retired	492	3.49	0.60
Not employed	542	3.40	0.70
Total	3,387	3.46	0.62
Test of significance	F(3,3382) = 3.212, p= 0.022		
Householders aged 5+			
One person	426	3.36	0.71
Two persons	1,388	3.50	0.58
Three-four persons	1,420	3.43	0.64
More than four persons	386	3.38	0.67
Total	3,619	3.44	0.64
Test of significance	F(3,3614) = 7.429, p< 0.001		
ARIA category [(a)]			
Highly accessible	3,010	3.44	0.63
Accessible	410	3.46	0.66
Moderately accessible	125	3.45	0.55
Remote	37	3.54	0.49
Very remote	30	3.15	0.91
Total	3,612	3.44	0.64
Test of significance	F(1,3606) = 1.810, p= 0.124		

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage - Australian Bureau of Statistics' Socio-Economic Indexes for Areas
(d) Accessibility/Remoteness Index of Australia

6.2.4 Social networks

Apart from the accessibility of social support, another aspect of social relations was addressed. Social networks and affiliations address a broader level of integration and connectedness within the community. In addition, networks imply reciprocity - giving and receiving for mutual benefit. To measure the diversity of social networks, respondents were asked to indicate any active membership they held in any organisation, committee, club or association that met on a regular basis. The study did not measure aversive social contact or the density, breadth or duration of interpersonal ties.

Respondents were asked to indicate from a list of 11 alternatives any group memberships that they currently held. A twelfth option was 'other, please specify' and responses were reassigned to a named category where possible. Types of membership were collapsed into four categories based on a common theme. The category 'shared interest' comprised groups that met because of a mutual concern, joint interest or shared skill (excluding sport). These groups were support group, cultural association, parent group, hobby club, religious group and professional association.

Groups that sought to make an intentional contribution to public purposes and responsibilities were merged to form the 'civic engagement' category. These were charitable organisation, fund-raising group and community service club. Groups that met for sport or exercise formed the 'physical activity' category. The fourth category 'social interaction' comprised social groups and other activities nominated by respondents where the basis for meeting and interaction was primarily for social contact. It is likely that population subgroups vary in their opportunities for social interaction. To assess whether networks were socially patterned, the relationship between the type of social network and social factors was examined.

6.2.5 Social network type and socioeconomic indicators

Overall, approximately 80% of respondents reported active membership in one or more groups. Participation fell below 80% for those with household incomes in the $31-40,000 range, those without post-secondary education, labourers and related workers, and those resident in areas with greatest social disadvantage (Table 6.12). From each socioeconomic indicator, the category with the highest proportion with group membership were those with income >$40,000, the tertiary educated, professionals, those with high occupational prestige, those not eligible for government concessions and those living in the second least disadvantaged area.

Socioeconomic indicators were also related to the types of social networks that people held. Notably, 30.4% of adults with income below $12,000 were involved in civic engagements. By comparison, 15.9% of those with income of $41-50,000 and 17.2% of those with income >$50,000 had civic networks.

A higher proportion of adults with vocational training had social networks related to physical activity (sport or exercise) than had adults with secondary or tertiary education.

Workers with professional occupations were highly represented in the shared interest category (65.5%). A smaller proportion of tradespersons (34.8%), plant/machine operators, drivers (31.6%), and labourers/related (30.7%) reported membership in the shared interest category. Rather, proportionately more tradespersons (58.3%) and plant/machine operators, drivers (59.0%) reported membership in physical activity groups than did professionals (37.7%) and paraprofessionals (38.5%).

Adults eligible for government concessions (cardholders) were proportionally less represented than non-cardholders in shared interest and physical activity categories. Although cardholders were better represented in civic engagement and social interaction networks, differences failed to reach statistical significance.

The distribution of social networks also varied according to social disadvantage of residential areas. However, patterns in the distribution by this socioeconomic indicator were not readily identified.

Table 6.12: Types of social networks by socioeconomic indicators (dentate persons, weighted data)

	Any membership	Shared interest	Civic engagement	Physical activity	Social interaction
	% with 1+ membership	% with 1+ membership	% with 1+ membership	% with 1+ membership	% with 1+ membership
Household income	ns	*	*	*	ns
<$12,000	80.2	39.2	30.4	31.2	26.6
$12-20,000	80.9	44.6	21.7	32.6	32.8
$21-30,000	80.7	49.1	23.7	35.6	28.1
$31-40,000	79.3	47.4	20.0	43.6	33.4
$41-50,000	83.9	42.9	15.9	55.6	29.9
>$50,000	83.3	52.5	17.2	43.7	31.9
Total	82.1	48.4	19.6	42.2	31.1
Educational attainment	*	*	ns	*	ns
Secondary or less	79.2	39.9	19.0	38.6	29.2
Vocation or other	82.0	44.7	21.0	45.4	31.1
Tertiary	83.4	58.6	19.3	38.5	32.7
Total	81.7	48.5	19.8	41.0	31.1
Occupational group [(a)]	ns	*	ns	*	*
Manager/administrator	84.0	53.1	18.7	51.8	27.4
Professional	85.7	65.5	17.4	37.7	32.6
Paraprofessional	81.5	46.9	15.4	38.5	32.3
Tradesperson	80.0	34.8	13.4	58.3	35.2
Clerk	82.1	44.6	17.7	47.9	32.0
Sales/Personal services	80.7	40.8	15.8	46.0	24.4
Plant/machine op; Driver	81.2	31.6	10.3	59.0	37.9
Labourer/related	75.9	30.7	16.0	43.8	27.6
Total	82.3	47.7	16.3	46.6	30.8
Occupational prestige [(b)]	ns	*	ns	ns	*
Low	82.4	37.4	15.8	49.4	32.7
Low-moderate	81.8	41.7	15.2	49.6	33.0
Moderate	80.1	41.3	15.1	48.7	26.6
Moderate-high	81.9	53.3	18.7	43.0	34.9
High	86.7	64.6	20.4	44.1	29.5
Total	82.7	48.3	17.2	46.7	31.4
Concession status					
Card holder	80.24 ns	43.9 *	21.5 ns	34.0 *	33.7 ns
No card	82.21	49.8	19.5	43.4	30.7
Total	81.85	48.7	19.9	41.6	31.3
Area disadvantage [(c)]	*	*	*	*	*
Quintile 1 (highest)	76.4	42.3	15.9	42.3	29.7
Quintile 2	80.5	47.7	22.8	38.6	31.0
Quintile 3	83.8	46.2	19.2	46.2	35.1
Quintile 4	85.2	52.1	20.8	42.8	31.3
Quintile 5	82.3	53.2	20.6	38.2	29.0
Total	81.8	48.6	19.8	41.6	31.2

*p<0.05 Pearson's Chi-square

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage – Australian Bureau of Statistics' Socio-Economic Indexes for Areas

6.2.6 Social network type and demographic characteristics

As presented in Table 6.13, social networks were also differentially distributed by demographic characteristics. Significantly higher proportions of females were involved in shared interest and social interaction groups, but significantly fewer met with others for sport or exercise.

Participation in civic engagement increased across age groups, from 12.2% of those aged 18-29 years to 35.8% of those aged 70+ years. Smaller proportions of the 70+ years group had networks in physical activity groups than had other age groups, and smaller proportions of the 18-29-year-olds compared to older adults had membership in shared interest groups. Overall membership tended to decline in midlife with a smaller proportion of adults aged between 40 and 59 years reporting any membership, and in particular, fewer meeting for the purpose of social interaction.

Compared with Australian-born, overseas-born people were more likely to be part of a group. Smaller proportions of Australian-born had social networks in shared interest groups or met for social interaction, but a higher proportion engaged in physical activity with others.

In comparing employment status categories, retirees tended to be socially active.

Adults who were sole household occupants were better represented than adults from larger households in civic groups and groups meeting for social interaction. However, a greater proportion of adults from households with four or more occupants aged 5 years or over, participated in shared interest groups and physical activity groups.

Differences based on geographical remoteness were not significant.

Table 6.13: Types of social networks by demographic characteristics (dentate persons, weighted data)

	Any membership	Shared interest	Civic engagement	Physical activity	Social interaction
	% with 1+ membership	% with 1+ membership	% with 1+ membership	% with 1+ membership	% with 1+ membership
Sex	ns	*	ns	*	*
Male	81.7	44.1	18.6	49.0	29.1
Female	82.0	53.3	21.1	34.3	33.5
Total	81.9	48.7	19.8	41.6	31.3
Age group	ns	*	*	*	*
18-29 years	82.2	42.3	12.2	50.4	33.2
30-39 years	82.0	53.1	14.3	41.2	31.4
40-49 years	79.6	47.2	20.9	41.8	28.2
50-59 years	80.7	53.0	28.0	36.5	27.8
60-69 years	85.4	50.3	24.7	39.0	30.2
70+ years	84.0	51.4	35.8	27.4	38.9
Total	81.9	48.7	19.9	41.6	31.3
Country of birth	*	*	ns	*	*
Australia	81.2	47.3	20.4	43.2	30.5
Overseas	84.2	53.1	17.5	35.3	34.2
Total	81.8	48.5	19.8	41.6	31.2
Language at home	ns	ns	ns	*	ns
Other than English	85.1	53.2	16.4	36.4	33.9
English	81.5	48.1	20.3	42.2	31.0
Total	81.8	48.7	19.9	41.6	31.3
Employment status	ns	ns	*	*	*
Full-time	80.8	47.4	16.0	44.9	29.5
Part-time	82.5	50.1	18.9	44.6	31.3
Retired	84.7	48.1	32.5	33.2	35.8
Not employed	80.1	53.0	20.9	32.2	29.7
Total	81.6	49.0	19.8	41.1	30.8
Householders aged 5+	*	*	*	*	*
One person	82.0	47.4	28.7	35.9	37.3
Two persons	82.6	49.7	18.9	39.4	28.4
Three-four persons	80.2	45.3	18.5	41.6	32.1
More than four persons	84.8	58.5	18.5	55.7	31.5
Total	81.8	48.7	19.9	41.6	31.3
ARIA category [(a)]	ns	ns	ns	ns	ns
Highly accessible	81.5	49.3	19.2	41.0	30.5
Accessible	84.1	43.4	21.8	43.4	36.7
Moderately accessible	83.6	52.3	27.3	46.9	33.6
Remote	79.5	43.6	25.6	56.4	23.1
Very remote	73.3	43.3	17.2	36.7	30.0
Total	81.8	48.6	19.9	41.6	31.2

ns $p>0.05$; *$p<0.05$ Pearson's Chi-square

Apart from the type of membership, the range of networks with which an individual has ties influences the breadth of their social integration and provides diversity in supportive functions. In order to assess the breadth of social ties, groups to which each respondent indicated a membership were summed to form a continuous scale of memberships from 0 to12.

Table 6.14 presents summary statistics for the sum of social networks. Overall, 18.1% reported having no social networks, indicating lower levels of social integration. The majority of respondents (70.7%) reported between 1 and 3 memberships, and those indicating four or more current memberships comprised 11.1% of the sample. The average number of different types of memberships was 1.8, and the most frequently reported number was one.

Table 6.14: Summary statistics for the sum of social networks (dentate persons, weighted data)

Statistics		N of different types of membership	Frequency	Percent	Cum percent
Sum of group memberships		0	668	18.15	18.15
N	3,678	1	1,129	30.69	48.84
N of items	13	2	966	26.27	75.10
Mean	1.77	3	506	13.76	88.86
Median	2.00	4	243	6.61	95.48
Mode	1.00	5	94	2.56	98.04
Std. deviation	1.45	6	40	1.10	99.13
Percent floor	18.15	7	11	0.30	99.44
Percent ceiling	0.02	8	11	0.29	99.73
Minimum	0.00	9	9	0.24	99.98
Maximum	12.00	12	1	0.02	100.00

6.2.7 Social network number and social characteristics

A description of the 668 individuals with no formal social networks was obtained to identify distinguishing social characteristics. Generally, those without social networks were more likely to be aged younger than 50 years, Australian-born, full-time workers, in large households, in professional occupations and with highest household income. There were no differences by sex - males contributed 50.4%. One explanation is that these persons are socially integrated in work, home and community life, but do not have formal networks. While this may be the case, it is noteworthy that the mean social support score for these people of 3.37 was significantly lower than that of 3.46 for those with one or more networks (F (1, 3621) = 9.927, p =0.002). Results are not tabulated.

Table 6.15 shows the mean of the sum of different memberships according to social indicators. The mean number of summed social networks differed significantly across socioeconomic indicators. Generally those less advantaged had fewer social networks.

Adults with incomes <$20,000 reported less memberships than others with greater household incomes. Tertiary educated people held more (1.97) than those with vocational (1.76) or secondary education (1.50). People in professional occupations reported greatest diversity in memberships (2.04), and labourers and related workers reported least (1.34). Trends were similar for occupational prestige, with most memberships held by the high prestige quintile (2.03) and fewest held by the low prestige quintile (1.62). Concession cardholders (1.67) had fewer sorts of networks than non cardholders (1.80), and people living in the most disadvantaged areas held fewer memberships (1.62) than did those in less disadvantaged areas.

The sum of memberships differed by demographic characteristics. Females had more memberships (1.83) than did males (1.71). Adults of 70+ years had the highest mean number of networks (2.01) of all the age groups, and the 18-29 years age group had fewest (1.65). Differences based on country of birth, language at home and geographical location were not statistically significant. Reflecting the high level of social integration of older people, retirees reported most networks among employment status groups (1.92). Individuals in households with more than four persons reported more social networks (2.06) than did adults in smaller households.

Table 6.15: Sum of social networks by socioeconomic and demographic factors (dentate persons, weighted data)

	Sum of networks		
	N	Mean	SD
Household income			
<$12,000	237	1.64	1.48
$12-20,000	387	1.61	1.26
$21-30,000	388	1.73	1.48
$31-40,000	454	1.85	1.68
$41-50,000	459	1.72	1.29
>$50,000	1,507	1.83	1.47
Total	3,432	1.77	1.46
Test of significance	F (5,3426) = 2.26; p=0.046		
Educational attainment			
Secondary or less	1,015	1.50	1.23
Vocation or other	1,280	1.76	1.48
Tertiary	1,324	1.97	1.53
Total	3,618	1.76	1.45
Test of significance	F (2,3615) = 30.56; p<0.001		
Occupational group [(a)]			
Manager/administrator	369	1.89	1.42
Professional	551	2.04	1.56
Paraprofessional	195	1.67	1.32
Tradesperson	290	1.69	1.48
Clerk	350	1.64	1.23
Sales; Personal services	311	1.57	1.38
Plant/machine op; Driver	117	1.54	1.22
Labourer/related	162	1.34	1.29
Total	2,345	1.75	1.42
Test of significance	F (7,2336) = 7.36; p<0.001		
Occupational prestige [(b)]			
Low	468	1.62	1.37
Low-moderate	446	1.65	1.34
Moderate	458	1.59	1.31
Moderate-high	568	1.99	1.75
High	511	2.03	1.45
Total	2,450	1.79	1.48
Test of significance	F (4,2445) = 11.06; p<0.001		
Concession status			
Card holder	673	1.67	1.38
No card	3,001	1.80	1.47
Total	3,674	1.77	1.45
Test of significance	F (1,3672) = 4.572; p=0.033		
Area disadvantage [(c)]			
Quintile 1 (greatest)	679	1.62	1.55
Quintile 2	549	1.74	1.52
Quintile 3	766	1.81	1.38
Quintile 4	731	1.84	1.42
Quintile 5	905	1.81	1.42
Total	3,629	1.77	1.45
Test of significance	F (4,3623) = 2.66; p=0.031		

	Sum of networks		
	N	Mean	SD
Sex			
Male	1,839	1.71	1.39
Female	1,839	1.83	1.51
Total	3,678	1.77	1.45
Test of significance	F (1,3676) = 6.24; p=0.013		
Age group			
18-29 years	951	1.65	1.36
30-39 years	811	1.76	1.51
40-49 years	742	1.71	1.42
50-59 years	521	1.91	1.54
60-69 years	328	1.84	1.39
70+ years	324	2.01	1.56
Total	3,678	1.77	1.45
Test of significance	F (5,3672) = 4.42; p=0.001		
Country of birth			
Australia	2,880	1.77	1.48
Overseas	761	1.75	1.33
Total	3,641	1.77	1.45
Test of significance	F (1,3639) = 0.10; p=0.757		
Language at home			
Other than English	389	1.78	1.41
English	3,289	1.77	1.46
Total	3,678	1.77	1.45
Test of significance	F (1,3676) = 0.02; p=0.885		
Employment status			
Full-time	1,708	1.67	1.35
Part-time	668	1.83	1.47
Retired	511	1.92	1.51
Not employed	549	1.79	1.61
Total	3,437	1.76	1.44
Test of significance	F (3,3432) = 4.75; p=0.003		
Householders aged 5+			
One person	439	1.93	1.57
Two persons	1,410	1.69	1.31
Three-four persons	1,429	1.72	1.48
More than four persons	395	2.06	1.68
Total	3,674	1.77	1.45
Test of significance	F (3,3669) = 8.86; p<0.001		
ARIA category [(d)]			
Highly accessible	3,048	1.76	1.46
Accessible	422	1.78	1.41
Moderately accessible	128	1.97	1.39
Remote	39	1.87	1.50
Very remote	30	1.64	1.60
Total	3,666	1.77	1.45
Test of significance	F (4,3661) = 0.73; p=0.056		

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage - Australian Bureau of Statistics' Socio-Economic Indexes for Areas
(d) Accessibility/Remoteness Index of Australia

6.2.8 Social support and networks and oral health

Decayed and missing teeth

Analysis began with an examination of the relationship between social support and decayed and missing teeth. As presented in Table 6.16, there were significant differences in decayed teeth by social support, but differences in missing teeth were not significant.

Consistent with other scales in this study, a summary statistic for the social support scale was computed as a mean of responses (permitting one invalid item). Because of the clustering of scores, mean scale scores were partitioned into tertiles rather than quintiles to form groups labelled 'high', 'moderate' and 'low' social support. Even so, the clustering of scores did not permit equal division. As a caveat, the labels 'moderate' and 'low' denote lower levels of support relative to the 'high' group. Because the sample mean for social support was 3.44 and at the 70th percentile was 4.00 (maximum score), comparatively few people disagreed that any dimension of social support was available to them.

Adults with low social support reported more decayed teeth (1.30) than those with moderate levels of support (0.81) and those with high social support (0.66). Differences in mean missing teeth were significant after tertile formation. Missing teeth was greatest among those with low social support (3.86 teeth lost), but was lowest among those with moderate levels of social support (3.12).

Table 6.16: Decayed and missing teeth by social support (dentate persons, weighted data)

	Decayed			Missing teeth		
	df	F	Sig.	df	F	Sig.
Social support scale	18, 2951	5.317	<0.001	19, 3492	1.307	0.167

	Decayed teeth					Missing teeth				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Social support scale										
Low	303	1.30	1.86	1.09	1.51	367	3.86	6.46	3.20	4.53
Moderate	1,533	0.81	1.48	0.73	0.88	1,781	3.12	5.81	2.85	3.39
High	1,134	0.66	1.39	0.58	0.74	1,365	3.51	6.08	3.19	3.83
Total	2,970	0.80	1.50	0.75	0.85	3,513	3.35	5.99	3.15	3.55
Test of significance	F (2, 2967) = 22.429; p <0.001					F (2, 3509) = 3.105; p = 0.045				

People with no formal social networks reported more decayed teeth (p=0.05) and more missing teeth than those with one or more memberships, although differences in missing teeth did not reach the 0.05 level (Table 6.17).

Adults with no social networks in any of the groups combined to form the 'shared interest' category had significantly more decayed teeth (0.92) than those with a network (0.78). Differences in decayed teeth for people with and without involvement in civic engagement, physical activity and social interaction were not significant.

Adults with a group membership in the 'shared interest' category had significantly fewer missing teeth than those with no membership in this category. Significant differences in missing teeth according to civic engagement and physical activity were also observed, but age-related effects confound these results.

Table 6.17: Decayed and missing teeth by social network membership (dentate persons, weighted data)

	Decayed teeth					Missing teeth				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Group membership (any)										
No membership	533	0.92	1.50	0.79	1.05	647	3.66	6.47	3.16	4.16
1+ membership(s)	2460	0.78	1.51	0.72	0.84	2911	3.35	5.96	3.13	3.56
Total	2993	0.81	1.51	0.75	0.86	3558	3.40	6.05	3.20	3.60
Test of significance	F (1, 2991) = 3.830; p = 0.050					F (1, 3556) = 1.384; p = 0.239				
Shared interest										
No membership	1517	0.86	1.59	0.78	0.94	1825	3.62	6.34	3.32	3.91
Membership	1476	0.74	1.41	0.67	0.82	1733	3.18	5.73	2.91	3.45
Total	2993	0.81	1.51	0.75	0.86	3558	3.40	6.05	3.20	3.60
Test of significance	F (1, 2991) = 4.689; p = 0.030					F (1, 3556) = 4.405; p = 0.032				
Civic engagement										
No membership	2,412	0.81	1.48	0.75	0.86	2855	3.09	5.78	2.87	3.30
Membership	581	0.80	1.62	0.67	0.93	703	4.69	6.91	4.18	5.20
Total	2,993	0.81	1.51	0.75	0.86	3558	3.40	6.05	3.20	3.60
Test of significance	F (1, 2991) = 0.002; p = 0.960					F (1, 3556) = 39.928; p < 0.001				
Physical activity										
No membership	1,745	0.77	1.44	0.70	0.84	2063	3.81	6.48	3.53	4.09
Membership	1,248	0.85	1.60	0.76	0.94	1495	2.84	5.36	2.57	3.11
Total	2,993	0.81	1.51	0.75	0.86	3558	3.40	6.05	3.20	3.60
Test of significance	F (1, 2991) = 2.147; p = 0.143					F (1, 3556) = 22.449; p < 0.001				
Social interaction										
No membership	2,045	0.81	1.49	0.75	0.88	2447	3.51	6.16	3.27	3.76
Membership	948	0.79	1.55	0.69	0.89	1111	3.16	5.81	2.82	3.51
Total	2,993	0.81	1.51	0.75	0.86	3558	3.40	6.05	3.20	3.60
Test of significance	F (1, 2991) = 0.118; p = 0.731					F (1, 3556) = 2.513; p = 0.113				

Social impact and oral symptom experience

As presented in Table 6.18, differences in the social impact of dental conditions and the number of oral symptoms experience varied significantly accorded to levels of social support. As social support increased, there was a corresponding decrease in social impact scores, from 0.73 for those with low support to 0.49 for those with high support. Similarly, as social support increased, a corresponding decrease in oral symptom experience was observed, from 1.27 symptoms reported by those with low support to 1.04 symptoms for those with high social support.

Table 6.18: Social impact and oral symptom experience by social support (dentate persons, weighted data)

	Social impact			Oral symptom experience		
	df	F	Sig.	df	F	Sig.
Social support scale	19, 3561	9.720	<0.001	19, 3602	3.402	<0.001

	Social impact					Oral symptom experience				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Social support scale										
Low	379	0.73	0.65	0.67	0.80	389	1.27	1.00	1.17	1.37
Moderate	1,815	0.52	0.54	0.50	0.55	1,839	1.11	1.03	1.06	1.16
High	1,387	0.49	0.49	0.46	0.51	1,394	1.04	0.95	0.99	1.09
Total	3,581	0.53	0.54	0.51	0.55	3,622	1.10	1.00	1.07	1.13
Test of significance	F (2, 3578) = 32.167; p < 0.001					F (2, 3619) = 8.542; p < 0.001				

Differences in social impact and oral symptom experience according to social networks were not significant. The single exception was for oral symptom experience, where social network centred on social interaction. In this case, non-members reported greater symptom experience.

Table 6.19: Decayed and missing teeth by social network membership (dentate persons, weighted data)

	Social impact					Oral symptom experience				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Group membership (any)										
No membership	655	0.56	0.61	0.51	0.61	666	1.12	1.02	1.04	1.20
1+ membership(s)	2,968	0.52	0.52	0.51	0.54	3,010	1.09	1.00	1.06	1.13
Total	3,623	0.53	0.54	0.51	0.55	3,677	1.10	1.00	1.07	1.13
Test of significance	F (1, 3620) = 2.436; p = 0.119					F (1, 3674) = 0.361; p = 0.076				
Shared interest										
No membership	1,858	0.53	0.55	0.50	0.55	1,886	1.07	0.98	1.03	1.12
Membership	1,765	0.54	0.53	0.51	0.56	1,791	1.13	1.02	1.08	1.18
Total	3,623	0.53	0.54	0.51	0.55	3,677	1.10	1.00	1.07	1.13
Test of significance	F (1, 3620) = 0.386; p = 0.534					F (1, 3674) = 3.143; p = 0.076				
Civic engagement										
No membership	2,906	0.54	0.53	0.52	0.56	2,947	1.11	0.99	1.07	1.14
Membership	717	0.51	0.58	0.47	0.55	730	1.08	1.04	1.00	1.15
Total	3623	0.53	0.54	0.51	0.55	3,677	1.10	1.00	1.07	1.13
Test of significance	F (1, 3620) = 1.544; p = 0.214					F (1, 3674) = 0.500; p = 0.479				
Physical activity										
No membership	2,114	0.54	0.56	0.52	0.57	2,146	1.11	1.01	1.07	1.16
Membership	1,509	0.51	0.52	0.49	0.54	1,531	1.08	0.99	1.03	1.13
Total	3,623	0.53	0.54	0.51	0.55	3,677	1.10	1.00	1.07	1.13
Test of significance	F (1, 3620) = 2.799; p = 0.094					F (1, 3674) = 1.018; p = 0.313				
Social interaction										
No membership	2,480	0.54	0.55	0.51	0.56	2,527	1.13	1.01	1.09	1.16
Membership	1,142	0.52	0.53	0.49	0.55	1,150	1.04	0.98	0.99	1.10
Total	3,623	0.53	0.54	0.51	0.55	3,677	1.10	1.00	1.07	1.13
Test of significance	F (1, 3620) = 0.337; p = 0.562					F (1, 3674) = 5.349; p = 0.021				

Social support and self-rated oral health

As presented in Table 6.20, significant differences in self-rated oral health according to the availability of social support were observed. The proportions of adults rating their oral health as average or worse increased with increasing social support. Moreover, the proportion that rated their oral health as very good increased with increasing support, and a higher percentage of those with moderate or high levels of support rated their oral health as excellent.

Table 6.20: Self-rated oral health according to social support (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
	Very poor or poor	Average	Good	Very good	Excellent	Pearson's Chi-square		
	Row %	Row %	Row %	Row %	Row %	Value	df	Asymp. sig. (2-sided)
Social support						33.334	8	<0.001
n	178	628	1,195	11,83	434			
Low	7.5	20.4	34.8	29.1	8.2			
Moderate	5.7	16.8	31.7	32.2	13.7			
High	3.2	17.3	34.3	34.3	10.8			
Total	4.9	17.4	33.0	32.7	12.0			

Adults with no formal ties to a social network were significantly less likely to rate their oral health favourably, as presented in Table 6.21. Adults with memberships in the shared interest and social interaction groups reported significantly better oral health than adults without these affiliations. Although a greater proportion of adults belonging to groups with mutual interest in sport/exercise and civic activities rated their oral health more favourably, differences between those with and without memberships did not reach statistical significance.

Table 6.21: Self-rated oral health by social network type (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
						Pearson's Chi-square		
	Very poor or poor	Average	Good	Very good	Excellent			
	Row %	Row %	Row %	Row %	Row %	Value	df	Asymp. sig. (2-sided)
Group membership (any)						17.617	4	0.001
n	**184**	**641**	**1,217**	**1,196**	**436**			
No membership	7.2	17.3	36.8	27.6	11.1			
1+ membership(s)	4.5	17.5	32.3	33.6	12.0			
Total	5.0	17.4	33.1	32.6	11.9			
Shared interest group						22.485	4	<0.001
n	**184**	**641**	**1,217**	**1,196**	**436**			
No membership	5.1	16.8	36.5	31.0	10.6			
Membership	4.9	18.2	29.6	34.2	13.2			
Total	5.0	17.4	33.1	32.6	11.9			
Civic engagement group						6.885	4	0.142
n	**184**	**641**	**1,216**	**1,196**	**436**			
No membership	5.3	17.1	33.8	32.1	11.7			
Membership	3.8	18.7	30.4	34.5	12.6			
Total	5.0	17.5	33.1	32.6	11.9			
Physical activity group						4.084	4	0.395
n	**184**	**641**	**1,217**	**1,196**	**435**			
No membership	5.2	17.7	33.2	31.4	12.4			
Membership	4.7	17.1	33.0	34.1	11.1			
Total	5.0	17.5	33.1	32.6	11.8			
Social interaction group						12.863	4	0.012
n	**184**	**641**	**1,217**	**1,196**	**436**			
No membership	5.2	18.4	33.2	32.3	10.8			
Membership	4.5	15.3	32.9	33.1	14.2			
Total	5.0	17.4	33.1	32.6	11.9			

In summary, there is evidence of an association between social relationships and oral health. Adults who are comparatively more socially isolated and adults who do not have social networks in the broader community are more likely to experience poor oral health. Low social support was associated with more decayed teeth, greater social impact of dental conditions, wider symptom experience and a poorer global self-rating of oral health. An absence of social network relations was associated with more decayed teeth and a poorer global rating of oral health. Adults who met regularly because of a shared interest reported better oral health over a variety of outcome measures.

6.3 Perceived stress

There is an extensive literature on the health consequences of stress exposure. Development of this literature has progressed along two pathways that differentiate between chronic stressors and acute life events. This study addresses chronic stress directly and indirectly. In this chapter, perceived stress is evaluated directly using a tested instrument. This study addresses chronic stress indirectly through factors such as material deprivation, stressful working conditions, inter-role conflict, and deficiencies in control, support, coping and outlook on life.

Disadvantaged material circumstances are not equally stressful to all adults and are moderated by expectations, life chances, stage of life and the mediating effects of psychosocial resources. Respondents' perceived psychological stress was quantified using the Perceived Stress Scale developed by Cohen and colleagues[2]. Response options appraise the frequency of stress rather than the intensity of impact of specific stressors. The percentage distribution of scale items across response categories is presented in Table 6.22. The item eliciting most frequent stress was #6, which measured confidence to handle personal problems. More than three-quarters of respondents (75.2%) scored this fairly often or very often. The second ranked stressor #10 'not feeling on top of things' was scored by 63.4% of people fairly often or very often. Of note, this item shared content similarity with #14 'difficulties piling up', which was scored fairly often or very often by only 7.0%. The important distinction between these is that #14 includes a clause 'so high that you could not overcome them'. Presumably, while 63.4% were often not 'on top of things', 93.0% coped sufficiently so as to not be overcome by difficulties.

Table 6.22: Percentage distribution of perceived stress scale items (dentate persons, weighted data)

Item	Response category						
	Not at all	Rarely	Sometimes	Fairly often	Very often	Valid	Missing
	Row Percentages						
Upset by something unexpected	4.8	29.7	48.1	11.3	3.1	97.0	3.0
Unable control important things	9.5	47.4	33.1	5.8	1.4	97.1	2.9
Felt nervous or stressed	4.2	18.1	46.6	21.7	6.7	97.3	2.7
Dealt successfully with life hassles	1.6	7.1	35.2	44.2	8.4	96.5	3.5
Effectively coped with changes	1.2	5.7	27.5	50.1	12.7	97.1	2.9
Confident to handle problems	0.9	3.2	18.0	53.3	21.9	97.3	2.7
Felt things were going your way	1.1	7.6	35.6	43.8	9.2	97.3	2.7
Coped with all you had to do	2.0	8.3	36.1	42.2	8.8	97.4	2.6
Control irritations in your life	0.8	8.0	31.5	47.7	9.3	97.3	2.7
On top of things	0.9	6.5	26.5	51.3	12.1	97.3	2.7
Angered by things beyond control	5.8	29.4	45.7	13.5	2.9	97.2	2.8
Thinking things to accomplish	0.9	5.8	29.5	45.0	16.2	97.3	2.7
Able to control way you spend time	1.1	9.5	29.5	46.6	10.6	97.4	2.6
Not overcome difficulties piling up	16.8	44.5	29.1	5.4	1.6	97.4	2.6

6.3.1 Factor analysis of the perceived stress scale items

The 14 items were analysed using principal components factor analysis with varimax rotation. As presented in Table 6.23, two separate and identifiable factors were extracted with eigenvalues greater than one, which together accounted for 51.1 % of the variation within the scale. Seven items with factor loadings greater than 0.40 loaded onto two factors that were labelled 'distress' and 'coping'. Alpha coefficients were 0.82 and 0.81 respectively indicating adequate internal consistency of the factors.

Table 6.23: Factor analysis of the perceived stress scale items (dentate persons, weighted data)

Initial statistics [a]				Final statistics [b]			
		Variance				Factor loadings	
Factor	Eigenvalue	%	Cum. %		Item number and label	Distress	Coping
1	5.28	37.7	37.70	1	Upset by unexpected	0.70	-0.15
2	1.88	13.45	51.15	2	Unable to control important things	0.72	-0.24
3	0.9	6.43	57.58	3	Felt nervous or stressed	0.76	-0.10
4	0.85	6.1	63.68	* 4	Dealt successfully	0.09	0.75
5	0.70	5.00	68.68	* 5	Effectively coped	-0.01	0.77
6	0.64	4.60	73.28	* 6	Confident in your ability	-0.35	0.69
7	0.63	4.49	77.77	* 7	Going your way	-0.43	0.60
8	0.57	4.05	81.83	8	Coped with all had to do	-0.66	0.18
9	0.48	3.46	85.28	* 9	Control irritations	-0.25	0.6
10	0.48	3.40	88.68	* 10	On top of things	-0.53	0.58
11	0.44	3.16	91.84	11	Angered by things beyond control	0.69	-0.13
12	0.43	3.10	94.94	12	Thinking about things to accomplish	0.45	0.32
13	0.38	2.71	97.65	* 13	Able to control your time	-0.34	0.41
14	0.33	2.35	100.00	14	Not overcome difficulties piling up	0.72	-0.28
					Cronbach's alpha	0.82	0.81
					N of Cases	3,533	3,519

(a) Extraction method: principal component analysis
(b) Rotation method: varimax with Kaiser normalization. Rotation converged in 3 iterations
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.91
* direction reversed

6.3.2 Perceived stress and socioeconomic indicators

Stress experience was examined for its relationship with socioeconomic indicators to test the hypothesis that adults with a lower income (purchasing power), basic education (knowledge power) and low occupational status (influence) would report higher levels of perceived stress. Findings are reported in Table 6.24. Generally, results supported the hypothesis of an inverse socioeconomic gradient in perceived stress. However, because stress perceptions decrease with age, age potentially confounded associations with socioeconomic position. Adults with lowest income reported least distress (1.72), while those earning >$50,000 reported a moderate stress score of 1.78. The most vulnerable group was situated midway across income categories, with incomes of $21,000 to $30,00 (1.88) and $31,000 to 40,000 (1.85). Coping scores were positively associated with income, increasing from 2.49 for those with an income <$12,000 to 2.73 for those with an income >$50,000. In a seemingly contradictory finding, adults with tertiary education reported higher mean scores for both distress and coping than adults with less educational attainment. Among occupational groups for the overall stress scale, tradespersons reported highest stress scores (1.69), and least stress was reported by professionals (1.50); however, when individual subscale scores were investigated, the distribution altered. Managers and administrators reported least distress (1.77) and sales and personal service workers reported highest distress (1.92). Professionals had highest coping scores (2.80) and labourers and related workers had poorest scores for coping (2.49). Cardholders reported significantly more distress and significantly poorer coping than non-cardholders. Distress and coping were also differentially distributed according to area disadvantage. People living in areas with least disadvantaged areas reported lowest distress and highest coping scores.

6.3.3 Perceived stress and demographic characteristics

The distribution of distress and coping were examined for their relationship with demographic characteristics (Table 6.25). Males reported significantly lower distress and better coping than females. On the overall scale and distress subscale, stress scores peaked in midlife for the 40-49 years age group before decreasing to their lowest level in the 70+ years age group. Of note, the 40-49 years age group also reported poorest coping scores. Although differences in distress and coping were not significant when comparing Australian-born adults with those born overseas, differences were significant for coping between English speaking adults and those who spoke a LOTE at home. Adults who spoke English reported higher coping scores, although their distress levels were not significantly lower. Part-time workers experienced the highest distress score among employment categories, but the non-employed reported poorest coping. Adults in the largest households reported highest distress and least coping capacity. Differences based on geographical remoteness were not statistically significant.

Table 6.24: Perceived stress scales by socioeconomic indicators (dentate persons, weighted data)

	N	Scale score		Distress subscale		Coping subscale	
		Mean	SD	Mean	SD	Mean	SD
Household income							
<$12,000	222	1.62	0.58	1.72	0.76	2.49	0.64
$12-20,000	368	1.54	0.52	1.77	0.67	2.68	0.57
$21-30,000	378	1.67	0.50	1.88	0.60	2.55	0.54
$31-40,000	443	1.63	0.49	1.85	0.59	2.59	0.53
$41-50,000	454	1.61	0.43	1.81	0.54	2.58	0.51
>$50,000	1,487	1.52	0.48	1.78	0.54	2.73	0.54
Total	3,351	1.57	0.49	1.80	0.59	2.65	0.55
Test of significance		F(5,3345)=8.391, p<0.001		F(5,3345)=3.388, p=0.005		F(5,3345)=16.417, p<0.001	
Educational attainment							
Secondary or less	973	1.59	0.49	1.75	0.59	2.58	0.57
Vocation or other	1,254	1.59	0.51	1.79	0.61	2.61	0.57
Tertiary	1,298	1.55	0.49	1.83	0.56	2.73	0.53
Total	3,525	1.57	0.50	1.79	0.59	2.65	0.56
Test of significance		F(2,3522)=2.464, p=0.085		F(2,3522)=4.694, p=0.009		F(2,3522)=24.226, p<0.001	
Occupational group [(a)]							
Manager/administrator	367	1.53	0.47	1.77	0.55	2.71	0.54
Professional	548	1.50	0.47	1.80	0.54	2.80	0.52
Paraprofessional	190	1.55	0.49	1.83	0.56	2.72	0.53
Tradesperson	287	1.69	0.43	1.87	0.56	2.49	0.48
Clerk	348	1.67	0.46	1.87	0.51	2.53	0.50
Sales/Personal services	306	1.65	0.43	1.92	0.52	2.62	0.55
Plant/machine op; Driver	116	1.66	0.50	1.88	0.54	2.56	0.59
Labourer/related	159	1.65	0.48	1.78	0.62	2.49	0.53
Total	2,321	1.60	0.47	1.84	0.55	2.64	0.54
Test of significance		F(7,2313)= 8.929, p<0.001		F(7,2313)= 2.739, p=0.008		F(7,2313)= 17.045, p<0.001	
Occupational prestige [(b)]							
Low	463	1.59	0.52	1.80	0.60	2.62	0.60
Low-moderate	439	1.69	0.46	1.90	0.57	2.51	0.51
Moderate	456	1.64	0.45	1.86	0.56	2.58	0.48
Moderate-high	561	1.57	0.48	1.82	0.53	2.68	0.57
High	506	1.48	0.46	1.78	0.52	2.82	0.51
Total	2,424	1.59	0.48	1.83	0.56	2.65	0.55
Test of significance		F(4,2419)=14.130, p<0.001		F(4,2419)=3.673, p=0.005		F(4,2419)=23.237, p<0.001	
Concession status							
Card holder	640	1.62	0.57	1.83	0.70	2.59	0.63
No card	2,940	1.56	0.48	1.79	0.56	2.66	0.54
Total	3,580	1.57	0.50	1.79	0.59	2.65	0.56
Test of significance		F(1,3578)=8.419, p=0.004		F(1,3578)=3.415, p=0.065		F(1,3578)=10.490, p=0.001	
Area disadvantage [(c)]							
Quintile 1 (highest)	651	1.64	0.50	1.83	0.59	2.55	0.58
Quintile 2	531	1.62	0.50	1.82	0.59	2.58	0.57
Quintile 3	745	1.57	0.47	1.78	0.61	2.65	0.53
Quintile 4	716	1.57	0.50	1.82	0.58	2.69	0.55
Quintile 5	893	1.51	0.49	1.76	0.58	2.74	0.54
Total	3,535	1.57	0.50	1.80	0.59	2.65	0.56
Test of significance		F(4,3529)=7.705, p<0.001		F(4,3529)=2.072, p=0.082		F(4,3529)=13.540, p<0.001	

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage - Australian Bureau of Statistics' Socio-Economic Indexes for Areas

Table 6.25: Perceived stress by demographic characteristics (dentate persons, weighted data)

	N	Stress scale		Distress subscale		Coping subscale	
		Mean	SD	Mean	SD	Mean	SD
Sex							
Male	1,808	1.52	0.49	1.73	0.58	2.68	0.57
Female	1,776	1.62	0.50	1.86	0.60	2.62	0.55
Total	3,584	1.57	0.50	1.79	0.59	2.65	0.56
Test of significance		F(1,3581)= 34.637; p<0.001		F(1,3581)= 48.424; p<0.001		F(1,3581)= 9.552; p =0.002	
Age group							
18-29 years	942	1.63	0.49	1.87	0.58	2.61	0.56
30-39 years	800	1.59	0.45	1.82	0.53	2.64	0.51
40-49 years	717	1.65	0.50	1.88	0.58	2.58	0.55
50-59 years	510	1.53	0.52	1.76	0.61	2.70	0.60
60-69 years	316	1.46	0.49	1.66	0.61	2.74	0.55
70+ years	300	1.38	0.51	1.52	0.64	2.77	0.61
Total	3,584	1.57	0.50	1.79	0.59	2.65	0.56
Test of significance		F(5,3577)= 19.612; p<0.001		F(5,3577)= 23.234; p<0.001		F(5,3577)= 8.187; p<0.001	
Country of birth							
Australia	2,812	1.57	0.49	1.79	0.59	2.65	0.56
Overseas	735	1.58	0.51	1.81	0.59	2.65	0.57
Total	3,547	1.57	0.50	1.79	0.59	2.65	0.56
Test of significance		F(1,3545)= 0.255; p=0.613		F(1,3545)= 0.711; p=0.399		F(1,3545)= <0.001; p=0.997	
Language at home							
Other than English	376	1.65	0.55	1.85	0.65	2.56	0.59
English	3,207	1.56	0.49	1.79	0.58	2.66	0.55
Total	3,584	1.57	0.50	1.79	0.59	2.65	0.56
Test of significance		F(1,3581)= 9.221; p=0.002		F(1,3581)= 3.436; p=0.064		F(1,3581)= 11.680; p=0.001	
Employment status							
Full-time	1,680	1.58	0.47	1.81	0.54	2.66	0.54
Part-time	656	1.63	0.50	1.88	0.59	2.62	0.56
Retired	479	1.42	0.51	1.58	0.64	2.75	0.59
Not employed	534	1.63	0.53	1.85	0.67	2.59	0.55
Total	3,349	1.57	0.50	1.80	0.59	2.65	0.56
Test of significance		F(3,3344)= 20.622; p<0.001		F(3,3344)= 26.339; p<0.001		F(3,3344)= 7.683; p<0.001	
Householders aged 5+							
One person	418	1.51	0.50	1.68	0.65	2.66	0.55
Two persons	1,372	1.51	0.48	1.74	0.58	2.72	0.55
Three-four persons	1,407	1.62	0.49	1.85	0.58	2.62	0.56
More than four	383	1.70	0.51	1.91	0.56	2.52	0.56
Total	3,579	1.57	0.50	1.79	0.59	2.65	0.56
Test of significance		F(3,3575)= 22.075; p<0.001		F(3,3575)= 18.360; p<0.001		F(3,3575)= 16.878; p<0.001	
ARIA category [(a)]							
Highly accessible	2,977	1.57	0.50	1.79	0.60	2.66	0.56
Accessible	406	1.58	0.44	1.80	0.55	2.63	0.52
Moderately accessible	124	1.60	0.50	1.84	0.60	2.64	0.55
Remote	35	1.54	0.38	1.72	0.43	2.63	0.47
Non-capital	30	1.60	0.54	1.69	0.65	2.49	0.62
Total	3,572	1.57	0.50	1.79	0.59	2.65	0.56
Test of significance		F(4,3567)= 0.230; p=0.922		F(4,3567)= 0.559; p=0.693		F(4,3567)= 0.793; p=0.529	

(a) Accessibility/Remoteness Index of Australia

6.3.4 Perceived stress and oral health

Decayed and missing teeth

Perceptions of distress and coping were examined for their relationship with decayed and missing teeth. Table 6.26 shows that differences in mean numbers of decayed and missing teeth across stress scores were statistically significant.

A positive gradient between stress and decayed teeth was observed. Adults with low scores on the overall scale reported 0.52 mean decayed teeth. The mean number of decayed teeth continued to increase across the low-moderate (0.62) and moderate range (0.66), before increasing more sharply at the moderate-high range (0.79). An even greater increase was observed as scores reached the high range, where the mean number of decayed teeth was 1.43. The relationship between stress and missing teeth was less clear. Generally those with lower stress scores reported more missing teeth. However, it is likely that the strong positive association between age and missing teeth confounded findings.

Table 6.26: Decayed and missing teeth by perceived stress (dentate persons, weighted data)

	Decayed			Missing teeth		
	df	F	Sig.	df	F	Sig.
Perceived stress scale	77, 2868	3.179	<0.001	77, 3400	2.042	<0.001
Distress subscale	43, 2902	4.222	<0.001	43, 3434	2.375	<0.001
Coping subscale	42, 2903	4.101	<0.001	42, 3435	2.155	<0.001

	Decayed teeth					Missing teeth				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Perceived stress scale										
Low	566	0.52	1.27	0.41	0.62	664	4.18	6.60	3.68	4.69
Low-moderate	712	0.62	1.21	0.53	0.71	848	3.25	5.83	2.85	3.64
Moderate	410	0.66	1.32	0.53	0.79	465	2.84	5.43	2.34	3.33
Moderate-high	685	0.79	1.52	0.68	0.90	819	2.94	5.59	2.56	3.32
High	574	1.43	1.92	1.27	1.58	682	3.38	6.15	2.92	3.84
Total	2,946	0.80	1.50	0.75	0.86	3,479	3.32	5.96	3.13	3.52
Test of significance	F (4, 2941) = 34.730; p < 0.001					F (4, 3473) = 5.147; p < 0.001				
Distress										
Low	618	0.57	1.35	0.46	0.68	742	4.17	6.74	3.69	4.66
Low-moderate	271	0.66	1.17	0.52	0.80	326	3.86	6.55	3.15	4.58
Moderate	877	0.66	1.27	0.57	0.74	1,038	3.06	5.41	2.73	3.39
Moderate-high	727	0.87	1.62	0.75	0.98	834	2.79	5.47	2.42	3.16
High	454	1.39	1.88	1.21	1.56	539	3.17	6.03	2.65	3.68
Total	2,946	0.80	1.50	0.75	0.86	3,479	3.32	5.96	3.13	3.52
Test of significance	F (4, 2941) = 24.682; p < 0.001					F (4, 3473) = 6.753; p < 0.001				
Coping										
Low	385	1.42	1.98	1.22	1.62	489	3.21	5.59	2.72	3.71
Low-moderate	675	0.91	1.53	0.79	1.02	777	3.36	6.00	2.94	3.78
Moderate	599	0.78	1.53	0.66	0.91	720	3.48	6.24	3.02	3.94
Moderate-high	694	0.60	1.27	0.51	0.70	822	2.98	5.79	2.59	3.38
High	594	0.54	1.18	0.44	0.63	670	3.62	6.05	3.16	4.08
Total	2,946	0.80	1.50	0.75	0.86	3,479	3.32	5.96	3.13	3.52
Test of significance	F (4, 2941) = 25.565; p < 0.001					F (4, 3473) = 1.253; p = 0.286				

Social impact and oral symptom experience

The relationships between stress and social impact and between stress and oral symptom experience were consistent. Differences in mean OHIP-14 and symptom experience scores were statistically significant across the three scale/subscales. The mean social impact score for adults with distress scores in the low quintile range was 0.30, increasing almost threefold across quintiles to 0.89 for those with high distress. Social impact scores decreased stepwise across coping quintiles from 0.80 for those with low scores for coping to 0.28 for those with high coping scores. Adults reporting high levels of stress also experienced a greater number of common oral complaints over the preceding twelve months. As presented in Table 6.27, differences in the sum of oral symptoms were statistically significant across each of the three scale/subscales. Despite some irregularities, a trend of increasing symptom experience with increasing levels of perceived stress was observed. Those adults with low distress scores reported fewest symptoms (0.86). This was contrasted against those adults with scores on the overall scale in the high range. These adults reported a mean of 1.37 oral symptoms.

Table 6:27 Social impact and oral symptom experience by perceived stress (dentate persons, weighted data)

	Social impact			Oral symptom experience		
	df	F	Sig.	df	F	Sig.
Perceived stress scale	77, 3467	8.116	<0.001	77, 3504	3.912	<0.001
Distress subscale	44, 3500	13.339	<0.001	44, 3537	5.418	<0.001
Coping subscale	42, 3502	9.309	<0.001	42, 3539	4.115	<0.001

	Social impact					Oral symptom experience				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Perceived stress scale										
Low	676	0.30	0.39	0.27	0.33	681	0.92	0.92	0.85	0.99
Low-moderate	861	0.41	0.41	0.39	0.44	868	0.98	0.91	0.92	1.04
Moderate	473	0.49	0.44	0.45	0.53	476	1.24	1.00	1.15	1.33
Moderate-high	837	0.60	0.56	0.56	0.64	845	1.07	0.98	1.01	1.14
High	698	0.83	0.68	0.78	0.88	713	1.37	1.13	1.29	1.46
Total	3546	0.53	0.54	0.51	0.55	3583	1.10	1.00	1.07	1.14
Test of significance	F (4, 3540) = 11.484; p < 0.001					F (4, 3577) = 25.611; p < 0.001				
Distress										
Low	757	0.30	0.35	0.28	0.33	763	0.86	0.91	0.79	0.92
Low-moderate	334	0.42	0.45	0.37	0.46	334	1.14	0.91	1.05	1.24
Moderate	1054	0.49	0.46	0.46	0.52	1065	1.06	0.98	1.00	1.12
Moderate-high	852	0.60	0.58	0.56	0.64	858	1.10	0.99	1.03	1.16
High	548	0.89	0.68	0.83	0.94	563	1.50	1.12	1.40	1.59
Total	3546	0.53	0.54	0.51	0.55	3583	1.10	1.00	1.07	1.14
Test of significance	F (4, 3540) = 115.129; p < 0.001					F (4, 3577) = 34.863; p < 0.001				
Coping										
Low	496	0.80	0.67	0.74	0.86	510	1.30	1.12	1.21	1.40
Low-moderate	802	0.59	0.56	0.55	0.63	811	1.17	1.06	1.10	1.24
Moderate	738	0.55	0.54	0.51	0.58	739	1.04	0.95	0.97	1.11
Moderate-high	829	0.43	0.43	0.41	0.46	838	1.00	0.91	0.94	1.06
High	680	0.36	0.44	0.33	0.39	685	1.07	0.97	0.99	1.14
Total	3546	0.53	0.54	0.51	0.55	3583	1.10	1.00	1.07	1.14
Test of significance	F (4, 3540) = 60.547; p < 0.001					F (4, 3577) = 9.402; p < 0.001				

Self-rated oral health

Significant associations were found between stress and self-rated oral health. In all, 55.0% of adults with low stress rated their oral health as very good or excellent, compared with 32.2% of those with high stress scores. While 3.7% of adults with low distress rated their oral health as poor or very poor, 10.5% of those with high distress rated their oral health poorly. Further, 4.5% of adults with low coping scores rated their oral health as excellent, compared with 18.4% of those with high coping scores.

Table 6.28: Self-rated oral health by perceived stress (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
						Pearson's Chi-square		
	Very poor or poor	Average	Good	Very good	Excellent			
	Row %	Row %	Row %	Row %	Row %	Value	df	Asymp. sig. (2-sided)
Perceived stress						167.737	16	<0.001
n	178	621	1,177	1,176	428			
Low	3.4	10.3	31.3	35.0	20.0			
Low-moderate	3.9	15.1	29.6	39.5	11.9			
Moderate	2.3	18.5	33.4	33.6	12.2			
Moderate-high	5.5	18.9	35.7	29.5	10.4			
High	8.9	24.2	34.7	26.2	6.0			
Total	5.0	17.3	32.9	32.8	12.0			
Distress						142.510	16	<0.001
n	178	621	1,177	1,177	427			
Low	3.7	12.6	30.6	35.7	17.5			
Low-moderate	4.2	12.8	41.5	30.7	10.7			
Moderate	3.1	19.8	29.2	35.4	12.4			
Moderate-high	5.1	16.7	33.8	33.9	10.5			
High	10.5	22.8	36.4	23.9	6.4			
Total	5.0	17.3	32.9	32.9	11.9			
Coping						141.130	16	<0.001
n	178	621	1,177	1,177	427			
Low	6.5	21.6	40.7	26.7	4.5			
Low-moderate	7.4	21.1	32.4	29.5	9.5			
Moderate	3.9	20.4	31.1	32.9	11.6			
Moderate-high	4.5	13.4	31.8	36.2	14.0			
High	2.6	11.1	30.9	37.0	18.4			
Total	5.0	17.3	32.9	32.8	12.0			

In summary, there was a strong association between perceived stress and a number of oral health outcomes. Most notably, there was a strong positive and graded relationship between stress and the number of decayed teeth, the social impact of oral conditions, the sum of common oral symptoms experienced and a global self-rating of oral health. While relationships between stress and numbers of teeth either missing or filled were also significant, these relationships were weaker, inconsistent and likely to be confounded by the age of respondents.

6.4 Life satisfaction

Life satisfaction is the cognitive component of subjective wellbeing. The broader construct of wellbeing also includes an affective component with measures of positive and negative mood states. This study limits wellbeing to the cognitive component and evaluates life satisfaction with the Satisfaction with Life Scale developed by Diener and colleagues. The scale is a global measure that does not focus on a specific life domain such as family or work. Being generic, judgments are based on respondents' own criteria rather than prescribed domains nominated by the researcher. The theoretical view of life satisfaction scales measure is an evaluation of individuals' satisfaction with their rate of progress toward self-defined goals.[3 4]

Univariate distribution

Table 6.29 presents the distribution of responses to the five positively worded items. Greatest agreement was assigned to item #3, where 62.5% agreed that they were satisfied with their life. Item #5 elicited least agreement, where 34.2% disagreed with the statement 'If I could live my life over, I would change almost nothing.'

Table 6.29: Response to the satisfaction with life scale (dentate persons, weighted data)

Item	Response category					Valid	Missing
	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree		
	Row percentages						
My life is close to my ideal	2.8	17.3	24.6	46.5	6.8	98.0	2.0
Conditions of my life are excellent	1.9	15.2	29.9	41.2	9.9	98.1	1.9
I am satisfied with my life	1.6	10.3	18.5	55.0	12.5	98.0	2.0
So far acquired important things I want	2.2	16.4	19.2	49.2	11.0	98.0	2.0
I would change almost nothing	5.0	29.2	24.7	31.2	7.9	98.0	2.0

6.4.1 Factor analysis of the life satisfaction scale items

The five items were analysed using principal component factor analysis with varimax rotation. Results revealed that five items represented a single factor that accounted for 66% of the variance in the construct. These results replicated test findings of the authors,[5] who also reported a single factor that explained 66% of the variation. Measures of internal consistency were also similar, with an alpha coefficient of 0.87 reported in initial scale development, and a similar coefficient of 0.86 being measured in this study.

Table 6.30: Factor analysis of the satisfaction with life scale items (dentate persons, weighted data)

Initial statistics [(a)]					
		Variance			
Factor	Eigenvalue	%	Cum. %		Item number and label
1	3.28	65.68	65.68	1	In most ways my life is close to my ideal
2	0.58	11.67	77.35	2	The conditions of my life are excellent
3	0.50	10.07	87.41	3	I am satisfied with my life
4	0.33	6.53	93.95	4	So far I have acquired the important things I want in life
5	0.30	6.05	100.00	5	If I could live my life over, I would change almost nothing
					Cronbach's alpha =0.86
					N of cases = 3,585

(a) Extraction method: principal component analysis
(b) Only one component was extracted – the solution could not be rotated
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.87

6.4.2 Life satisfaction and socioeconomic indicators

In order to investigate social variation in life satisfaction, mean scores were examined for their relationship with socioeconomic and demographic factors and results are shown in Table 6.31.

A positive relationship was observed between each socioeconomic indicator, although differences based on educational attainment were not significant. The greatest range in scores was observed between occupational groups, where mean scores varied between 2.18 for the plant/machine operators, drivers category, and 2.51 for those in professional occupations.

6.4.3 Life satisfaction and demographic characteristics

Life satisfaction scores for females (2.47) were greater than those reported by males (2.36). There was a trend of increasing life satisfaction with older age, with mean scores ranging from 2.39 among 18-29-year-olds to 2.62 for those aged 70+ years. However, adults aged 40-49 years reported lowest life satisfaction (2.36).

Australian-born adults (2.43) expressed higher levels of life satisfaction than those born overseas (2.36). Of note, adults who spoke a language other than English did not report significantly lower satisfaction than other adults. Retirees (2.56) expressed greater satisfaction than those in full-time (2.40) and part-time work (2.42), and those who were not employed reported least satisfaction (2.36). Adults who lived alone expressed least life satisfaction (2.24), and adults in two-person households were most satisfied (2.53). Differences based on geographical remoteness were not statistically significant.

Table 6.31: Mean scale scores for life satisfaction by social factors (dentate persons, weighted data)

	Satisfaction with life		
	N	Mean	SD
Household income			
<$12,000	233	2.27	0.89
$12-20,000	377	2.34	0.83
$21-30,000	382	2.32	0.79
$31-40,000	447	2.35	0.72
$41-50,000	451	2.45	0.74
>$50,000	1,488	2.47	0.77
Total	3,378	2.40	0.78
Test of significance	F(5,3371)= 5.661; p<0.001		
Educational attainment			
Secondary or less	983	2.39	0.76
Vocation or other	1,256	2.39	0.76
Tertiary	1,313	2.45	0.78
Total	3,552	2.41	0.77
Test of significance	F(2,3548)= 2.393; p=0.092		
Occupational group [(a)]			
Manager/administrator	368	2.51	0.79
Professional	550	2.52	0.77
Paraprofessional	192	2.40	0.78
Tradesperson	290	2.26	0.72
Clerk	350	2.42	0.72
Sales/Personal services	310	2.28	0.74
Plant/machine op; Driver	117	2.18	0.67
Labourers/related	160	2.24	0.74
Total	2,338	2.39	0.76
Test of significance	F(7,2330)= 8.113; p<0.001		
Occupational prestige [(b)]			
Low	465	2.35	0.74
Low-moderate	445	2.26	0.80
Moderate	458	2.39	0.72
Moderate-high	565	2.53	0.78
High	511	2.45	0.75
Total	2,444	2.40	0.76
Test of significance	F(4,2438)= 9.346; p<0.001		
Concession status			
Card holder	655	2.25	0.86
No card	2,952	2.45	0.75
Total	3,607	2.42	0.77
Test of significance	F(1,3605)= 37.200; p<0.001		
Area disadvantage [(c)]			
Quintile 1 (highest)	662	2.30	0.77
Quintile 2	534	2.44	0.78
Quintile 3	751	2.38	0.76
Quintile 4	715	2.45	0.79
Quintile 5	900	2.48	0.76
Total	3,562	2.41	0.77
Test of significance	F(4,3557)= 5.820; p<0.001		

	Satisfaction with life		
	N	Mean	SD
Sex			
Male	1,817	2.36	0.77
Female	1,794	2.47	0.78
Total	3,611	2.42	0.77
Test of significance	F(1,3609)= 17.275; p<0.001		
Age group			
18-29 years	938	2.39	0.76
30-39 years	803	2.47	0.77
40-49 years	723	2.26	0.82
50-59 years	511	2.42	0.78
60-69 years	324	2.51	0.71
70+ years	312	2.62	0.70
Total	3,611	2.42	0.77
Test of significance	F(5,3605)= 12.189; p<0.001		
Country of birth			
Australia	2,826	2.43	0.78
Overseas	748	2.36	0.77
Total	3,574	2.41	0.78
Test of significance	F(1,3572)= 5.044; p= 0.025		
Language at home			
Other than English	386	2.39	0.85
English	3,226	2.42	0.76
Total	3,611	2.42	0.77
Test of significance	F(1,3609)= 0.619; p= 0.431		
Employment status			
Full-time	1,680	2.40	0.77
Part-time	660	2.42	0.77
Retired	495	2.56	0.72
Not employed	538	2.36	0.83
Total	3,373	2.42	0.78
Test of significance	F(3,3369)= 6.532; p<0.001		
Householders aged 5+			
One person	430	2.24	0.76
Two persons	1,389	2.53	0.75
Three-four persons	1,403	2.39	0.79
More than four persons	384	2.31	0.77
Total	3,607	2.42	0.77
Test of significance	F(3,3602)= 19.308; p<0.001		
ARIA category [(d)]			
Highly accessible	3,004	2.41	0.78
Accessible	402	2.40	0.73
Moderately accessible	126	2.48	0.77
Remote	37	2.43	0.58
Very remote	30	2.51	0.80
Total	3,599	2.42	0.77
Test of significance	F(4,3594)= 0.342; p=0.849		

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage - Australian Bureau of Statistics' Socio-Economic Indexes for Areas
(d) Accessibility/Remoteness Index of Australia

6.4.4 Life satisfaction and oral health

Life satisfaction was examined for its relationship with oral health.

Decayed and missing teeth

Differences in mean decayed and missing teeth according to life satisfaction scores were statistically significant, as presented in Table 6.32.

Life satisfaction was inversely related to decayed teeth. Adults with low satisfaction scores reported almost twice the mean number of decayed teeth (1.11) as those with high satisfaction (0.56). Adults with greater satisfaction also reported fewer missing teeth, although differences failed to reach statistical significance when scores were presented in quintiles.

Table 6.32: Decayed and missing teeth by life satisfaction (dentate persons, weighted data)

	Decayed			Missing teeth		
	df	F	Sig.	df	F	Sig.
Life satisfaction	29, 2922	4.550	<0.001	29, 3472	2.352	<0.001

	Decayed teeth					Missing teeth				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Life satisfaction										
Low	698	1.11	1.67	0.99	1.24	815	3.44	6.10	3.02	3.86
Low-moderate	757	0.82	1.51	0.71	0.92	918	3.29	6.13	2.89	3.69
Moderate	599	0.85	1.62	0.73	0.98	718	3.63	6.20	3.18	4.09
Moderate-high	424	0.49	1.23	0.37	0.60	529	3.51	5.78	3.01	4.00
High	475	0.56	1.21	0.45	0.67	523	2.95	5.76	2.46	3.45
Total	2953	0.81	1.51	0.75	0.86	3503	3.38	6.03	3.18	3.58
Test of significance	$F(4, 2947) = 15.719$; $p < 0.001$					$F(4, 3497) = 1.103$; $p = 0.354$				

Social impact and symptom experience

Table 6.33 presents findings of the relationships between life satisfaction and social impact and oral symptom experience scores. Adults with low scores for life satisfaction reported mean social impact scores of 0.73, and impact decreased incrementally with increased life satisfaction to a mean of 0.39 for those with high levels of life satisfaction. The greatest oral health gain was achieved in the step between low (0.73) to low-moderate (0.58) life satisfaction. A similar inverse association was observed between life satisfaction and oral symptom experience. Adults with low life satisfaction had a mean oral symptom score of 1.36, and this decreased to 0.96 for those with moderate-high and high levels of satisfaction with life. As was the case with social impact scores, greatest oral health gain was achieved in the step from low (1.36) to low-moderate (1.08) scores.

Table 6.33: Social impact and oral symptom experience by life satisfaction (dentate persons, weighted data)

	Social impact			Oral symptom experience		
	df	F	Sig.	df	F	Sig.
Life Satisfaction	29, 3537	12.085	<0.001	29, 3579	5.715	<0.001

	Social impact					Oral symptom experience				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Life Satisfaction										
Low	839	0.73	0.65	0.68	0.77	850	1.36	1.08	1.28	1.43
Low-moderate	925	0.58	0.56	0.55	0.62	942	1.08	1.00	1.01	1.14
Moderate	728	0.46	0.43	0.43	0.49	736	1.03	0.96	0.96	1.10
Moderate-high	541	0.38	0.41	0.35	0.42	545	0.96	0.96	0.88	1.04
High	534	0.39	0.44	0.35	0.42	538	0.96	0.90	0.88	1.03
Total	3567	0.53	0.54	0.51	0.55	3610	1.10	1.00	1.06	1.13
Test of significance	F (4, 3562) = 56.255; p < 0.001					F (4, 3604) = 20.750; p < 0.001				

Self-rated oral health

As presented in Table 6.34, just over a third of adults (34.8%) with low levels of life satisfaction rated their oral health as very good or excellent. By contrast, 58.9% of adults with high levels rated their oral health as very good or excellent. In addition, 28.6% of those with low life satisfaction rated their oral health as poor or very poor, compared with 16.0% with high life satisfaction.

Table 6.34: Self-rated oral health by life satisfaction (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
	Very poor or poor	Average	Good	Very good	Excellent	Pearson's Chi-square		
	Row %	Row %	Row %	Row %	Row %	Value	df	Asymp. sig. (2-sided)
Life satisfaction						191.103	16	<0.001
n	**178**	**628**	**1,190**	**1,178**	**431**			
Low	7.8	20.8	36.7	27.4	7.4			
Low-moderate	4.3	20.3	36.6	31.5	7.4			
Moderate	4.0	17.6	35.4	32.4	10.6			
Moderate-high	3.9	12.5	25.7	39.9	18.0			
High	4.1	11.9	25.1	36.2	22.7			
Total	4.9	17.4	33.0	32.7	12.0			

6.5 Relative inequality

In economically developed societies, it has been suggested that absolute differences in material circumstances are less important to explaining the variation in health status within populations than are the relative material differences between people. This argument is based on the research of Wilkinson, who showed that mortality rates were higher in OECD countries where the scale of income differences was greater. Moreover, life expectancy was greater in the most egalitarian countries. [6] The notion of relative inequality refers to the way in which people see their position relative to that of others around them. Implicit is this perception is the social meanings that people attach to the differences that they observe. When people perceive their social circumstances as inferior, it is thought to generate a psychosocial burden of perceived inequality that has a negative affect on health. In communities that are more egalitarian there is less scope for differentiation by social rank and all members of the community benefit. Conversely, communities that are more disparate in terms of the distribution of resources tend to be less cohesive and supportive, and individuals in these communities suffer.

In this chapter, an index of relative inequality was developed based on the dispersion in IRSD values assigned to census Collection Districts (CDs) allocated to postcode areas. A CD is the smallest enumeration unit used for reporting census data. The number of CDs contained within a postcode area varied widely from one to 159, as shown in Table 6.35. Queensland and New South Wales were the states with greatest number of CDs allocated to postcode areas.

Table 6.35: Distribution in the number of census collection districts within postcode areas per sampling stratum

	N	Mean	SD	Minimum	Maximum
Sampling strata					
New South Wales – Sydney (capital city)	802	35.40	18.78	3	110
New South Wales – rest of state	433	33.29	24.37	2	100
Victoria – Melbourne (capital city)	679	31.23	14.12	2	83
Victoria – rest of state	221	22.50	20.83	1	81
Queensland – Brisbane (capital city)	310	32.13	18.84	2	115
Queensland – rest of state	359	46.03	41.68	1	159
South Australia – Adelaide (capital city)	216	26.02	14.21	1	61
South Australia – rest of state	74	14.91	11.93	1	46
Western Australia – Perth (capital city)	263	36.30	20.17	1	86
Western Australia – rest of state	87	34.15	31.76	1	89
Tasmania	87	29.27	26.08	1	91
Australian Capital Territory	61	30.34	13.12	1	52
Northern Territory	29	29.13	17.54	1	53
Total	**3,620**	**33.13**	**23.25**	**1**	**159**

A measure of the dispersion of disadvantage within postcode areas was obtained by subtracting the smallest IRSD value assigned to a CD within a postcode from the largest CD IRSD value. Differences were then ranked and divided into deciles, having omitted those postcode areas that contained only one CD (n=21). Decile 1 contained those 10% of postcodes with least dispersion in IRSD values. The dispersion in IRSD values is presented in Table 6.36. It was hypothesised that people living in areas with little dispersion in IRSD values would report better oral health, irrespective of their personal social position or the IRSD value of the area, compared with people in postcodes areas with wide dispersion in IRSD values.

Table 6.36: Dispersion of IRSD values for deciles one to ten (dentate persons, weighted data)

	N	Mean	SD	95% CI for mean		Minimum	Maximum
				Lower	Upper		
Decile 1	358	78.94	40.85	74.69	83.19	0.00	274.73
Decile 2	362	128.22	42.20	123.86	132.59	67.25	321.26
Decile 3	350	174.16	86.93	165.03	183.29	91.69	522.12
Decile 4	370	199.74	75.93	191.98	207.50	103.36	430.67
Decile 5	360	216.58	74.17	208.89	224.27	112.20	617.79
Decile 6	365	228.80	65.55	222.05	235.55	128.57	598.17
Decile 7	361	253.49	66.83	246.58	260.41	143.62	566.52
Decile 8	351	315.46	81.89	306.87	324.05	163.36	503.61
Decile 9	364	364.39	92.70	354.84	373.94	205.17	668.17
Decile 10	358	469.49	101.86	458.91	480.08	274.01	788.20
Total	3,599	242.88	132.34	238.55	247.20	0.00	788.20

6.5.1 Relative inequality and oral health

Decayed and missing teeth

The mean number of decayed teeth differed significantly across deciles 1-10. Lowest mean decayed teeth were reported in the 10% of postcode areas with least variation in CD IRSD values (0.51), which were those areas with least relative inequality. Mean decayed teeth peaked in the ninth decile. The relationships between deciles of socioeconomic inequality and missing teeth were not significant.

Table 6.37: Decayed and missing teeth by relative inequality (dentate persons, weighted data)

	Decayed teeth					Missing teeth				
	N	Mean	SD	95% CI		N	Mean	SD	95% CI	
				Lower	Upper				Lower	Upper
Dispersion of IRSD values										
Decile 1(least dispersion)	292	0.51	1.13	0.07	0.38	340	3.18	5.44	0.29	2.60
Decile 2	294	0.56	1.09	0.06	0.43	348	3.68	6.76	0.36	2.97
Decile 3	278	0.71	1.38	0.08	0.54	340	2.94	5.60	0.30	2.34
Decile 4	309	0.86	1.42	0.08	0.70	360	2.87	5.42	0.29	2.31
Decile 5	283	0.90	1.74	0.10	0.70	350	3.24	5.47	0.29	2.67
Decile 6	308	0.81	1.45	0.08	0.65	358	2.79	5.51	0.29	2.22
Decile 7	289	0.69	1.36	0.08	0.54	345	3.81	6.36	0.34	3.14
Decile 8	279	1.01	1.76	0.11	0.80	337	4.29	6.92	0.38	3.55
Decile 9	297	1.14	1.68	0.10	0.95	356	3.95	6.65	0.35	3.25
Decile 10	301	0.89	1.82	0.10	0.68	344	3.14	5.76	0.31	2.52
Total	2,929	0.81	1.51	0.03	0.75	3,481	3.39	6.02	0.10	3.19
Test of significance	F (9, 2918) = 4.995; p<0.001					F (9, 3470) = 2.493; p=0.129				

Social impact and oral symptom experience

Significant differences in social impact scores and oral symptom experience were observed across deciles. However, no clear relationship for either outcome could be discerned (Table 6.38).

Table 6.38: Social impact and oral symptoms by relative inequality (dentate persons, weighted data)

	Social impact					Oral symptom experience				
	N	Mean	SD	95% CI		N	Mean	SD	95% CI	
				Lower	Upper				Lower	Upper
Dispersion of IRSD values										
Decile 1	355	0.48	0.47	0.02	0.43	358	1.11	0.90	0.05	1.02
Decile 2 (least dispersion)	361	0.55	0.52	0.03	0.49	362	0.99	0.98	0.05	0.89
Decile 3	347	0.58	0.55	0.03	0.52	350	1.15	0.92	0.05	1.06
Decile 4	357	0.48	0.53	0.03	0.42	370	1.09	1.07	0.06	0.98
Decile 5	354	0.56	0.54	0.03	0.51	360	1.04	1.02	0.05	0.93
Decile 6	361	0.49	0.49	0.03	0.44	365	1.23	1.09	0.06	1.12
Decile 7	356	0.59	0.62	0.03	0.53	361	1.09	1.00	0.05	0.99
Decile 8	347	0.56	0.55	0.03	0.50	351	1.02	0.95	0.05	0.92
Decile 9	359	0.55	0.61	0.03	0.49	363	1.24	1.08	0.06	1.13
Decile 10	347	0.51	0.55	0.03	0.46	358	1.08	0.97	0.05	0.98
Total	3,544	0.54	0.54	0.01	0.52	3,598	1.11	1.00	0.02	1.07
Test of significance	F (9, 3534) = 2.103; p=0.026					F (9, 3587) = 2.461; p=0.009				

Self-rated oral health

The proportion of people rating their oral health very good or excellent decreased significantly with increasing dispersion in IRSD values (Table 6.39).

Table 6.39: Self-rated oral health according to relative inequality (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
	Very poor or poor	Average	Good	Very good	Excellent	Pearson's Chi-square		
	Row %	Row %	Row %	Row %	Row %	Value	df	Asymp. sig. (2-sided)
Dispersion of IRSD values								
n	**161**	**493**	**952**	**933**	**338**	85.716	36	<0.001
Decile 1(least dispersion)	2.2	22.6	27.7	34.4	2.2			
Decile 2	6.4	13.0	29.1	38.0	6.4			
Decile 3	6.3	18.3	35.4	28.0	6.3			
Decile 4	5.7	15.6	32.9	34.2	5.7			
Decile 5	4.7	21.2	30.9	28.4	4.7			
Decile 6	3.6	14.8	28.0	43.7	3.6			
Decile 7	6.1	16.4	37.8	28.9	6.1			
Decile 8	4.3	14.9	39.4	31.4	4.3			
Decile 9	6.0	17.9	39.8	27.2	6.0			
Decile 10	5.6	18.4	31.3	31.3	5.6			
Total	5.1	17.3	33.2	32.6	5.1			

6.6 Psychosocial factors and dental behaviour

To evaluate the plausibility of the indirect pathway, one further analysis was conducted by examining associations between psychosocial factors and dental behaviour. The two dental behaviour subscales were selected as the dependent variables. Results are presented in Table 6.40.

A number of investigators maintain that people with a strong sense of personal control achieve better health outcomes because they tend to adopt favourable health behaviours.[7] To examine this relationship, the two personal control subscales were explored for their relationship with dental visiting and self-care. Results supported this association. As perceived constraint increased, scores for dental visiting and self-care decreased. Conversely, as mastery increased, decreases in the performance of both dental behaviours were observed.

A body of research demonstrates that supportive social contacts reinforce favourable health behaviour. This relationship was tested using the social support scale. Results revealed a stepwise increase in scores for both behaviours with increasing social support. There is also evidence that chronic stress induces unhealthy patterns of behaviour, or constrains healthy choices. This relationship was tested using the two stress subscales for their association with dental behaviour. Results showed that as distress increased, scores for dental visiting and dental self-care decreased. Conversely, as coping ability increased, scores for dental visiting and self-care also increased. There was also a positive association between perceptions of life satisfaction and dental visiting and self-care.

Previous research has shown that more egalitarian societies tend to be healthier. This analysis tested whether individuals living in small areas with greater socioeconomic inequality showed less favourable dental behaviour. Results revealed a trend of lower behaviour scores in areas of higher socioeconomic inequality; however, differences did not reach statistical significance. Apart from the non-significant findings for socioeconomic inequality, significant differences were observed for each of the associations tested. These associations supported the pathway depicted in the conceptual framework that links psychosocial factors to oral health via dental behaviour.

Table 6.40: Dental visiting and dental self-care by psychosocial factors (dentate persons, weighted data)

	Dental visiting				Dental self-care			
	Mean	SD	CI for mean		Mean	SD	CI for mean	
			Upper	Lower			Upper	Lower
Constraint								
Low	2.73	0.87	2.66	2.79	2.55	0.68	2.50	2.60
Low-moderate	2.61	0.86	2.55	2.66	2.43	0.66	2.38	2.47
Moderate	2.52	0.76	2.46	2.58	2.38	0.57	2.33	2.43
Moderate-high	2.40	0.84	2.34	2.46	2.29	0.63	2.25	2.34
High	2.33	0.86	2.26	2.39	2.30	0.72	2.25	2.36
Total	2.52	0.85	2.50	2.55	2.39	0.66	2.37	2.41
Test of significance	F (4, 3595)= 24.990, p<0.001				F (4, 3595)= 18.092, p<0.001			
Mastery								
Low	2.36	0.93	2.28	2.44	2.23	0.66	2.17	2.28
Low-moderate	2.46	0.82	2.41	2.52	2.30	0.59	2.26	2.34
Moderate	2.54	0.83	2.49	2.59	2.41	0.65	2.37	2.45
Moderate-high	2.63	0.82	2.57	2.68	2.49	0.65	2.44	2.53
High	2.59	0.92	2.51	2.68	2.52	0.73	2.46	2.59
Total	2.52	0.85	2.50	2.55	2.39	0.66	2.37	2.41
Test of significance	F (4, 3595)= 9.249, p<0.001				F (4, 3595)= 21.411, p<0.001			
Social support								
Low	2.26	0.90	2.17	2.35	2.26	0.69	2.19	2.33
Moderate	2.54	0.87	2.50	2.58	2.39	0.69	2.36	2.42
High	2.58	0.81	2.54	2.62	2.43	0.60	2.39	2.46
Total	2.53	0.86	2.50	2.55	2.39	0.66	2.37	2.41
Test of significance	F (4, 3581)= 22.206, p<0.001				F (4, 3581)= 9.995, p<0.001			
Distress								
Low	2.65	0.86	2.59	2.71	2.55	0.67	2.50	2.60
Low-moderate	2.60	0.77	2.51	2.68	2.52	0.65	2.45	2.59
Moderate	2.60	0.87	2.55	2.65	2.37	0.62	2.34	2.41
Moderate-high	2.47	0.82	2.41	2.52	2.30	0.63	2.26	2.34
High	2.25	0.87	2.18	2.33	2.25	0.71	2.19	2.31
Total	2.52	0.86	2.49	2.55	2.39	0.66	2.37	2.41
Test of significance	F (4, 3542)= 22.181, p<0.001				F (4, 3542)= 25.653, p<0.001			
Coping								
Low	2.19	0.89	2.12	2.27	2.22	0.69	2.16	2.28
Low-moderate	2.41	0.81	2.35	2.47	2.31	0.62	2.27	2.36
Moderate	2.58	0.83	2.52	2.64	2.35	0.63	2.30	2.39
Moderate-high	2.64	0.83	2.58	2.70	2.49	0.63	2.44	2.53
High	2.69	0.85	2.63	2.76	2.53	0.70	2.48	2.58
Total	2.52	0.86	2.49	2.55	2.39	0.66	2.37	2.41
Test of significance	F (4, 3542)= 34.862, p<0.001				F (4, 3542)= 25.474, p<0.001			
Life satisfaction								
Low	2.22	0.84	2.17	2.28	2.22	0.64	2.18	2.27
Low-moderate	2.52	0.83	2.46	2.57	2.35	0.63	2.31	2.39
Moderate	2.61	0.84	2.55	2.67	2.48	0.65	2.43	2.52
Moderate-high	2.70	0.83	2.63	2.77	2.52	0.64	2.47	2.58
High	2.71	0.83	2.64	2.78	2.48	0.70	2.42	2.54
Total	2.52	0.85	2.49	2.55	2.39	0.66	2.37	2.41
Test of significance	F (4, 3569)= 42.347, p<0.001				F (4, 3569)= 26.439, p<0.001			
Socioeconomic inequality								
Quintile 1 (least inequality)	2.56	0.88	2.50	2.63	2.42	0.65	2.37	2.46
Quintile 2	2.56	0.83	2.49	2.62	2.40	0.71	2.35	2.45
Quintile 3	2.54	0.86	2.48	2.61	2.43	0.65	2.39	2.48
Quintile 4	2.50	0.83	2.43	2.56	2.35	0.65	2.30	2.40
Quintile 5	2.46	0.86	2.40	2.53	2.39	0.62	2.35	2.44
Total	2.52	0.85	2.50	2.55	2.40	0.66	2.38	2.42
Test of significance	F (4, 3551)= 1.801, p<0.126				F (4, 3551)= 1.711, p<0.145			

6.7 Summary of bivariate associations

There were consistent associations in bivariate analyses between psychosocial factors and oral health (Table 6.41). Of the seven psychosocial factors examined, each was important to oral health except social networks, where difference were only significant for decayed teeth.

Greater constraint was associated with poor oral health for all five outcomes. Higher mastery was associated with better oral health on all five outcomes. People with low social support had worse oral health than had those with moderate or high levels of support. Distress was positively associated with adverse oral health for all five outcomes, and coping was negatively associated with adverse oral health for all five outcomes. People with high life satisfaction had less decay,fewer missing teeth, lower social impact, fewer symptoms and a smaller proportion rating their oral health poorly than other groups.

Table 6.41: Summary of bivariate associations between psychosocial factors and oral health

	Decayed ‡		Missing ‡		Social impact ‡		Symptoms ‡		Self-rated ‡	
Personal control										
Constraint	p<0.001	+	p<0.001	-	p<0.001	+	p<0.001	+	p<0.001	+
Mastery	p<0.001	-	p<0.001	-	p<0.001	-	p<0.001	-	p<0.001	-
Social support	p<0.001	-	p<0.05	-	p<0.001	-	p<0.001	-	p<0.01	-
Social networks	p<0.05	-	p>0.05		p>0.05		p>0.05		p>0.05	
Stress										
Distress	p<0.001	+	p<0.001	-	p<0.001	+	p<0.001	+	p<0.001	+
Coping	p<0.001	-	p>0.05		p<0.001	-	p<0.001	-	p<0.001	-
Life satisfaction	p<0.001	-	p>0.05		p<0.001	-	p<0.001	-	p<0.001	-
Relative inequality	p<0.001	+	p>0.05		p<0.05		p<0.01		p<0.001	+

ns p> 0.05 level (ANOVA or chi-square)
* p<0.05 (ANOVA or chi-square)
† p<0.01 (ANOVA or chi-square)
‡ p<0.001 (ANOVA or chi-square)

An interesting exception to the socioeconomic distribution of psychosocial factors was that advantaged adults tended to experience *more* rather than less distress; but at the same time they reported best coping ability. This implies that coping ability buffers the health-damaging potential of stress on oral health. Supporting this idea, a significant distress and coping interaction effect on the social impact of oral conditions was found as presented in Table 6.42.

Table 6.42: Interaction effect of distress and coping on social impact (dentate persons, weighted data)

Source	Type III Sum of Squares (a)	df	Mean Square	F	Sig.
Corrected Model	344.458	393	0.876	4.093	<0.001
Intercept	78.654	1	78.654	367.257	<0.001
Distress	60.619	40	1.515	7.076	<0.001
Coping	18.185	34	0.535	2.497	<0.001
Distress * Coping	156.390	319	0.490	2.289	<0.001
Error	635.642	2,968	0.214		
Total	1920.149	3,362			
Corrected Total	980.101	3,361			

Dependent variable: Mean social impact score

(a) R Squared = .351 (Adjusted R Squared = .266)

In the general health literature, it is noted that a sense of control moderates the impact of disadvantage on self-assessed health; adults with low income but high mastery had comparable health status to individuals with high income.[8] In this study the same scale was used and the same subscales were derived (constraint and mastery), but findings did not concur that a sense of control moderated the income gap in oral health. There was one exception; people with high constraint, ie, low personal control, had the same number of decayed teeth (1.41) irrespective of whether income was low or high (Table 6.43). Thus, economic advantage did not exert a protective influence in the presence of low control.

Table 6.43: Testing control for a moderating effect on oral health inequality (dentate persons, weighted data)

	Household income <$50,000					Household income ≥$50,000				
	Decayed teeth	Missing teeth	Social impact	Oral symptoms	Average or poorer	Decayed teeth	Missing teeth	Social impact	Oral symptoms	Average or poorer
	Mean	Mean	Mean	Mean	%	Mean	Mean	Mean	Mean	%
Constraint										
Low	0.78	3.19	0.37	1.06	17.7	0.31	1.69	0.31	1.00	7.4
Low-mod	0.82	3.94	0.48	0.95	19.6	0.49	1.62	0.50	1.02	19.0
Moderate	0.90	4.25	0.57	1.11	20.8	0.32	1.37	0.46	1.08	21.1
Mod-high	1.14	4.95	0.62	1.17	26.8	0.75	2.06	0.54	1.30	24.6
High	1.41	6.82	0.82	1.26	39.0	1.41	1.47	0.77	1.31	28.7
Total	1.02	4.71	0.58	1.11	25.3	0.57	1.66	0.49	1.12	19.0
Mastery										
Low	1.04	5.32	0.86	1.30	34.9	0.92	2.23	0.59	1.22	33.8
Low-mod	1.17	5.46	0.58	1.12	26.4	0.71	1.77	0.55	1.19	16.0
Moderate	1.00	4.30	0.53	1.09	25.1	0.53	1.74	0.51	1.10	19.4
Mod-high	0.91	4.18	0.49	0.99	21.9	0.37	1.26	0.45	1.05	16.0
High	0.95	4.34	0.50	1.14	18.1	0.47	1.52	0.36	1.06	16.9
Total	1.02	4.71	0.58	1.11	25.4	0.57	1.66	0.49	1.12	19.0

Multicollinearity was assessed by examining correlations (Pearson) between the independent variables (Table 6.44). Associations in the weak-moderate range were observed between the two subscales of the personal control scales, constraint and mastery (-0.51), and between the coping and constraint subscales (-0.50). Also in the weak-moderate range but with smaller coefficients were correlations between distress and constraint (0.46) and between constraint and life satisfaction (-4.2). Other associations were in the weak-weak range, suggesting that they are each measuring quite different constructs.

Table 6.44: Correlation matrix on psychosocial batteries (dentate persons, weighted data)

		Mastery	Social support	Sum of networks	Distress	Coping	Life satisfaction	Relative inequality
Constraint	r	-0.510 **	-0.147 **	-0.076 **	0.458 **	-0.502 **	-0.415 **	0.051
	Sig.	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002
	N	3,637	3,609	3,637	3,569	3,569	3,593	3,558
Mastery	r	1.000	0.052 **	0.060 **	-0.214 **	0.387 **	0.303 **	-0.016
	Sig.	.	0.002	<0.001	<0.001	<0.001	<0.001	0.334
	N	3,637	3,609	3,637	3,569	3,569	3,593	3,558
Social support	r		1.000	0.066 **	-0.157 **	0.172 **	0.171 **	-0.048
	Sig.		.	<0.001	<0.001	<0.001	<0.001	0.004
	N		3,623	3,623	3,577	3,577	3,583	3,545
Sum of networks	r			1.000	-0.053 **	0.122 **	0.123 **	-0.035
	Sig.			.	0.001	<0.001	<0.001	0.036
	N			3,678	3,584	3,584	3,611	3,599
Distress	r				1.000	-0.491 **	-0.475 **	0.037
	Sig.				.	<0.001	<0.001	0.027
	N				3,584	3,584	3,552	3,506
Coping	r					1.000	0.482 **	-0.070
	Sig.					.	<0.001	<0.001
	N					3,584	3,552	3,506
Life satisfaction	r						1.000	-0.036
	Sig.						.	0.032
	N						3611	3,533
Relative inequality	r							1.000
	Sig.							.
	N							3,599

** Correlation is significant at the 0.01 level (2-tailed)

6.7 Multivariate analysis

Hierarchical multiple regression modelling was conducted to examine the relationship between psychosocial factors and oral health outcomes in the presence of sociodemographic variables.

Decayed teeth

The proportion of explained variance in decayed teeth was 9.5%, of which psychosocial factors contributed 3.6% (Table 6.45). The largest effect was for household income, where a positive association was observed between income of $20,000-$50,000 (relative to higher income) and decayed teeth. Female sex and speaking a LOTE were positively associated with decayed teeth. There was a positive association between constraint and distress scores and decayed teeth. Socioeconomic inequality in postcode areas was also positively associated with decayed teeth. Personal control, social support and life satisfaction were not significant in the model.

Table 6.45: Multiple linear regression model: Decayed teeth (dentate persons, weighted data)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1	0.067	0.059	0.067	8.250	15, 1724	<0.001
2	0.107	0.095	0.040	8.614	9, 1715	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	1.042	0.830		0.210
	Male	0.327	0.075	0.110	<0.001
	Age in years	-0.002	0.003	-0.020	0.433
	Australian-born	0.004	0.093	0.001	0.965
	Speaks English at home	-0.491	0.133	-0.089	<0.001
	Employed full-time (ref)				
	Employed part-time	0.080	0.094	0.022	0.397
	Retired	0.584	0.305	0.046	0.056
	Not employed	0.320	0.165	0.047	0.052
	Householders aged 5+	0.027	0.030	0.022	0.363
	ARIA score *	0.006	0.022	0.006	0.802
	Income <$20,000	0.302	0.163	0.047	0.064
	Income $20 to $50,000	0.386	0.078	0.125	<0.001
	Income >$50,000 (ref)				
	Up to secondary eduction	0.134	0.101	0.037	0.183
	Vocational education or other	0.061	0.084	0.020	0.468
	Tertiary education (ref)				
	Occupational prestige †	0.001	0.003	0.006	0.817
	IRSD area disadvantage ‡	-0.001	0.001	-0.043	0.139
Step 2	Constraint	0.213	0.073	0.094	0.004
	Mastery	0.077	0.076	0.029	0.314
	Social support	-0.074	0.057	-0.031	0.194
	No formal networks	-0.158	0.110	-0.040	0.152
	Sum of formal networks	0.028	0.029	0.027	0.341
	Distress	0.292	0.083	0.110	<0.001
	Coping	-0.119	0.092	-0.043	0.195
	Life satisfaction	0.035	0.053	0.018	0.508
	Socioeconomic inequality	0.001	<0.001	0.074	0.006

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Missing teeth

The model for all persons explained 22.7% of the variance in missing teeth; most of that was accounted for by age, which had a beta coefficient of 0.469 in block 2 (Table 6.46). Apart from age, other sociodemographic factors positively associated with missing teeth were Australian-born, LOTE, small household, low income, secondary education (in reference to tertiary education), low occupational prestige and area disadvantage. Living with more householders was negatively associated with missing teeth. Greater distress, and, unexpectedly better coping were also positively associated with missing teeth. Personal control, social support and networks, life satisfaction and socioeconomic inequality were not significantly associated with missing teeth.

Table 6.46: Multiple linear regression model: Missing teeth (dentate persons, weighted data)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1	0.230	0.224	0.230	39.207	1965	<0.001
2	0.237	0.227	0.006	1.786	1956	0.066

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	-2.171	2.140		0.310
	Male	0.318	0.196	0.035	0.104
	Age in years	0.171	0.008	0.469	<0.001
	Australian-born	0.586	0.243	0.051	0.016
	Speaks English at home	-0.593	0.339	-0.037	0.081
	Employed full-time (ref)				
	Employed part-time	0.012	0.245	0.001	0.963
	Retired	-0.054	0.717	-0.002	0.940
	Not employed	-0.313	0.444	-0.015	0.481
	Householders aged 5+	-0.156	0.077	-0.043	0.043
	ARIA score *	0.017	0.057	0.006	0.773
	Income <$20,000	0.842	0.406	0.046	0.038
	Income $20 to $50,000	0.297	0.202	0.032	0.142
	Income >$50,000 (ref)				
	Up to secondary eduction	0.529	0.255	0.050	0.038
	Vocational education or other	0.123	0.218	0.013	0.573
	Tertiary education (ref)				
	Occupational prestige †	0.034	0.009	0.090	<0.001
	IRSD area disadvantage ‡	-0.007	0.002	-0.106	<0.001
Step 2	Constraint	0.258	0.189	0.038	0.172
	Mastery	0.043	0.194	0.005	0.825
	Social support	0.044	0.149	0.006	0.768
	No formal networks	-0.240	0.284	-0.020	0.398
	Sum of formal networks	-0.016	0.075	-0.005	0.831
	Distress	0.516	0.208	0.064	0.013
	Coping	0.629	0.230	0.076	0.006
	Life satisfaction	0.024	0.139	0.004	0.864
	Socioeconomic inequality	-0.002	0.001	-0.031	0.184

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Social impact

The inclusion of psychosocial factors into the model for all persons made a considerable contribution. Results are presented in Table 6.47. Of the 16.1% of explained variance in social impact scores, psychosocial factors accounted for 11.4%. Of all the independent variables, distress had the greatest effect, followed by LOTE. Constraint, distress and socioeconomic inequality were negatively associated with social impact. Control, social support and networks and life satisfaction were not significantly associated with social impact in the presence of the other variables.

Table 6.47: Multiple linear regression model: Social impact (dentate, weighted data, all persons)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1	0.054	0.047	0.054	7.618	2006	<0.001
2	0.171	0.161	0.117	31.311	1997	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	1.225	0.258		<0.001
	Male	-0.012	0.024	-0.011	0.613
	Age in years	0.004	0.001	0.088	<0.001
	Australian-born	-0.028	0.029	-0.020	0.348
	Speaks English at home	-0.288	0.041	-0.152	<0.001
	Employed full-time (ref)				
	Employed part-time	0.035	0.029	0.028	0.236
	Retired	-0.131	0.086	-0.033	0.126
	Not employed	-0.111	0.052	-0.046	0.032
	Householders aged 5+	-0.007	0.009	-0.017	0.424
	ARIA score *	0.003	0.007	0.010	0.635
	Income <$20,000	0.082	0.049	0.038	0.092
	Income $20 to $50,000	-0.010	0.024	-0.009	0.680
	Income >$50,000 (ref)				
	Up to secondary eduction	-0.032	0.031	-0.026	0.293
	Vocational education or other	0.019	0.026	0.018	0.461
	Tertiary education (ref)				
	Occupational prestige †	0.002	0.001	0.036	0.136
	IRSD area disadvantage ‡	-0.001	<0.001	-0.100	<0.001
Step 2	Constraint	0.054	0.023	0.067	0.018
	Mastery	-0.028	0.024	-0.030	0.236
	Social support	-0.022	0.018	-0.026	0.219
	No formal networks	0.027	0.034	0.020	0.432
	Sum of formal networks	-0.012	0.009	-0.033	0.191
	Distress	0.228	0.025	0.245	<0.001
	Coping	-0.031	0.028	-0.032	0.269
	Life satisfaction	-0.016	0.017	-0.025	0.325
	Socioeconomic inequality	-0.001	<0.001	-0.083	<0.001

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Oral symptom experience

The model for oral symptom experience did not fit the data well (Table 6.48) and explained only 3.1% of the variance in oral symptom experience. Psychosocial factors accounted for 1.9%. Of the sociodemographic factors, geographic remoteness, low education and area disadvantage were positively associated with oral symptom experience. Distress was the only significant variable among the psychosocial factors. Distress had the greatest effect of all the independent variables and was positively associated with symptoms. Social support was negatively associated with symptom experience and of borderline statistical significance.

Table 6.48: Multiple linear regression model: Oral symptom experience (dentate, weighted data, all persons)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1	0.019	0.012	0.019	2.672	2026	<0.001
2	0.043	0.031	0.023	5.451	2017	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	2.234	0.544		<0.001
	Male	0.052	0.050	0.025	0.297
	Age in years	<0.001	0.002	-0.004	0.867
	Australian-born	-0.072	0.062	-0.027	0.244
	Speaks English at home	-0.065	0.085	-0.018	0.442
	Employed full-time (ref)				
	Employed part-time	0.039	0.062	0.016	0.535
	Retired	-0.046	0.181	-0.006	0.801
	Not employed	-0.089	0.109	-0.019	0.413
	Householders aged 5+	-0.030	0.019	-0.036	0.118
	ARIA score *	-0.032	0.015	-0.051	0.027
	Income <$20,000	0.131	0.103	0.031	0.202
	Income $20 to $50,000	-0.022	0.051	-0.010	0.666
	Income >$50,000 (ref)				
	Up to secondary eduction	-0.199	0.065	-0.082	0.002
	Vocational education or other	0.025	0.055	0.011	0.656
	Tertiary education (ref)				
	Occupational prestige †	<0.001	0.002	-0.002	0.943
	IRSD area disadvantage ‡	-0.001	<0.001	-0.063	0.022
Step 2	Constraint	-0.049	0.048	-0.031	0.312
	Mastery	0.054	0.049	0.029	0.274
	Social support	-0.071	0.037	-0.043	0.058
	No formal networks	-0.028	0.072	-0.010	0.703
	Sum of formal networks	0.009	0.019	0.013	0.630
	Distress	0.249	0.053	0.136	<0.001
	Coping	-0.038	0.058	-0.020	0.516
	Life satisfaction	-0.030	0.035	-0.023	0.396
	Socioeconomic inequality	<0.001	<0.001	-0.020	0.424

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Self-rated oral health

The relationship between psychosocial factors and self-rated oral health was examined using logistic regression to calculate the odds ratios for rating oral health poorly, having adjusted for sociodemographic factors. The higher the odds, the greater the likelihood that the relationship is causal. The results are reported in Table 6.49. Income and education, but not employment status, were significant constructs. However, retirees, compared with full-time workers, had significantly lower odds of rating their oral health poorly. The odds of rating oral health unfavourably were 2.3 times greater for those with income <$20,000 compared with those with income >$50,000 and were 2.1 times among those with vocational education than those with tertiary education.

Among other sociodemographic factors, those who were older and who spoke a LOTE at home had increased odds of rating their oral health as average or poorer. Females had lower odds than males of rating their oral health unfavourably. Having controlled for demographic and socioeconomic factors, social support and networks, stress, life satisfaction and socioeconomic inequality were not significantly associated with self-rated oral health poorly. Greater constraint was associated increased odds or poor self-rated oral health.

Table 6.49: Odds ratios and 95% C.I. for self-rating oral health as average or poorer (dentate only, weighted data)

	Odds ratio	95% C.I.		Sig.
Female	0.764	0.593	0.985	0.038
Male (ref)				
Age in years	1.031	1.020	1.042	<0.001
Overseas-born	0.995	0.741	1.337	0.975
Australia (ref)				
LOTE at home	1.824	1.238	2.688	0.002
English (ref)				
Employment status				0.134
Not employed	0.902	0.508	1.601	0.725
Retired	0.338	0.134	0.849	0.021
Part-time	1.018	0.748	1.387	0.909
Full-time (ref)				
Householders aged 5+ years	1.045	0.950	1.149	0.368
ARIA score *	1.048	0.978	1.122	0.184
Household income				0.002
<$20,000	2.316	1.409	3.807	0.001
$20,000-$50,000	0.976	0.757	1.260	0.854
>$50,000 (ref)				
Educational attainment				<0.001
Secondary or less	1.204	0.861	1.683	0.278
Vocational or other	2.140	1.625	2.817	<0.001
Tertiary (ref)				
Occupational prestige †	1.006	0.995	1.017	0.315
Concession card	0.911	0.571	1.455	0.697
No card (ref)				
Area disadvantage ‡	0.999	0.997	1.001	0.543
Constraint	1.429	1.131	1.806	0.003
Mastery	1.205	0.948	1.530	0.127
Social support	1.026	0.857	1.227	0.782
No social networks	0.739	0.512	1.065	0.105
1+ social networks (ref)				
Number of formal networks	0.933	0.844	1.032	0.178
Distress	1.227	0.952	1.581	0.115
Coping	0.785	0.592	1.042	0.094
Life satisfaction	1.038	0.872	1.237	0.673
Socioeconomic inequality	0.998	0.997	1.000	0.084
Constant	0.040			0.017
Nagelkerke R Square = 0.120				

* Low ARIA scores indicate greater remoteness

† Low prestige scores indicate higher prestige

‡ Low IRSD values indicate more disadvantaged areas

6.8 References to Chapter 6

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7. Childhood Environment

The childhood family environment paves the way for social, behavioural and emotional development that continues into adulthood. Indeed, there is growing awareness that childhood circumstances are linked to health outcomes later in life. In this study, adults were asked to recall specific family circumstances during the period of middle childhood at ten years of age. Two hypotheses were tested. The first was that there is a positive association between childhood socioeconomic circumstances and adult oral health. The second was that there is a positive association between the psychosocial climate of the family in childhood and adult oral health.

7.1 Childhood circumstance

7.1.1 Socioeconomic circumstance

As an indicator of childhood SEP, respondents were asked to identify the occupational group of each parent (or carer) from the eight major ASCO occupational groups. These eight groups were supplemented with three additional categories labelled 'domestic duties', 'unemployed', and 'other, please specify'. Where possible, descriptors for 'other' were used to reassign cases. The choice of parental occupation as the index of childhood SEP has been previously made in dental research. Poulton and colleagues, [1] working with the 1972-73 birth cohort study (Dunedin Multidisciplinary Health and Development Study), defined socioeconomic status (SES) in childhood as the highest occupational level of either parent. Their research showed poor circumstances early in the life course had enduring adverse effects on health. They reported that even when socioeconomic circumstances improved, children from families with a low socioeconomic status had a greater chance of poor dental and general health in young adulthood.

Although parental occupation is commonly used as an indicator of childhood SEP, in population-level studies age-related and period effects confound the status that is accorded to parental occupation. Just as participation in post-school education increased over the past 30 years in Australia, the occupational profile and the prestige of different skills shifted substantially. These trends raise difficulties in interpreting the relative status of adults from differing age groups. In this study entering age of respondent into multivariate models controlled this confounding effect.

Table 7.1 shows the distribution of paternal and maternal occupation. One fifth (20.9%) of respondents' fathers were tradespersons, 15.0% were managers or administrators, and (14.0%) were professionals. The occupational group of mothers was dominated by domestic duties, with almost two thirds (63.4%) of respondents indicating this group. In all, 12.1% of fathers' occupations were not reassigned. Most of these were farmers, market gardeners or orchardists.

Table 7.1: Parental occupation at age ten years (dentate persons, weighted data)

	Parents' occupations			
	Paternal occupation		Maternal occupation	
	Frequency	%	Frequency	%
Manager or administrator	553	15.0	110	3.0
Professional	516	14.0	247	6.7
Paraprofessional	155	4.2	102	2.8
Tradesperson	769	20.9	50	1.4
Clerk	203	5.5	205	5.6
Salesperson or personal service worker	191	5.2	192	5.2
Plant or machine operator; driver	291	7.9	68	1.9
Labourer	417	11.3	122	3.3
Domestic duties	23	0.6	2331	63.4
Unemployed	25	0.7	75	2.0
Other	445	12.1	108	2.9
Valid	**3,678**	**100.0**	**3,610**	**98.2**
Missing	**91**	**2.5**	**68**	**1.8**
Total	**3,678**	**100.0**	**3,678**	**100.0**

7.1.2 Psychosocial circumstance

Of the numerous psychosocial factors in childhood that may impact health, two were selected to examine for their association with adult oral health. These were parental cohabitation, and the principal care-giver's parenting style. Findings of the Family Characteristics Survey conducted in April 1997 showed that of Australia's 4.6 million children aged 0-17 years, 1.1 million lived with only one of their natural parents, usually as a result of relationship or marriage breakdown.[2] Not all of these children continued to live in single-parent families, as many make a transition into step- or blended families. Clearly, there are other reasons why parents do not cohabit. A number of respondents volunteered that when they were aged ten, one parent was deceased, or separated from the family because of illness or war service.

Parenting style generally refers to the elements of responsiveness (warmth or supportiveness) and demandingness (disciplinary approach), [3] among which styles such as indulgent, authoritarian, authoritative, and uninvolved are distinguished. In this study, parenting style as defined as both generally positive and supportive, or generally negative and non-supportive. In a systematic review of the literature on the relationship between childhood development, family characteristics and health, Repetti and colleagues [4] found that cold, unsupportive and neglectful parenting was a key predictor of poor mental and physical health later in life.

Table 7.2 presents the frequency distribution of responses to the two items on parental cohabitation and parenting style. While the majority of respondents (89.3%) lived with both natural parents at the age of ten, 7.5% did not, and 3.7% were unsure or chose not to respond. A similar majority (87.0%) reported that the parenting style of their primary care-giver was generally positive and supportive. In total, 143 respondents opted to use the category labelled 'other, please specify'. Each of these descriptors was subsequently assessed and reassigned where possible to either 'positive' or 'negative' groups. In 63 cases, a decision could not be made to reassign responses and these cases were omitted from analysis.

Table 7.2: Psychosocial characteristics of family of origin in childhood (dentate persons, weighted data)

	Male		Female		All	
	N	Column %	N	Column %	N	Column %
Parental cohabitation [(a)]						
Together	1,654	90.0	1,630	88.6	3,284	89.3
Separately	124	6.7	152	8.3	276	7.5
Unsure	10	0.5	7	0.4	17	0.5
Missing	50	2.7	51	2.8	119	3.2
Total	1,839	100.0	1839	100.0	3,678	100.0
Parental rearing style [(b)]						
Generally positive and supportive	1,642	89.3	1,559	84.7	3,201	87.0
Generally negative and non-supportive	132	7.2	172	9.4	304	8.3
Other	15	0.8	49	2.6	63	1.7
Missing	50	2.7	60	3.3	110	3.0
Total	1839	100.0	1839	100.0	3,678	100.0

(a) When you were aged ten, did your parents live together or separately?
(b) How would you describe the parenting style of the person chiefly responsible for rearing you?

As shown in the cross-tabulation in Table 7.3, only 1.9% of adults indicated that their parents did not live together and that they were reared in a negative and non-supportive manner.

Table 7.3: Cross-tabulation of parental rearing style and cohabitation (dentate persons, weighted data)

		Parental rearing style		
		Positive and supportive (total %)	Negative and non-supportive (total %)	Total
Parental cohabitation	Together	85.7	6.8	92.5
	Separately	5.6	1.9	7.5
	Total	**91.3**	**8.7**	**100.0**

Relationships among childhood variables

The relationship between childhood psychosocial and the socioeconomic characteristics was evaluated using Pearson's Chi square to test for significance of differences (Table 7.4).

Overall, 7.4% of adults reported that their parents lived separately when they were aged ten. However, this proportion varied dramatically across paternal occupation categories, from 3.9% of adults whose fathers were managers, administrators or professionals to 18.1% of adults who were engaged in domestic duties; and 56.0% of adults whose fathers were unemployed. The dispersion of rearing styles across paternal occupation categories was also wide, although less dramatic than parental cohabitation. Again, a greater proportion of adults whose fathers had been unemployed were disadvantaged, with 29.2% rating the rearing style of their care giver as negative and unsupportive. By contrast, 4.9% of adults whose fathers were managers or professionals rated their rearing as being negative.

The distribution in parental cohabitation and parental rearing style based on maternal occupation was different. The proportion of adults whose mothers had been unemployed and reported that their parents lived separately was 7.9%, and the smallest proportion of parents living separately were those where the maternal occupation was domestic duties (5.6%). Adults whose mothers had been plant or machine operators, drivers or labourers reported the highest proportion of negative rearing styles (22.0%), followed by the unemployed (14.7%). For other maternal occupations, the proportion reporting a negative rearing style ranged fom a low of 4.3% (managers, professionals) to 8.5%.

Table 7.4: Childhood socioeconomic position and psychosocial factors (dentate persons, weighted data)

	Parental cohabitation			Rearing style		
		Together	Separately		Positive, supportive	Negative, unsupportive
	N	Row %		N	Row %	
Paternal occupation						
Manager, administrator; professional	1,043	96.1	3.9	1,026	95.1	4.9
Paraprofessional; tradesperson	917	93.5	6.5	904	92.1	7.9
Clerk; sales, personal services	390	93.6	6.4	379	91.8	8.2
Plant/machine operator, driver; labourer	702	94.4	5.6	688	87.1	12.9
Domestic duties; other	448	81.9	18.1	450	88.0	12.0
Unemployed	25	44.0	56.0	24	70.8	29.2
Total	3,525	92.6	7.4	3,471	91.3	8.7
Test of significance		χ^2=184.643, df=5, p<0.001			χ^2=54.224, df=5, p<0.001	
Maternal occupation						
Manager, administrator; professional	347	90.8	9.2	348	95.7	4.3
Paraprofessional; tradesperson	150	85.3	14.7	149	95.3	4.7
Clerk; sales, personal services	392	85.7	14.3	386	92.0	8.0
Plant/machine operator, driver; labourer	178	87.1	12.9	168	78.0	22.0
Domestic duties; other	2,406	94.4	5.6	2,368	91.5	8.5
Unemployed	76	92.1	7.9	75	85.3	14.7
Total	3,549	92.3	7.7	3,494	91.4	8.6
Test of significance		χ^2=57.548, df=5, p<0.001			χ^2=53.004, df=5, p<0.001	

7.1.3 Childhood environment and socioeconomic indicators

The four family-of-origin variables were examined for their relationship with respondents' current socioeconomic circumstances. Parental occupation was collapsed into two groups. Group A comprised manager or administrator; professional; and paraprofessional categorics. Group B comprised all other categories: tradesperson; clerk; sales or personal services; plant or machine operator, driver; labourer; domestic duties; unemployed; and other. Findings are presented in Table 7.5. Differences were tested for significance using Pearson's chi-square.

Of those adults whose income was >$50,000 at the time of data collection, 5.8% reported that their parents lived separately, when they were ten years old. By comparison, more than double that proportion (12.9%) of adults whose income was <$12,000 reported that their parents lived separately. A lower proportion of adults with tertiary education (6.7%) reported their parents lived separately compared with adults with a maximum of secondary education (9.3%), although the difference did not reach statistical significance at the <0.05 level.

There were significance differences by occupation. A smaller proportion of adults who were managers or administrators (4.9%) reported that their parents had not cohabited, than any other occupational group. While 11.9% of cardholders reported that their parents had not cohabited, 6.8% of non -cardholders reported that their parents had not cohabited. Differences were also significant across quintiles of area disadvantage, ranging from 10.0% of parents living apart among adults living in the most disadvantaged areas to 5.7% of parent among adults in the least disadvantaged areas.

While there was a clear relationship between parental cohabitation in childhood and socioeconomic position in adulthood, there was no evidence of an association between parental rearing style and socioeconomic position in adulthood.

There were significant associations between socioeconomic position in childhood (parents' occupation) and current socioeconomic indicators. For example, of adults in the lowest income group, 17.4% reported their father's occupation fitted group A categories (manager/administrator, professional, paraprofessional), compared with 42.6% of adults with an income >$50,000. Similarly, 8.3% of adults in the lowest income group reported maternal occupation in group A, compared with 15.9% of adults with an income >$50,000.

In addition, 22.2% of adults with a secondary education only had fathers in occupational group A, compared with 49.4% of adults with a tertiary education. Further, 7.0% of adults with a secondary education had mothers in occupational group A, compared with 17.3% of adults with a tertiary education.

Overall, 37.0% of the sample reported paternal occupation in group A. A higher than average proportion of respondents who were themselves managers (49.6%) or professionals (43.6%) had fathers in group A occupations. Similarly, while 14.5% of the sample reported that their mother had been in occupational group A, a higher proportion was currently in managerial (19.2%), professional (20.2%) or paraprofessional (15.6%) occupations.

These relationships were reflected in occupational prestige scores where higher than average proportions of workers in moderate-high or high prestige occupations had mothers or fathers in occupational group A.

A lower proportion of cardholders had fathers who worked in occupational group A, although differences in cardholder status according to maternal occupational group were not significant.

There was a socioeconomic gradient in area disadvantage by paternal occupation. With each quintile of decreasing area disadvantage, there was an increased proportion of adults who had fathers in occupational group A. Proportions ranged from 23.5% in quintile 1 (high disadvantage) to 48.7% in quintile 5 (low disadvantage). The socioeconomic gradient in area disadvantage was less evident according to maternal occupation.

Table 7.5: Childhood environment characteristics by socioeconomic indicators (dentate persons, weighted data)

	Parental cohabitation		Parental rearing style		Paternal occupation		Maternal occupation	
	Together	Separate	Positive	Negative	Group A [(a)]	Group B [(b)]	Group A [(a)]	Group B [(b)]
	Row %		Row %		Row %		Row %	
Household income								
<$12,000	87.1	12.9	92.0	8.0	17.4	82.6	8.3	91.7
$12-20,000	89.2	10.8	90.4	9.6	22.8	77.2	7.6	92.4
$20-30,000	90.4	9.6	89.9	10.1	22.3	77.7	8.4	91.6
$30-40,000	94.9	5.1	90.5	9.5	30.9	69.1	10.1	89.9
$40-50,000	88.6	11.4	93.0	7.0	34.8	65.2	11.3	88.7
>$50,000	94.2	5.8	90.7	9.3	42.6	57.4	15.9	84.1
Total	92.1	7.9	90.9	9.1	33.8	66.2	12.2	87.8
Pearson's Chi-square	χ^2=34.51(df=5; p<0.001)		χ^2=3.39(df=5; p=0.640)		χ^2=124.22(df=5; p<0.001)		χ^2=37.69(df=5; p<0.001)	
Educational attainment								
Secondary or less	90.7	9.3	91.1	8.9	22.2	77.8	7.0	93.0
Vocational or other	92.5	7.5	90.9	9.1	26.9	73.1	10.8	89.2
Tertiary	93.3	6.7	91.5	8.5	49.4	50.6	17.3	82.7
Total	92.3	7.7	91.2	8.8	34.0	66.0	12.1	87.9
Pearson's Chi-square	χ^2=5.65(df=2; p=0.059)		χ^2=0.27(df=2; p=0.872)		χ^2=227.34(df=2; p<0.001)		χ^2=58.93(df=2; p<0.001)	
Occupational group [(c)]								
Manager/administrator	95.1	4.9	92.6	7.4	49.6	50.4	19.2	80.8
Professional	94.9	5.1	92.3	7.7	43.6	56.4	20.2	79.8
Paraprofessional	89.8	10.2	83.0	17.0	32.3	67.7	15.6	84.4
Tradesperson	90.3	9.7	88.7	11.3	23.8	76.2	9.7	90.3
Clerk	92.2	7.8	94.4	5.6	30.9	69.1	9.1	90.9
Sales/Personal services	90.0	10.0	89.4	10.6	37.7	62.3	8.0	92.0
Plant/machine op; Driver	94.9	5.1	90.5	9.5	26.5	73.5	8.6	91.4
Labourers/related	91.8	8.2	92.4	7.6	33.1	66.9	19.9	80.1
Total	92.7	7.3	91.0	9.0	37.0	63.0	14.5	85.5
Pearson's Chi-square	χ^2=16.23(df=7; p=0.023)		χ^2=24.81(df=7; p=0.001)		χ^2=69.71(df=7; p<0.001)		χ^2=52.06(df=7; p<0.001)	
Occupational prestige [(d)]								
Low	90.9	9.1	94.3	5.7	33.0	67.0	10.5	89.5
Low-moderate	93.5	6.5	91.0	9.0	29.0	71.0	11.7	88.3
Moderate	89.6	10.4	87.9	12.1	32.3	67.7	9.0	91.0
Moderate-high	93.7	6.3	91.0	9.0	40.6	59.4	17.2	82.8
High	95.7	4.3	90.5	9.5	47.7	52.3	21.1	78.9
Total	92.8	7.2	90.9	9.1	37.0	63.0	14.2	85.8
Pearson's Chi-square	χ^2=16.86(df=4; p=0.002)		χ^2=11.36(df=4; p=0.023)		χ^2=48.14(df=4; p<0.001)		χ^2=41.87(df=4; p<0.001)	
Concession status								
Card holder	88.1	11.9	91.3	8.7	21.3	78.7	12.2	87.8
No card	93.2	6.8	91.3	8.7	36.9	63.1	12.8	87.2
Total	92.3	7.7	91.3	8.7	34.1	65.9	12.7	87.3
Pearson's Chi-square	χ^2=19.22(df=1; p<0.001)		χ^2=0.00(df=1; p=0.963)		χ^2=58.63(df=1 p<0.001)		χ^2=0.19(df=1; p=0.664)	
Area disadvantage[(e)]								
Q1 (high disadvantage)	90.0	10.0	91.8	8.2	23.5	76.5	9.4	90.6
Quintile 2	92.4	7.6	91.4	8.6	23.7	76.3	13.0	87.0
Quintile 3	91.6	8.4	92.1	7.9	31.6	68.4	11.3	88.7
Quintile 4	92.6	7.4	92.5	7.5	36.4	63.6	14.5	85.5
Quintile 5	94.3	5.7	89.4	10.6	48.7	51.3	14.4	85.6
Total	92.3	7.7	91.3	8.7	34.2	65.8	12.6	87.4
Pearson's Chi-square	χ^2=10.36(df=4; p=0.035)		χ^2=6.08(df=4; p=0.193)		χ^2=146.51(df=4; p<0.001)		χ^2=12.36(df=4; p=0.015)	

(a) Manager/administrator; professional; paraprofessional
(b) Tradesperson; clerk; sales/personal services; plant/machine operator, driver; labourer; domestic duties; unemployed; other
(c) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(d) Daniel Prestige Scale
(e) Index of Relative Socio-Economic Disadvantage - Australian Bureau of Statistics' Socio-Economic Indexes for Areas

7.1.4 Childhood environment and demographic characteristics

The four childhood environment factors were examined for their association with demographic characteristics (Table 7.6). Overall, males reported a more favourable view of social and economic circumstances in childhood than did females. A higher proportion of males reported parental cohabitation, a positive and supportive parental rearing style, and parental employment in group A occupations. Differences in parental cohabitation by sex, however, were not significant. There were significant differences between age groups. A smaller proportion of adults aged 70+ years than other age groups reported that their parents did not live together (4.0%), although the lowest level of parental cohabitation was reported by the 60-69-year-olds (12.8%) indicating that the relationship between age and parental cohabitation was not linear. The 70+years age group also recorded the highest percentage of positive parenting rearing style (96.8%). Adults in middle age were less satisfied than younger and older adults in their appraisals of rearing style with 87.1% of 40-49-year-olds and 86.5% of 50-59 years olds rating it as positive and supportive.

Differences in parental occupation by age group were also significant. A clear inverse relationship between age group and occupational group A employment was observed. Paternal employment in occupational group A was reported by 45.9% of 18-29-year-olds compared with 23.7% of adults aged 70+ years. Maternal participation in work classified as occupational group A showed a clear difference among age groups. While almost a quarter (24.7%) of 18-29-year-olds reported maternal occupation in group A, the proportion decreased to 16.2% among 30-39-year-olds, and then dropped sharply to 6.6% among 40-49-year-olds. Of adults aged 70+ years, 2.2% reported maternal occupation in group A. A higher proportion of respondents who were born overseas reported maternal employment in occupational group A. Other differences based on country of birth were not significant. There were no significant differences according to language spoken at home or in parental cohabitation based on the employment status of respondents. However, there were comparatively large differences in perceptions of parental rearing between employment status categories. While 4.5% of retirees rated their primary care-giver's rearing as negative and unsupportive, 10.3% of those not employed perceived their rearing as negative.

Differences in parental occupational group by employment status of respondents reflected age-related trends, with a smaller proportion of retirees reporting paternal and maternal occupation in occupational group A. Overall, a less favourable profile was observed among adults who were not employed. Compared with respondents in the workforce, a greater percentage of those not employed reported that they had not lived with both parents, rated their rearing as not supportive, and reported parental employment in occupational group B categories. Compared with households with fewer occupants, a smaller proportion of adults living in households with more than four persons lived with only one parent in childhood. In addition, fewer of these adults rated their parental rearing style as negative, although differences across household size were not significant. A smaller proportion of these adults reported maternal employment in occupational group A.

Table 7.6: Childhood environment by demographic characteristics (dentate persons, weighted data)

	Parental cohabitation		Parental rearing style		Paternal occupation		Maternal occupation	
	Together	Separate	Positive	Negative	Group A [(a)]	Group B [(b)]	Group A [(a)]	Group B [(b)]
	Row %		Row %		Row %		Row %	
Sex								
n	**3,284**	**276**	**3,201**	**304**	**1,223**	**2,364**	**460**	**3,150**
Male	93.0	7.0	92.6	7.4	36.3	63.7	14.1	85.9
Female	91.5	8.5	90.1	9.9	31.9	68.1	11.3	88.7
Total	92.2	7.8	91.3	8.7	34.1	65.9	12.7	87.3
Pearson's Chi-square	χ^2=3.01(df=1; p=0.083)		χ^2=6.89(df=1; p=0.009)		χ^2=7.93(df=1; p=0.005)		χ^2=6.28(df=1; p=0.012)	
Age group								
n	**3,284**	**275**	**3,201**	**304**	**1,223**	**2,363**	**458**	**3,152**
18-29 years	89.7	10.3	95.4	4.6	45.9	54.1	24.7	75.3
30-39 years	94.0	6.0	91.4	8.6	36.8	63.3	16.2	83.8
40-49 years	93.1	6.9	87.1	12.9	29.2	70.8	6.6	93.4
50-59 years	94.1	5.9	86.5	13.5	25.7	74.3	6.2	93.8
60-69 years	87.2	12.8	91.2	8.8	28.1	71.9	3.1	96.9
70+ years	96.0	4.0	96.8	3.2	23.7	76.3	2.2	97.8
Total	92.3	7.7	91.3	8.7	34.1	65.9	12.7	87.3
Pearson's Chi-square	χ^2=31.97(df=5; p<0.001)		χ^2=61.54(df=5; p<0.001)		χ^2=103.13(df=5; p<0.001)		χ^2=231.84(df=5; p<0.001)	
Country of birth								
n	**3,247**	**275**	**3,166**	**302**	**1,211**	**2,340**	**459**	**3,114**
Australia	92.3	7.7	91.0	9.0	33.4	66.6	11.9	88.1
Overseas	91.8	8.2	92.2	7.8	36.8	63.2	16.4	83.6
Total	92.2	7.8	91.3	8.7	34.1	65.9	12.8	87.2
Pearson's Chi-square	χ^2=0.17(df=1; p=0.678)		χ^2=0.99(df=1; p=0.319)		χ^2=2.96(df=1; p=0.085)		χ^2=10.47(df=1; p=0.001)	
Language at home								
n	**3,284**	**276**	**3,201**	**304**	**1,224**	**2,364**	**459**	**3,151**
Other than English	93.2	6.8	89.5	10.5	34.0	66.0	11.5	88.5
English	92.2	7.8	91.6	8.4	34.1	65.9	12.9	87.1
Total	92.3	7.7	91.4	8.6	34.1	65.9	12.7	87.3
Pearson's Chi-square	χ^2=0.51(df=1; p=0.476)		χ^2=1.70(df=1; p=0.193)		χ^2=0.00(df=1; p=0.982)		χ^2=0.52(df=1; p=0.470)	
Employment status								
n	**3,074**	**256**	**2,990**	**287**	**1,115**	**2,239**	**409**	**2,963**
Full-time	93.0	7.0	90.3	9.7	34.9	65.1	13.8	86.2
Part-time	92.0	8.0	91.5	8.5	37.7	62.3	13.2	86.8
Retired	90.2	9.8	95.5	4.5	23.1	76.9	2.2	97.8
Not employed	92.7	7.3	89.7	10.3	32.0	68.0	15.1	84.9
Total	92.3	7.7	91.2	8.8	33.2	66.8	12.2	87.8
Pearson's Chi-square	χ^2=4.17(df=3; p=0.244)		χ^2=14.22(df=3; p=0.003)		χ^2=31.14(df=3; p<0.001)		χ^2=54.65(df=3; p<0.001)	
Householders aged 5+								
n	**3,279**	**276**	**3,196**	**304**	**1,224**	**2,359**	**459**	**3,146**
One person	90.5	9.5	91.2	8.8	35.7	64.3	10.2	89.8
Two persons	89.7	10.3	92.3	7.7	32.2	67.8	11.5	88.5
Three-four persons	94.4	5.6	90.3	9.7	35.7	64.3	15.5	84.5
More than 4 persons	95.7	4.3	91.4	8.6	33.9	66.1	9.9	90.1
Total	92.2	7.8	91.3	8.7	34.2	65.8	12.7	87.3
Pearson's Chi-square	χ^2=29.63(df=3; p<0.001)		χ^2=3.42(df=3; p=0.332)		χ^2=4.39(df=3; p=0.222)		χ^2=17.10(df=3; p=0.001)	
ARIA category								
n	**3,284**	**276**	**3,201**	**304**	**1,224**	**2,364**	**459**	**3,151**
Highly accessible	92.4	7.6	91.2	8.8	36.2	63.8	12.9	87.1
Accessible	90.9	9.1	91.7	8.3	23.6	76.4	13.0	87.0
Mod accessible	93.6	6.4	93.5	6.5	21.4	78.6	8.7	91.3
Remote	86.8	13.2	94.6	5.4	19.4	80.6	18.4	81.6
Very remote	96.6	3.4	86.2	13.8	48.3	51.7	3.3	96.7
Total	92.3	7.7	91.3	8.7	34.1	65.9	12.7	87.3
Pearson's Chi-square	χ^2=3.82(df=4; p=0.430)		χ^2=2.38(df=4; p=0.666)		χ^2=40.46(df=4; p<0.001)		χ^2=5.39(df=4; p=0.249)	

(a) Manager/Administrator; Professional; Paraprofessional
(b) Tradesperson; Clerk; Sales/Personal services; Plant/Machine Op, Driver; Labourer; Domestic duties; Unemployed; Other

7.1.5 Childhood environment and oral health

Decayed and missing teeth

As presented in Table 7.7, adults who lived with both parents at the age of ten reported significantly fewer decayed teeth (1.48) than adults who lived with one natural parent (1.79). In addition, adults who lived with both parents reported significantly fewer missing teeth (5.89) than adults who reported that their parents had not lived together (7.06).

There were no significant differences in the mean number of decayed and missing teeth based on ratings of primary care giver's rearing style.

To examine the relationship between socioeconomic position in childhood and oral health in adulthood, parental occupation was categorised into five groups with a sixth category labelled unemployed. The first two of the eight ASCO major occupational groups i.e. 'manager or administrator' and 'professional', were combined to form the most socioeconomically advantaged group. The third and fourth major ASCO groups of 'paraprofessional' and 'tradesperson' were combined to form the second occupational category. Similarly, the fifth and sixth ASCO groups of 'clerk' and 'sales or personal service worker' were combined, and the seventh and eighth ASCO groups of 'plant or machine operator and driver' and 'labourer' were combined to form a fourth category. The fifth category was comprised of occupations described as either 'domestic duties' or 'other', and the sixth category comprised responses of 'unemployed'. The same categories applied for both paternal and maternal occupations. Because of the unequal distribution of cases across occupational categories, the number of cases is also reported.

There were significant differences in decayed teeth according to paternal occupation. The highest mean decayed teeth were reported by adults whose father's occupational group was 'plant/machine operator or labourer' (1.05). Unexpectedly, those whose fathers were unemployed (0.63) reported fewest decayed teeth, although the small number of cases may yield unreliable data. Apart from this finding, decayed teeth in adulthood tended to follow an inverse socioeconomic gradient, with the paternal managerial professional group reporting 0.65 decayed teeth and subsequent occupational groups reporting higher mean decayed teeth.

A marked difference in the number of missing teeth was observed between paternal occupational groups. Adults whose fathers were a 'manager or administrator' had least missing teeth (1.87). Adults whose fathers held other occupations reported within a range of 3.02 to 4.54 missing teeth. Greatest numbers of missing teeth were reported by adults whose father was employed in 'domestic duties or other non-classified work' (4.54).

Adults whose maternal occupational category was 'unemployed' reported highest mean decayed teeth (2.05). This was approximately a 2.7-fold increase in the number of affected teeth reported by those whose mothers were employed in domestic duties, trades, or other unclassified work (0.81). Adults with fewest decayed teeth reported that their mother's occupation was clerk, sales, personal service work (0.70) or managerial work (0.71). There were more missing teeth among adults whose mother was either unemployed (4.22) or in the domestic duties group (4.23) than among adults whose mothers were in other occupations. Maternal occupation in managerial and professional work was associated with fewest missing teeth (1.10).

Table 7.7: Decayed and missing teeth by childhood factors (dentate persons, weighted data)

	Decayed teeth					Missing teeth				
	N	Mean	SD	95% CI		N	Mean	SD	95% CI	
				Lower	Upper				Lower	Upper
Parental cohabitation										
Together	2,686	0.78	1.48	0.72	0.84	3,188	3.30	5.89	3.10	3.51
Separately	228	1.23	1.79	0.99	1.46	264	4.09	7.06	3.23	4.95
Total	2,914	0.81	1.51	0.76	0.87	3,452	3.36	5.99	3.16	3.56
Test of significance		F(1,2911) = 18.598, p< 0.001					F(1,3450) = 4.229, p= 0.040			
Parent rearing style										
Positive and supportive	2,621	0.81	1.52	0.75	0.87	3,107	3.41	6.07	3.20	3.62
Negative and non-supportive	243	0.73	1.30	0.57	0.90	293	3.29	5.65	2.64	3.94
Total	2,863	0.80	1.51	0.75	0.86	3,400	3.40	6.03	3.20	3.60
Test of significance		F(1,2861) = 0.577, p= 0.448					F(1,3398) = 0.106, p= 0.745			
Paternal occupation										
Manager, Admin; Professional	896	0.65	1.26	0.57	0.73	1,050	1.87	4.34	1.61	2.14
Paraprofessional; Tradesperson	765	0.68	1.38	0.58	0.77	900	4.11	6.43	3.69	4.53
Clerk; Sales, Personal Services	321	0.76	1.29	0.62	0.90	384	3.02	5.44	2.47	3.56
Plant/machine Op; Labourer	549	1.05	1.76	0.90	1.20	684	4.03	6.57	3.53	4.52
Domestic duties; Other	373	1.00	1.63	0.83	1.16	435	4.54	7.10	3.87	5.21
Unemployed	23	0.63	1.08	0.15	1.10	25	4.00	7.30	0.95	7.04
Total	2,926	0.79	1.46	0.73	0.84	3,478	3.35	5.99	3.15	3.55
Test of significance		F(5,2920) = 7.791, p<0.001					F(5,3471) = 21.838, p< 0.001			
Maternal occupation										
Manager, admin; professional	324	0.71	1.26	0.57	0.85	351	1.10	3.93	0.68	1.51
Paraprofessional; tradesperson	119	0.81	1.42	0.55	1.06	147	2.63	5.10	1.80	3.47
Clerk; sales, personal services	359	0.70	1.37	0.56	0.85	389	1.25	3.33	0.92	1.58
Plant/machine op; labourer	163	0.76	1.19	0.57	0.94	186	1.59	3.60	1.07	2.11
Domestic duties; other	1,924	0.81	1.53	0.74	0.88	2,357	4.23	6.59	3.96	4.50
Unemployed	62	2.05	2.80	1.34	2.76	69	4.22	6.06	2.77	5.67
Total	2,951	0.81	1.51	0.75	0.86	3,500	3.38	6.02	3.18	3.58
Test of significance		F(5,2945) = 9.166, p< 0.001					F(5,3494) = 34.846, p< 0.001			

Social impact and oral symptoms

As presented in Table 7.8, adults whose parents had cohabited when they were aged ten reported less social impact from their oral conditions (0.53) than adults whose parents had lived separately (0.59). In addition, adults whose parents had cohabited reported fewer oral symptoms (1.08) than those raised with one natural parent (1.25).

Adults who perceived their care giver's rearing to be positive and supportive reported lower social impact scores (0.52) than adults reared in a negative and unsupportive environment (0.66). In addition, adults who perceived a more favourable rearing environment reported fewer oral symptoms in adulthood (1.07) than adults reared in a negative environment (1.23).

Adults whose father's occupation was in the managerial and professional category reported lower social impact scores (0.46) than other adults. Highest impact scores were reported by adults whose father's occupation was plant or machine operator, driver or labourer (0.69), followed by the unemployed group (0.57). In addition, adults whose fathers had been managers or professionals tended to report low symptom experience (1.03), as did adults whose fathers had been a clerk or in sales or personal services (1.00). Adults whose fathers had been unemployed reported the highest symptom experience (1.35), followed by the plant or machine operator, driver, or labourer category (1.25).

Similar associations were observed for maternal occupational group. Adults whose mothers were a manager or professional reported lowest social impact scores (0.46) among occupational groups, and these adults also reported fewer oral symptoms (1.03) than adults whose mothers had done other work. Adults whose mothers had been plant or machine operators, drivers reported the highest social impact scores, or labourers (0.69) followed by those whose mothers were unemployed (0.57). Similarly, adults whose mothers had been plant or machine operators or drivers reported the highest oral symptom experience, or labourers (1.47) followed by the group whose mothers were unemployed (1.24).

Table 7.8: Social impact and oral symptom experience by childhood factors (dentate persons, weighted data)

	Social impact					Oral symptom experience				
	N	Mean	SD	95% CI		N	Mean	SD	95% CI	
				Lower	Upper				Lower	Upper
Parental cohabitation										
Together	3,239	0.53	0.54	0.51	0.54	3,283	1.08	1.00	1.05	1.12
Separately	274	0.59	0.56	0.53	0.66	276	1.25	1.04	1.13	1.37
Total	3,513	0.53	0.54	0.51	0.55	3,558	1.10	1.00	1.06	1.13
Test of significance		F(1,3510) = 3.953, p= 0.047					F(1,3556) = 6.931, p= 0.009			
Parent rearing style										
Positive and supportive	3,165	0.52	0.53	0.50	0.54	3,200	1.07	0.99	1.04	1.11
Negative and non-supportive	297	0.66	0.63	0.59	0.73	304	1.23	1.04	1.11	1.34
Total	3,462	0.53	0.54	0.51	0.55	3,503	1.09	1.00	1.05	1.12
Test of significance		F(1,3460) = 18.486, p< 0.001					F(1,3501) = 6.517, p= 0.011			
Paternal occupation										
Manager, admin; professional	1,057	0.49	0.51	0.46	0.52	1,069	1.00	0.93	0.94	1.05
Paraprofessional; tradesperson	918	0.55	0.54	0.51	0.58	923	1.09	1.02	1.02	1.15
Clerk; sales, personal services	389	0.57	0.57	0.51	0.62	394	1.16	1.06	1.05	1.26
Plant/machine op; labourer	698	0.56	0.58	0.52	0.61	708	1.25	1.06	1.17	1.33
Domestic duties; other	461	0.50	0.48	0.45	0.54	467	1.08	0.93	0.99	1.16
Unemployed	25	0.63	0.57	0.39	0.86	25	1.35	1.10	0.89	1.80
Total	3,549	0.53	0.54	0.51	0.55	3,586	1.10	1.00	1.07	1.13
Test of significance		F(5,3542) = 2.901, p= 0.013					F(5,3580) = 6.132, p< 0.001			
Maternal occupation										
Manager, admin; professional	357	0.46	0.58	0.40	0.52	358	1.03	1.01	0.93	1.14
Paraprofessional; tradesperson	150	0.54	0.50	0.46	0.62	151	1.18	1.00	1.02	1.34
Clerk; sales, personal services	391	0.54	0.52	0.49	0.60	397	1.00	1.01	0.90	1.10
Plant/machine op; labourer	182	0.69	0.75	0.58	0.80	190	1.47	1.05	1.32	1.62
Domestic duties; other	2,416	0.52	0.52	0.50	0.54	2,438	1.08	0.98	1.04	1.12
Unemployed	68	0.57	0.51	0.45	0.69	75	1.24	1.04	1.00	1.48
Total	3,565	0.53	0.54	0.51	0.55	3,609	1.10	1.00	1.06	1.13
Test of significance		F(5,3558) = 4.637, p< 0.001					F(5,3602) = 7.074, p< 0.001			

Self-rated oral health

Associations between childhood factors and self-rated oral health are presented in Table 7.9. Although a higher proportion of adults whose parents cohabited rated their oral health as excellent, and a lower proportion of this group rated their oral health as poor or very poor, associations were weak and failed to reach statistical significance. Similarly, differences in self-rated oral health according to rearing style were not significant, although a higher proportion of adults who perceived their rearing to be positive rated their oral health more favourably.

There were significant differences in self-rated oral health according to paternal occupation. While 14.2% of adults whose fathers had been managers or professionals rated their oral health as excellent, 3.8% adults whose fathers had been unemployed when they were aged ten rated their oral health as excellent. More than a quarter of adults who rated their oral health as average or poorer had fathers who had been plant or machine operators, drivers or labourers (26.1%) or unemployed (26.9%). This contrasted with 18.5% of adults rating their oral health as average or worse whose fathers had been managers or professionals.

There was also a significant inverse gradient in self-rated oral health by socioeconomic position in childhood as determined by maternal occupation. For example, while 51.9% of adults whose mother had been a manager or professional rated their oral health as very good or excellent, 30.0% of adults whose mothers were unemployed rated their oral health as very good or excellent.

Table 7.9: Self-rated oral health by childhood factors (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
	Very poor or poor	Average	Good	Very good	Excellent	Pearson's Chi-square		
	Row %	Row %	Row %	Row %	Row %	Value	df	Asymp. Sig. (2-sided)
Parental cohabitation						3.433	4.0	0.488
n	**178**	**621**	**1,163**	**1,162**	**429**			
Together	4.9	17.3	32.8	32.7	12.3			
Separately	6.2	19.8	31.9	32.6	9.5			
Total	5.0	17.5	32.7	32.7	12.1			
Parent rearing style						7.677	4.0	0.104
n	**173**	**600**	**1,156**	**1,144**	**427**			
Positive and supportive	4.7	17.0	33.3	32.9	12.2			
Negative, non-supportive	7.9	19.1	30.6	30.6	11.8			
Total	4.9	17.1	33.0	32.7	12.2			
Paternal occupation	175	628	1,178	1,172	429	38.341	20	0.008
Manager, admin; professional	4.2	14.3	33.1	34.3	14.2			
Paraprofessional; tradesperson	5.4	18.8	33.6	32.0	10.2			
Clerk; sales, personal services	4.1	18.8	32.8	30.0	14.2			
Plant/machine op; labourer	5.9	20.2	30.7	32.7	10.5			
Domestic duties; other	4.7	16.8	35.4	31.8	11.3			
Unemployed	0.0	26.9	15.4	53.8	3.8			
Total	4.9	17.5	32.9	32.7	12.0			
Maternal occupation	**177**	**627**	**1,189**	**1,178**	**432**	72.523	20	<0.001
Manager, admin; professional	2.2	14.8	31.1	40.1	11.8			
Paraprofessional; tradesperson	4.0	20.0	41.3	26.0	8.7			
Clerk; sales, personal services	6.1	12.0	29.8	34.6	17.6			
Plant/machine op; labourer	5.3	16.3	35.8	30.0	12.6			
Domestic duties; other	5.1	18.9	32.3	32.5	11.2			
Unemployed	6.6	6.6	57.9	15.8	13.2			
Total	4.9	17.4	33.0	32.7	12.0			

7.2 Childhood environment and other explanatory factors

The oral health literature reporting life course associations is sparse. If childhood family circumstance has a bearing on oral health in adult life, it is useful in developing explanatory models to determine whether childhood conditions are also associated with factors thought to be explanatory in adulthood of variation in oral health status. Consequently, the relationship between childhood factors and dental behaviour and psychosocial characteristics in adulthood were examined.

7.2.1 Dental behaviour

First tested was the association between parental cohabitation and dental behaviour. Mean subscale scores for dental visiting and dental self-care were the dependent variables.

As presented in Table 7.10, respondents whose parents lived together reported significantly higher dental visiting scores (2.54) than did those whose lived separately (2.37). Differences in dental self-care based on parental cohabitation were not significant. Adults who were reared in a positive and supportive style reported better dental visiting scores (2.55) than did those reared in a negative environment (2.40). Although adults reared in a supportive environment also reported marginally higher self-care scores, differences were not significant. Unexpectedly, adults whose fathers were unemployed had best scores for dental visiting (2.64), and these were followed by fathers who had been managers, administrators or professionals (2.60). Lowest scores for dental visiting were reported by adults whose fathers had been plant or machine operators, drivers or labourers (2.36). Differences in dental self-care based on paternal occupation were not significant.

Highest dental visiting scores were reported by adults whose mothers had been involved in domestic duties or other unclassified work when the respondent was aged ten (2.57). Differences in dental self-care by maternal occupation were significant, with highest scores reported by adults whose mothers had been paraprofessional or tradespersons (2.47), followed by domestic duties (2.41).

Table 7.10: Dental behaviour by childhood factors (dentate persons, weighted data)

	Dental visiting				Dental self-care			
	Mean	SD	CI for mean		Mean	SD	CI for mean	
			Upper	Lower			Upper	Lower
Parental cohabitation								
Together	2.54	0.85	2.51	2.57	2.39	0.66	2.37	2.42
Separately	2.37	0.90	2.26	2.48	2.37	0.67	2.29	2.45
Total	2.52	0.85	2.50	2.55	2.39	0.66	2.37	2.41
Test of significance	F (1, 3519)= 9.849, p=0.002				F (1, 3519)= 0.353, p=0.553			
Parental rearing style								
Positive and supportive	2.55	0.85	2.52	2.58	2.40	0.66	2.38	2.42
Negative and unsupportive	2.40	0.88	2.30	2.50	2.37	0.65	2.29	2.44
Total	2.54	0.85	2.51	2.57	2.40	0.66	2.38	2.42
Test of significance	F (1, 3465)= 8.554, p=0.003				F (1, 3465)= 0.845, p=0.358			
Paternal occupation								
Manager, admin; professional	2.60	0.80	2.55	2.65	2.41	0.66	2.37	2.45
Paraprofessional; tradesperson	2.55	0.83	2.49	2.60	2.38	0.63	2.34	2.42
Clerk; sales, personal services	2.54	0.87	2.46	2.63	2.44	0.62	2.38	2.51
Plant/machine op; labourer	2.36	0.88	2.30	2.43	2.34	0.69	2.29	2.40
Domestic duties; other	2.51	0.93	2.43	2.60	2.40	0.69	2.34	2.46
Unemployed	2.64	0.83	2.30	2.99	2.50	0.55	2.27	2.73
Total	2.52	0.85	2.49	2.55	2.39	0.66	2.37	2.41
Test of significance	F (5, 3543)= 6.781, p<0.001				F (5, 3543)= 1.488, p=0.190			
Maternal occupation								
Manager, admin; professional	2.51	0.84	2.42	2.59	2.39	0.69	2.32	2.47
Paraprofessional; tradesperson	2.52	0.87	2.38	2.66	2.47	0.63	2.36	2.57
Clerk; sales, personal services	2.34	0.85	2.26	2.42	2.29	0.58	2.24	2.35
Plant/machine op; labourer	2.44	0.81	2.32	2.56	2.33	0.61	2.24	2.42
Domestic duties; other	2.57	0.85	2.53	2.60	2.41	0.67	2.38	2.44
Unemployed	2.43	0.91	2.21	2.64	2.33	0.58	2.19	2.47
Total	2.52	0.85	2.50	2.55	2.39	0.66	2.37	2.41
Test of significance	F (5, 3519)= 9.849, p=0.002				F (5, 3519)= 9.849, p=0.002			

7.2.2 Health self-efficacy

Factors were evaluated for their relationship with health self-efficacy beliefs in adulthood. Findings are presented in Table 7.11. Adults who had lived with both parents reported lower diffidence scores and higher assurance scores than other adults. These differences, however, failed to reach statistical significance. Differences in health self-efficacy were significant for parental rearing style. Adults who were reared in positive and supportive styles reported lower diffidence scores than adults raised in negative styles and also higher assurance scores. Differences in health self efficacy were also significant for parental occupation. The lowest diffidence scores were reported by adults whose fathers had been managers or professionals. Adults whose fathers had been plant or machine operators, drivers or labourers reported the highest diffidence scores. Adults whose fathers were engaged in domestic or unclassified work had the lowest assurance scores, followed by those whose fathers who had been plant or machine operators, drivers or labourers. Adults whose mothers were unemployed had the highest diffidence scores, and diffidence scores were considerably higher for these adults than for all other adults. The lowest diffidence scores were reported by adults whose mothers had been managers or professionals. Adults with unemployed mothers who were reported the lowest assurance scores.

Table 7.11: Health self-efficacy by childhood factors (dentate persons, weighted data)

	Diffidence				Assurance			
	Mean	SD	CI for mean		Mean	SD	CI for mean	
			Upper	Lower			Upper	Lower
Parental cohabitation								
Together	1.36	0.74	1.34	1.39	2.87	0.53	2.85	2.89
Separately	1.37	0.68	1.29	1.45	2.85	0.53	2.79	2.91
Total	1.36	0.74	1.34	1.39	2.87	0.53	2.85	2.88
Test of significance	F (1, 3529)= 0.020, p=0.887				F (1, 3529)= 0.280, p=0.597			
Parental rearing style								
Positive and supportive	1.35	0.72	1.32	1.37	2.88	0.53	2.86	2.90
Negative and unsupportive	1.50	0.84	1.40	1.59	2.77	0.62	2.70	2.84
Total	1.36	0.73	1.34	1.38	2.87	0.54	2.85	2.89
Test of significance	F (1, 3476)= 12.034, p=0.001				F (1, 3476)= 11.533, p=0.001			
Father's occupational group								
Manager, admin; professional	1.24	0.72	1.19	1.28	2.93	0.55	2.89	2.96
Paraprofessional; tradesperson	1.42	0.71	1.38	1.47	2.83	0.51	2.79	2.86
Clerk; sales, personal services	1.28	0.76	1.21	1.36	2.96	0.54	2.91	3.02
Plant/machine op; labourer	1.47	0.75	1.42	1.53	2.83	0.55	2.79	2.87
Domestic duties; other	1.40	0.72	1.33	1.47	2.81	0.52	2.76	2.86
Unemployed	1.26	0.67	0.99	1.54	2.87	0.48	2.68	3.07
Total	1.36	0.73	1.33	1.38	2.87	0.54	2.85	2.89
Test of significance	F (5, 3553)= 11.945, p<0.001				F (5, 3553)= 7.649, p<0.001			
Mother's occupational group								
Manager, admin; professional	1.21	0.64	1.15	1.28	2.86	0.56	2.80	2.92
Paraprofessional; tradesperson	1.45	0.83	1.32	1.58	2.80	0.58	2.71	2.89
Clerk; sales, personal services	1.25	0.75	1.17	1.32	2.96	0.57	2.90	3.01
Plant/machine op; labourer	1.32	0.80	1.20	1.43	2.90	0.61	2.82	2.99
Domestic duties; other	1.39	0.73	1.36	1.42	2.86	0.52	2.84	2.89
Unemployed	1.88	0.83	1.69	2.07	2.55	0.45	2.45	2.65
Total	1.36	0.74	1.34	1.39	2.87	0.54	2.85	2.89
Test of significance	F (5, 3575)= 13.420, p<0.001				F (5, 3575)= 8.149, p<0.001			

7.2.3 Dental satisfaction

The dental care satisfaction of adults whose parents cohabited was higher than that of those whose parents were not together, but not significantly higher (Table 7.12). Also reporting higher levels of dental satisfaction were adults whose rearing styles were positive (3.02) rather than negative (2.80).

Adults whose fathers had been unemployed were least satisfied with dental services (2.84), and those most satisfied had fathers employed as clerks, or in sales or personal services (3.12). Maternal occupation in domestic duties was associated with highest dental satisfaction (3.03) while maternal unemployment was associated with least satisfaction with dental care (2.72).

Table 7.12: Dental satisfaction by childhood environment factors (dentate persons, weighted data)

	Dental satisfaction			
	Mean	SD	CI for mean	
			Upper	Lower
Parental cohabitation				
Together	3.00	0.78	2.97	3.03
Separately	2.94	0.84	2.83	3.04
Total	2.99	0.78	2.97	3.02
Test of significance	F (1, 3524)= 1.696, p=0.193			
Parental rearing style				
Positive and supportive	3.02	0.76	2.99	3.05
Negative and unsupportive	2.80	0.84	2.70	2.89
Total	3.00	0.77	2.98	3.03
Test of significance	F (1, 3470)= 22.805, p<0.001			
Father's occupational group				
Manager, admin; professional	2.98	0.79	2.93	3.03
Paraprofessional; tradesperson	3.01	0.74	2.97	3.06
Clerk; sales, personal services	3.12	0.69	3.05	3.19
Plant/machine op; labourer	2.90	0.86	2.84	2.97
Domestic duties; other	3.04	0.74	2.97	3.11
Unemployed	2.84	0.87	2.47	3.21
Total	3.00	0.78	2.97	3.02
Test of significance	F (5, 3548)= 4.543, p<0.001			
Mother's occupational group				
Manager, admin; professional	2.89	0.73	2.81	2.97
Paraprofessional; tradesperson	2.98	0.84	2.84	3.11
Clerk; sales, personal services	2.97	0.76	2.89	3.04
Plant/machine op; labourer	2.94	0.84	2.82	3.06
Domestic duties; other	3.03	0.77	3.00	3.06
Unemployed	2.72	0.84	2.53	2.92
Total	3.00	0.78	2.97	3.02
Test of significance	F (1, 3575)= 4.565, p<0.001			

7.2.4 Personal control

Perceptions of personal control did not differ significantly according to whether or not adults lived with one or both natural parents at the age of ten. However, adults who perceived that their rearing had been unsupportive expressed significantly less control, as indicated by their constraint scores (1.48) which were higher than those for adults with supportive rearing (1.29). Differences in mastery beliefs based on rearing style were not significant. An association was observed between parental occupation and personal control beliefs. Adults whose fathers had been a manager or professional reported less constraint (1.21) and greater mastery (3.06) than adults whose fathers had had other occupations. However, it is important to acknowledge that although statistically significant differences existed among the means, post-hoc tests to determine among which occupational groups the differences occurred were not conducted. Adults whose fathers were unemployed reported both greatest constraint (1.42) and least mastery (2.90). Adults whose maternal occupation had been in management or a profession reported lowest constraints (1.15), while adults whose mothers were unemployed reported greatest constraint (1.53) as well as lowest mastery scores (2.90).

Table 7.13: Personal control by childhood factors (dentate persons, weighted data)

	Constraint				Mastery			
	Mean	SD	CI for mean		Mean	SD	CI for mean	
			Upper	Lower			Upper	Lower
Parental cohabitation								
Together	1.31	0.68	1.28	1.33	2.97	0.59	2.95	2.99
Separately	1.34	0.66	1.26	1.42	3.04	0.56	2.97	3.10
Total	1.31	0.68	1.29	1.33	2.97	0.59	2.95	2.99
Test of significance	F (1, 3536)= 0.609, p=0.435				F (1, 3536)= 3.546, p=0.060			
Parental rearing style								
Positive and supportive	1.29	0.67	1.27	1.32	2.98	0.57	2.96	3.00
Negative and unsupportive	1.48	0.77	1.39	1.56	2.92	0.71	2.84	3.00
Total	1.31	0.68	1.29	1.33	2.98	0.59	2.96	3.00
Test of significance	F (1, 3484)= 20.363, p<0.001				F (1, 3484)= 3.401, p=0.065			
Father's occupational group								
Manager, admin; professional	1.21	0.64	1.17	1.25	3.06	0.55	3.02	3.09
Paraprofessional; tradesperson	1.33	0.65	1.29	1.38	2.97	0.58	2.93	3.00
Clerk; sales, personal services	1.27	0.71	1.20	1.34	2.93	0.70	2.86	3.00
Plant/machine op; labourer	1.37	0.72	1.32	1.43	2.93	0.60	2.88	2.97
Domestic duties; other	1.41	0.69	1.34	1.47	2.91	0.58	2.86	2.97
Unemployed	1.42	0.64	1.15	1.68	2.92	0.35	2.77	3.06
Total	1.31	0.67	1.29	1.33	2.97	0.59	2.96	2.99
Test of significance	F (5, 3561)= 8.175, p<0.001				F (5, 3561)= 6.329, p<0.001			
Mother's occupational group								
Manager, admin; professional	1.15	0.61	1.08	1.21	3.09	0.55	3.03	3.14
Paraprofessional; tradesperson	1.36	0.73	1.25	1.48	2.95	0.56	2.86	3.04
Clerk; sales, personal services	1.19	0.66	1.12	1.25	3.10	0.57	3.05	3.16
Plant/machine op; labourer	1.20	0.71	1.10	1.30	2.91	0.78	2.79	3.02
Domestic duties; other	1.36	0.67	1.33	1.38	2.95	0.58	2.92	2.97
Unemployed	1.53	0.62	1.39	1.68	2.90	0.47	2.80	3.01
Total	1.31	0.68	1.29	1.33	2.98	0.59	2.96	2.99
Test of significance	F (5, 3582)= 11.872, p<0.001				F (5, 3582)= 8.213, p<0.001			

7.2.5 Psychological stress

Adults whose parents cohabited reported less distress and better coping than adults whose parents were not together, although differences in distress scores were not significant (Table 7.14). Adults who perceived their rearing to be negative and unsupportive were disadvantaged with respect to distress and coping, reporting significantly higher distress and poorer coping than adults who were reared in a positive and supportive style. While differences in distress scores according to paternal occupation were not significant, coping scores were positively associated with paternal occupation, with highest coping reported by adults whose father had been a manager or professional (2.73) and lowest coping reported by those whose fathers had been unemployed (2.44). Adults with lowest distress scores reported that their mother's occupation had been home duties when they were aged ten (1.77,) while adults whose mother had been a plant or machine operator, driver or labourer reported highest distress (1.93). Highest coping scores were reported by those whose mother had been a manager or professional (2.73), and poorest coping was reported by adults whose mothers had been unemployed (2.33).

Table 7.14: Stress by childhood factors (dentate persons, weighted data)

	Distress				Coping			
	Mean	SD	CI for mean		Mean	SD	CI for mean	
			Upper	Lower			Upper	Lower
Parental cohabitation								
Together	1.80	0.59	1.78	1.82	2.66	0.56	2.64	2.68
Separately	1.79	0.58	1.72	1.86	2.55	0.55	2.49	2.62
Total	1.80	0.59	1.78	1.82	2.65	0.56	2.63	2.67
Test of significance	F (1, 3497)= 0.059, p=0.808				F (1, 3497)= 8.509, p=0.004			
Parental rearing style								
Positive and supportive	1.77	0.58	1.75	1.79	2.67	0.55	2.65	2.69
Negative and unsupportive	2.00	0.63	1.93	2.07	2.52	0.63	2.44	2.59
Total	1.79	0.59	1.77	1.81	2.65	0.56	2.63	2.67
Test of significance	F (1, 3443)= 40.766, p<0.001				F (1, 3443)= 20.189, p<0.001			
Father's occupational group								
Manager, admin; professional	1.78	0.55	1.75	1.82	2.73	0.54	2.70	2.76
Paraprofessional; tradesperson	1.79	0.59	1.75	1.83	2.59	0.54	2.55	2.62
Clerk; sales, personal services	1.78	0.61	1.72	1.84	2.68	0.53	2.62	2.73
Plant/machine op; labourer	1.78	0.63	1.73	1.83	2.64	0.61	2.59	2.68
Domestic duties; other	1.85	0.60	1.80	1.91	2.64	0.57	2.58	2.69
Unemployed	1.77	0.61	1.52	2.02	2.44	0.55	2.21	2.67
Total	1.79	0.59	1.77	1.81	2.65	0.56	2.64	2.67
Test of significance	F (5, 3520)= 1.094, p=0.362				F (5, 3520)= 7.571, p<0.001			
Mother's occupational group								
Manager, admin; professional	1.80	0.55	1.74	1.86	2.73	0.51	2.68	2.79
Paraprofessional; tradesperson	1.83	0.56	1.74	1.92	2.62	0.60	2.53	2.72
Clerk; sales, personal services	1.83	0.57	1.78	1.89	2.66	0.54	2.60	2.71
Plant/machine op; labourer	1.93	0.67	1.83	2.02	2.54	0.69	2.44	2.64
Domestic duties; other	1.77	0.60	1.75	1.80	2.66	0.55	2.64	2.68
Unemployed	1.81	0.45	1.70	1.91	2.33	0.49	2.22	2.44
Total	1.80	0.59	1.78	1.81	2.65	0.56	2.63	2.67
Test of significance	F (5, 3543)= 2.980, p=0.011				F (5, 3543)= 8.392, p<0.001			

7.2.6 Social support

Adults who lived with both parents reported higher levels of social support, although differences were significance (Table 7.15). Adults who rated their rearing in childhood as negative and unsupportive were less able to access forms of social support in adulthood. Adults whose fathers had been unemployed reported lower social support than adults whose father had worked, and similarly, adults whose mothers were unemployed reported less social support than other adults.

7.2.7 Life satisfaction

There was no significant relationship between parental cohabitation and life satisfaction, and differences in life satisfaction according to paternal occupation were also non-significant. Adults who had been reared in a supportive environment experienced a considerably higher sense of life satisfaction (2.47), than adults whose care-giver was unsupportive (2.04). Highest life satisfaction scores by maternal occupation were reported by those whose mother had been a manager or professional (2.47) and least satisfaction was reported by those whose mother had been a plant or machine operator, driver or labourer (2.18).

Table 7.15: Social support and life satisfaction by childhood environment (dentate persons, weighted data)

	Social support				Life satisfaction			
	Mean	SD	CI for mean		Mean	SD	CI for mean	
			Upper	Lower			Upper	Lower
Parental cohabitation								
Together	3.45	0.63	3.43	3.47	2.42	0.77	2.39	2.45
Separately	3.39	0.71	3.31	3.48	2.43	0.82	2.33	2.52
Total	3.44	0.64	3.42	3.46	2.42	0.77	2.39	2.45
Test of significance	F (1, 3527)= 1.996, p=0.158				F (1, 3543)= 0.024, p=0.877			
Parental rearing style								
Positive and supportive	3.47	0.59	3.45	3.49	2.47	0.75	2.44	2.49
Negative and unsupportive	3.20	0.93	3.09	3.30	2.04	0.92	1.94	2.14
Total	3.45	0.63	3.43	3.47	2.43	0.77	2.41	2.46
Test of significance	F (1, 3473)= 52.260, p<0.001				F (1, 3490)= 87.060, p<0.001			
Father's occupational group								
Manager, admin; professional	3.46	0.61	3.42	3.49	2.43	0.75	2.39	2.48
Paraprofessional; tradesperson	3.53	0.57	3.49	3.56	2.41	0.78	2.36	2.47
Clerk; sales, personal services	3.42	0.68	3.35	3.48	2.43	0.80	2.35	2.51
Plant/machine op; labourer	3.37	0.67	3.32	3.42	2.39	0.82	2.33	2.45
Domestic duties; other	3.40	0.66	3.34	3.46	2.42	0.72	2.36	2.49
Unemployed	3.30	0.70	3.01	3.59	2.39	0.83	2.05	2.73
Total	3.45	0.63	3.43	3.47	2.42	0.78	2.39	2.44
Test of significance	F (5, 3550)= 5.895, p<0.001				F (5, 3567)= 0.337, p=0.891			
Mother's occupational group								
Manager, admin; professional	3.55	0.49	3.50	3.61	2.47	0.75	2.39	2.55
Paraprofessional; tradesperson	3.42	0.56	3.34	3.51	2.36	0.71	2.25	2.48
Clerk; sales, personal services	3.36	0.67	3.29	3.42	2.45	0.83	2.37	2.54
Plant/machine op; labourer	3.30	0.72	3.20	3.40	2.18	0.91	2.05	2.31
Domestic duties; other	3.46	0.64	3.43	3.48	2.42	0.76	2.39	2.45
Unemployed	3.27	0.82	3.08	3.46	2.41	0.62	2.27	2.56
Total	3.44	0.64	3.42	3.46	2.42	0.77	2.39	2.44
Test of significance	F (1, 3572)= 6.963, p<0.001				F (1, 3590)= 4.147, p=0.001			

Table 7.16: Social mobility: paternal occupation and current occupation (dentate persons, weighted data)

	Current occupational group		
	Manager, Administrator, Professional	Paraprofessional, tradesperson, clerk, sales person, personal service worker	Plant/machine operator, driver, labourer or related
	Row percentages (n)		
Paternal occupational group			
Manager, administrator, professional	50.1 (375)	40.2 (301)	9.6 (72)
Paraprofessional, tradesperson, clerk, sales or personal service worker	37.6 (330)	54.4 (478)	8.0 (70)
Plant or machine operator, driver, labourer or related, domestic duties, unemployed	30.6 (213)	50.1 (348)	19.3 (134)
Total	39.6 (918)	48.6 (1,127)	11.9 (276)

Table 7.17: Decayed teeth by social mobility: paternal and current occupation (dentate persons, weighted data)

	Current occupational group		
	Manager, Administrator, Professional	Paraprofessional, tradesperson, clerk, sales person, personal service worker	Plant/machine operator Driver Labourer or related
	Decayed teeth mean (sd)		
Paternal occupational group			
Manager, administrator, professional	0.63 (1.28)	0.69 (1.15)	1.11 (1.36)
Paraprofessional, tradesperson, clerk, sales or personal service worker	0.73 (1.34)	0.64 (1.27)	0.64 (1.20)
Plant or machine operator, driver, labourer or related, domestic duties, unemployed	0.56 (1.07)	0.96 (1.62)	1.67 (2.07)
Total	0.65 (1.26)	0.75 (1.37)	1.24 (1.74)
Test of significance	F(2,800)=1.396, p=0.248	F(2,939)=5.255, p=0.005	F(2,229)=6.608, p=0.002

Table 7.18: Missing teeth by social mobility: paternal and current occupation (dentate persons, weighted data)

	Current occupational group		
	Manager, administrator, professional	Paraprofessional, tradesperson, clerk, sales person, personal service worker	Plant/machine operator Driver Labourer or related
	Missing teeth mean (sd)		
Paternal occupational group			
Manager, administrator, professional	1.28 (3.41)	1.26 (2.76)	2.55 (5.40)
Paraprofessional, tradesperson, clerk, sales or personal service worker	2.22 (4.57)	2.17 (4.35)	3.46 (6.14)
Plant or machine operator, driver, labourer or related, domestic duties, unemployed	2.67 (5.03)	2.66 (4.94)	3.09 (5.73)
Total	1.93 (4.29)	2.08 (4.23)	3.04 (5.75)
	F(2,913)=16.241, p<0.001	F(2,1109)=15.122, p<0.001	F(2,275)=1.341, p=0.263

Table 7.19: Social impact by social mobility: paternal and current occupation (dentate persons, weighted data)

	Current occupational group		
	Manager, administrator, professional	Paraprofessional, tradesperson, clerk, sales person, personal service worker	Plant/machine operator, driver, labourer or related
	Social impact mean (sd)		
Paternal occupational group			
Manager, administrator, professional	0.42 (0.49)	0.58 (0.48)	0.65 (0.74)
Paraprofessional, tradesperson, clerk, sales or personal service worker	0.54 (0.47)	0.57 (0.54)	0.47 (0.60)
Plant or machine operator, driver, labourer or related, domestic duties, unemployed	0.45 (0.49)	0.57 (0.54)	0.57 (0.50)
Total	0.47 (0.48)	0.58 (0.53)	0.57 (0.60)
	F(2,916)=5.130, p=0.006	F(2,1154)=0.150, p=0.861	F(2,281)=6.608, p=0.002

Table 7.20: Oral symptoms by social mobility: paternal and current occupation (dentate persons, weighted data)

	Current occupational group		
	Manager, administrator, professional	Paraprofessional, tradesperson, clerk, sales person, personal service worker	Plant/machine operator, driver, labourer or related
	Oral symptom experience mean (sd)		
Paternal occupational group			
Manager, administrator, professional	1.08 (0.89)	1.08 (1.02)	0.77 (0.86)
Paraprofessional, tradesperson, clerk, sales or personal service worker	1.13 (1.06)	1.08 (1.05)	1.06 (0.87)
Plant or machine operator, driver, labourer or related, domestic duties, unemployed	1.32 (1.12)	1.16 (0.93)	1.54 (1.03)
Total	1.16 (1.01)	1.11 (1.01)	1.22 (1.00)
	F(2,929)=2.973, p=0.052	F(2,1159)=0.245, p=0.783	F(2,283)=14.148, p<0.001

Table 7.21 Self-rated oral health by social mobility: paternal and current occupation (dentate persons, weighted data)

	Current occupational group		
	Manager, administrator, professional	Paraprofessional, tradesperson, clerk, sales person, personal service worker	Plant/machine operator, driver, labourer or related
	Self-rated oral health as average or poorer (%)		
Paternal occupational group			
Manager, administrator, professional	18.6	17.7	25.8
Paraprofessional, tradesperson, clerk, sales or personal service worker	22.9	23.4	22.9
Plant or machine operator, driver, labourer or related, domestic duties, unemployed	19.1	21.8	29.4
Total	20.2	21.0	26.0

7.3 Summary of bivariate associations

A summary of the associations between childhood environment factors and oral health outcomes is presented in Table 7.22.

People whose parents did not cohabit when they were aged ten experienced poorer oral health in adulthood. They experienced significantly more decayed and missing teeth, greater social impact and a wider range of oral symptoms. A higher proportion also rated their oral health poorly, although these differences failed to reach statistical significance.

The style of childhood rearing was associated with adult oral health. People who perceived their rearing as negative and unsupportive experienced significantly greater social impact and a wider range of oral symptoms, and a greater proportion rated their oral health poorly. Differences in decayed and missing teeth were not significant.

There were significant differences in oral health outcome across parental occupation groups. Paternal occupation as manager, administrator or professional was associated with least missing teeth, least social impact, fewest symptoms and the smallest proportion of persons with poor self-rated oral health. Adults with the worst oral health outcomes reported paternal occupation as either plant/machine operator driver labourer, or domestic duties or unemployed.

Maternal occupation as manager, administrator or professional was associated with least missing teeth, least social impact and the smallest proportion of persons with poor self-rated oral health. Compared with this maternal occupation group, adults whose mothers had been unemployed reported an almost threefold greater number of decayed teeth. Adults with worst oral health outcomes reported maternal occupation as either plant/machine operator, driver labourer, domestic duties or unemployed.

Table 7.22: Summary of bivariate associations between demographic characteristics and oral health

	Mean	SD	Mean	SD	Mean	SD	Mean	SD	% rating oral health average or poorer
	Decayed ‡		Missing *		Social impact *		Symptoms †		Self-rated ns
Parental cohabitation									
Together	0.78	1.48	3.30	5.89	0.53	0.54	1.08	1.00	22.2
Separately	1.23	1.79	4.09	7.06	0.59	0.56	1.25	1.04	26.2
Total	0.81	1.51	3.36	5.99	0.53	0.54	1.10	1.00	22.5
	Decayed ns		Missing ns		Social impact ‡		Symptoms †		Self-rated *
Parental rearing style									
Positive supportive	0.81	1.52	3.41	6.07	0.52	0.53	1.07	0.99	21.6
Negative unsupportive	0.73	1.30	3.29	5.65	0.66	0.63	1.23	1.04	27.0
Total	0.80	1.51	3.40	6.03	0.53	0.54	1.09	1.00	22.1
	Decayed ‡		Missing ‡		Social impact *		Symptoms ‡		Self-rated †
Father's Occupation									
Manager, admin; professional	0.65	1.26	1.87	4.34	0.49	0.51	1.00	0.93	18.5
Paraprofessional; tradesperson	0.68	1.38	4.11	6.43	0.55	0.54	1.09	1.02	24.2
Clerk; sales, personal Services	0.76	1.29	3.02	5.44	0.57	0.57	1.16	1.06	22.9
Plant/machine operator; labourer	1.05	1.76	4.03	6.57	0.56	0.58	1.25	1.06	26.2
Domestic duties; other	1.00	1.63	4.54	7.10	0.50	0.48	1.08	0.93	21.5
Unemployed	0.63	1.08	4.00	7.30	0.63	0.57	1.35	1.10	28.0
Total	0.79	1.46	3.35	5.99	0.53	0.54	1.10	1.00	22.4
	Decayed ‡		Missing ‡		Social impact ‡		Symptoms ‡		Self-rated †
Mother's Occupation									
Manager, admin; professional	0.71	1.26	1.10	3.93	0.46	0.58	1.03	1.01	17.3
Paraprofessional; tradesperson	0.81	1.42	2.63	5.10	0.54	0.50	1.18	1.00	24.3
Clerk; sales, personal Services	0.70	1.37	1.25	3.33	0.54	0.52	1.00	1.01	18.0
Plant/machine operator; labourer	0.76	1.19	1.59	3.60	0.69	0.75	1.47	1.05	21.6
Domestic duties; other	0.81	1.53	4.23	6.59	0.52	0.52	1.08	0.98	24.0
Unemployed	2.05	2.80	4.22	6.06	0.57	0.51	1.24	1.04	13.3
Total	0.81	1.51	3.38	6.02	0.53	0.54	1.10	1.00	22.4

ns p> 0.05 level (ANOVA or chi-square)
* p<0.05 (ANOVA or chi-square)
† p<0.01 (ANOVA or chi-square)
‡ p<0.001 (ANOVA or chi-square)

7.4 Multivariate analysis

Childhood environment characteristics were entered into a series of multivariate linear analyses. In hierarchical multiple linear regression, sociodemographic variables were entered in step 1 and childhood factors entered in step 2.

Decayed teeth

As presented in Table 7.23, the adjusted R^2 statistic indicated that the overall fit of the model was poor, with only 5.3% of the variance in decayed teeth explained. Sociodemographic factors accounted for 4.0% of the explained variance. As indicated by the beta coefficient of 0.117, the largest effect was for income in the $20,000-50,000 range (relative to income >$50,000). Other sociodemographic factors positively associated with decayed teeth were male sex, low occupational prestige and area disadvantage. Parental cohabitation and care-giver rearing style were not significantly associated with decayed teeth, having controlled for sociodemographic factors. Of the paternal occupational groups, being a manager, administrator or professional was selected as the reference group. Unexpectedly, parental occupation groups that were significant in the model were negatively associated with decayed teeth relative to the reference group. These were paternal occupations of paraprofessional or trade, and maternal occupations of paraprofessional or trade, domestic duties and unemployed.

Table 7.23: Multiple linear regression model: decayed teeth (dentate persons, weighted data)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1	0.048	0.040	0.048	5.719	15, 1699	<0.001
2	0.068	0.053	0.020	3.010	12, 1687	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	2.022	0.599		0.001
	Male	0.177	0.071	0.064	0.013
	Age in years	0.002	0.003	0.017	0.532
	Australian-born	0.085	0.091	0.023	0.351
	Speaks English at home	-0.179	0.134	-0.033	0.181
	Employed full-time (ref)				
	Employed part-time	0.060	0.089	0.018	0.497
	Retired	0.478	0.286	0.041	0.095
	Not employed	0.248	0.165	0.037	0.134
	Householders aged 5+	0.020	0.028	0.018	0.480
	ARIA score *	0.008	0.021	0.009	0.718
	Income <$20,000	0.244	0.156	0.040	0.119
	Income $20 to $50,000	0.333	0.075	0.117	<0.001
	Income >$50,000 (ref)				
	Up to secondary eduction	-0.052	0.096	-0.015	0.587
	Vocational education or other	0.046	0.081	0.016	0.574
	Tertiary education (ref)				
	Occupational prestige †	0.008	0.003	0.072	0.010
	IRSD Area Disadvantage ‡	-0.002	<0.001	-0.088	0.001
Step 2	Parents lived together	-0.104	0.135	-0.019	0.439
	Rearing positive and supportive	0.158	0.116	0.033	0.174
	Father manager, administrator; professional (ref)				
	Father paraprofessional; tradesperson	-0.257	0.089	-0.084	0.004
	Father clerk; sales, personal services	0.145	0.119	0.032	0.224
	Father plant/machine operator, driver; labourer	0.125	0.103	0.036	0.226
	Father domestic duties; other	0.046	0.121	0.011	0.702
	Father unemployed	-0.290	0.479	-0.015	0.545
	Mother manager, administrator; professional (ref)				
	Mother paraprofessional; tradesperson	-0.382	0.194	-0.054	0.049
	Mother clerk; sales, personal services	-0.296	0.139	-0.072	0.033
	Mother plant/machine operator; labourer	-0.198	0.183	-0.032	0.279
	Mother domestic duties; other	-0.302	0.114	-0.104	0.008
	Mother unemployed	-0.608	0.288	-0.054	0.035

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Missing teeth

As presented in Table 7.24, the overall model accounted for approximately a quarter of the variance in missing teeth (23.6%). However, childhood factors explained less than 1% of the variance in missing teeth after controlling for the effects of sociodemographic factors. Again, age had the greatest effect of all variables, as expressed with a beta coefficient of 0.48. Parental cohabitation, rearing style and maternal occupation were not significant in the model. However, having a father who had been a plant or machine operator or driver or labourer was positively related to missing teeth in adulthood. Having a unemployed father was also positively related to missing teeth, although only of borderline significance.

Table 7.24: Multiple linear regression model: missing teeth (dentate persons, weighted data)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1	0.241	0.235	0.241	41.106	1942	<0.001
2	0.247	0.236	0.006	1.200	1930	0.277

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	-0.754	1.644		0.646
	Male	0.326	0.192	0.036	0.090
	Age in years	0.174	0.008	0.480	<0.001
	Australian-born	0.618	0.247	0.054	0.012
	Speaks English at home	-0.595	0.353	-0.035	0.092
	Employed full-time (ref)				
	Employed part-time	0.130	0.242	0.012	0.591
	Retired	-0.323	0.694	-0.010	0.641
	Not employed	-0.140	0.471	-0.006	0.767
	Householders aged 5+	-0.206	0.076	-0.056	0.007
	ARIA score *	0.001	0.057	<0.001	0.985
	Income <$20,000	0.923	0.407	0.050	0.024
	Income $20 to $50,000	0.178	0.201	0.019	0.376
	Income >$50,000 (ref)				
	Up to secondary eduction	0.363	0.254	0.034	0.153
	Vocational education or other	0.137	0.220	0.015	0.533
	Tertiary education (ref)				
	Occupational prestige †	0.032	0.009	0.086	<0.001
	IRSD area disadvantage ‡	-0.005	0.001	-0.087	<0.001
Step 2	Parents lived together	-0.215	0.370	-0.012	0.561
	Rearing positive and supportive	0.261	0.310	0.017	0.399
	Father manager, administrator; professional (ref)				
	Father paraprofessional; tradesperson	0.226	0.240	0.023	0.348
	Father clerk; sales, personal services	0.514	0.322	0.036	0.111
	Father plant/machine operator, driver; labourer	0.725	0.279	0.064	0.010
	Father domestic duties; other	0.267	0.328	0.019	0.416
	Father unemployed	2.688	1.384	0.039	0.052
	Mother manager, administrator; professional (ref)				
	Mother paraprofessional; tradesperson	0.528	0.534	0.023	0.323
	Mother clerk; sales, personal services	-0.185	0.382	-0.014	0.628
	Mother plant/machine operator; labourer	-0.215	0.495	-0.011	0.665
	Mother domestic duties; other	-0.020	0.312	-0.002	0.949
	Mother unemployed	0.718	0.774	0.020	0.354

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Social impact

Sociodemographic and childhood factors explained 6.3% of the variance in social impact scores for all persons (Table 7.25). Age, speaking a LOTE at home, low income, low occupational prestige and area disadvantage were positively related to impact scores. Only one childhood factor was significantly associated with social impact after controlling for sociodemographic factors. Being raised in a positive and supportive manner was negatively associated with the social impact of oral conditions.

Table 7.25: Multiple linear regression model: social impact (dentate, weighted data, all persons)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1	0.061	0.054	0.061	8.563	15, 1982	<0.001
2	0.075	0.063	0.015	2.597	12, 1970	0.002

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	1.354	0.209		<0.001
	Male	-0.024	0.025	-0.023	0.328
	Age in years	0.004	0.001	0.084	0.001
	Australian-born	-0.036	0.031	-0.027	0.251
	Speaks English at home	-0.325	0.044	-0.168	<0.001
	Employed full-time (ref)				
	Employed part-time	0.040	0.031	0.032	0.194
	Retired	-0.157	0.089	-0.041	0.077
	Not employed	-0.161	0.057	-0.063	0.005
	Householders aged 5+	0.002	0.010	0.005	0.827
	ARIA score *	-0.001	0.007	-0.002	0.923
	Income <$20,000	0.130	0.052	0.061	0.012
	Income $20 to $50,000	0.018	0.025	0.017	0.474
	Income >$50,000 (ref)				
	Up to secondary eduction	-0.078	0.032	-0.063	0.016
	Vocational education or other	0.018	0.028	0.016	0.527
	Tertiary education (ref)				
	Occupational prestige †	0.004	0.001	0.082	0.001
	IRSD area disadvantage ‡	-0.001	<0.001	-0.094	<0.001
Step 2	Parents lived together	0.075	0.047	0.037	0.111
	Rearing positive and supportive	-0.143	0.040	-0.081	<0.001
	Father manager, administrator; professional (ref)				
	Father paraprofessional; tradesperson	-0.045	0.031	-0.039	0.142
	Father clerk; sales, personal services	0.027	0.041	0.016	0.513
	Father plant/machine operator, driver; labourer	-0.058	0.035	-0.044	0.102
	Father domestic duties; other	-0.035	0.041	-0.022	0.390
	Father unemployed	0.085	0.176	0.011	0.632
	Mother manager, administrator; professional (ref)				
	Mother paraprofessional; tradesperson	-0.039	0.068	-0.014	0.572
	Mother clerk; sales, personal services	0.054	0.049	0.034	0.274
	Mother plant/machine operator; labourer	0.033	0.064	0.014	0.605
	Mother domestic duties; other	-0.052	0.040	-0.047	0.193
	Mother unemployed	-0.108	0.094	-0.028	0.247

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Oral symptom experience

Childhood factors contributed slightly more to explaining variation in oral symptom experience than socioeconomic and demographic factors combined (Table 7.26). The model only poorly fitted the data though, accounting for 3.7% of the variance in symptom experience. Significant among childhood factors were two categories of paternal occupation, both of which were positively associated with oral symptoms, relative to the reference category. These categories were clerk, sales, personal services; and plant/machine operator, driver and labourer.

Table 7.26: Multiple linear regression model: oral symptom experience (dentate persons, weighted data)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1	0.024	0.017	0.024	3.291	2001	<0.001
2	0.050	0.037	0.026	4.572	1989	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	2.017	0.414		<0.001
	Male	-0.031	0.049	-0.015	0.524
	Age in years	-0.005	0.002	-0.066	0.010
	Australian-born	-0.157	0.062	-0.060	0.011
	Speaks English at home	-0.040	0.087	-0.010	0.650
	Employed full-time (ref)	0.059	0.061	0.024	0.330
	Employed part-time	0.044	0.174	0.006	0.801
	Retired	-0.032	0.114	-0.006	0.776
	Not employed	-0.019	0.019	-0.023	0.318
	Householders aged 5+	-0.040	0.014	-0.065	0.006
	ARIA score *	0.115	0.103	0.027	0.262
	Income <$20,000	0.033	0.050	0.016	0.510
	Income $20 to $50,000				
	Income >$50,000 (ref)	-0.286	0.064	-0.117	<0.001
	Up to secondary eduction	0.022	0.055	0.010	0.691
	Vocational education or other				
	Tertiary education (ref)	-0.002	0.002	-0.027	0.285
	Occupational prestige †	-0.001	<0.001	-0.036	0.144
	IRSD area disadvantage ‡	0.141	0.093	0.035	0.128
Step 2	Parents lived together	-0.018	0.078	-0.005	0.819
	Rearing positive and supportive				
	Father manager, administrator; professional (ref)	0.050	0.061	0.022	0.412
	Father paraprofessional; tradesperson	0.082	0.082	0.025	0.317
	Father clerk; sales, personal services	0.414	0.070	0.160	<0.001
	Father plant/machine operator, driver; labourer	0.256	0.082	0.080	0.002
	Father domestic duties; other	-0.123	0.351	-0.008	0.726
	Father unemployed				
	Mother manager, administrator; professional (ref)	-0.108	0.135	-0.021	0.424
	Mother paraprofessional; tradesperson	-0.028	0.097	-0.009	0.771
	Mother clerk; sales, personal services	0.060	0.125	0.013	0.629
	Mother plant/machine operator; labourer	0.005	0.079	0.003	0.945
	Mother domestic duties; other	0.264	0.186	0.034	0.157
	Mother unemployed				

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Self-rated oral health

Odds ratios for average or poorer oral health were calculated using logistic regression (Table 7.27). Persons with low household income and those with least education showed significantly higher odds of rating their oral health poorly compared with more advantaged persons. Adults who spoke a language other than English at home had significantly higher odds than English-speaking adults, and part-time workers had greater odds than had full-time workers. In the presence of the demographic and socioeconomic factors, none of the childhood factors was significant in the model.

Table 7.27: Odds ratios and 95% C.I. for self-rating oral health as average or poorer (dentate only, weighted data)

	Odds ratio	95% C.I.		Sig.
Female	0.817	0.636	1.048	0.112
Male (ref)	1.000			
Age in years	1.028	1.017	1.039	<0.001
Overseas-born	1.115	0.830	1.498	0.470
Australian-born (ref)	1.000			
LOTE	2.044	1.374	3.040	<0.001
English (ref)	1.000			
Employment status				0.134
Not employed	0.865	0.476	1.572	0.634
Retired	0.352	0.145	0.853	0.021
Part-time	0.996	0.734	1.351	0.979
Full-time (ref)	1.000			
Householders aged 5+ years	1.110	1.011	1.219	0.028
ARIA score *	1.052	0.983	1.124	0.141
Household income				0.001
<$20,000	2.539	1.554	4.149	<0.001
$20,000-$50,000	1.143	0.889	1.471	0.298
>$50,000 (ref)	1.000			
Educational attainment				<0.001
Secondary or less	1.174	0.839	1.642	0.350
Vocational or other	2.150	1.628	2.839	<0.001
Tertiary (ref)	1.000			
Occupational prestige †	1.009	0.998	1.020	0.127
Concession card	0.991	0.627	1.568	0.971
No concession card (ref)	1.000			
Area disadvantage ‡	1.000	0.998	1.002	0.918
Parents separated	1.253	0.793	1.978	0.334
Parents lived together (ref)	1.000			
Rearing negative and unsupportive	1.201	0.830	1.739	0.332
Rearing positive and supportive (ref)	1.000			
Paternal occupation				0.602
Manager, administrator; professional	1.000			
Paraprofessional; tradesperson	0.887	0.652	1.206	0.444
Clerk; sales, personal services	0.851	0.558	1.300	0.457
Plant/machine operator; labourer	1.108	0.786	1.562	0.558
Domestic duties; other	0.786	0.522	1.186	0.252
Unemployed	0.844	0.158	4.513	0.842
Maternal occupation				0.751
Manager, administrator; professional	1.000			
Paraprofessional; tradesperson	1.052	0.501	2.212	0.893
Clerk; sales, personal services	1.103	0.664	1.834	0.705
Plant/machine operator; labourer	0.773	0.404	1.478	0.437
Domestic duties; other	1.096	0.727	1.654	0.661
Unemployed	0.675	0.240	1.898	0.456
Constant	0.029			<0.001
Nagelkerke R square	0.097			

Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

7.5 References to Chapter 7

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[2] Australian Bureau of Statistics. Children, Australia: A Social Report. Catalogue Number 4119.0, February 1999.

[3] Maccoby EE, Martin JA. Socialization in the context of the family: Parent-child interaction. In Mussen PH (Ed.) and Hetherington EM. Handbook Of Child Psychology: Vol. 4. Socialization, Personality, and Social Development (4th ed., pp. 1-101). New York: Wiley. 1983.

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8. Work Environment

Chapter 8 addresses key work environment characteristics and examines their relationships with oral health. These include hours worked, job security and skill obsolescence. In addition, three psychosocial scales measure workplace autonomy (decision-making authority, personal freedom, skill discretion, job strain), social support, and dual-role conflict at the work/home interface. In addressing the workplace, the focus shifts from being on the individual exclusively to incorporate contextual aspects of the environment in which individuals interact.

The objective of this chapter is to determine whether aspects of the workplace social context are associated with oral health independently of individual-level factors. It is hypothesised that greater autonomy, less stress and greater social support in the workplace are each associated with better oral health.

Omitted from these analyses are the 13.9% retirees (n=511), the 14.9% not employed (n=549) and 6.6% who did not report an employment status (n=241). As only 175 persons were concession cardholders in the reduced sample, this socioeconomic indicator was not examined.

In 1999 at the time of this study, ABS estimates of labour force participation rates in Australia were 72.8% for males and 53.9% for females, and the standardised total labour force participation rate was 63.8 %. Part-time workers comprised 26.0% of the total employed.[1] In terms of overall participation, this sample was similar to ABS national estimates, with 64.6% in paid work and part-time workers comprising 28.1%.

8.1 Hours worked

A notable characteristic of the Australian workforce is the length of working hours. According to monthly ABS Labour Force Surveys, Australia has the second longest working hours among OECD member nations. More than a quarter of the workforce work more than 50 hours per week and more than one fifth work unpaid overtime.[2] In a recent written submission to the Australian Industrial Relations Commission, the Australian Council of Trade Unions stated, 'Modern market economies have been characterised since the industrial revolution by a reduction in working time. Australia, in stark contract, is one of only a handful of countries whose working time is increasing. Australia is also the only country whose extended hours of work is being driven by a growing phenomenon of unpaid overtime.'[3]

Table 8.1 presents frequency statistics for those in the workforce according to employment status and hours worked. Of those, 72% worked full-time, and 43% (of the valid sample) worked more than 40 hours weekly.

Table 8.1: Response to employment status and hours worked (dentate persons, weighted data)

	Count	%	Valid %		Count	%	Valid %
Employment status				**Hours worked** [(a)]			
Full-time	1708	71.9	-	Up to 20 hours	314	13.2	14.7
Part-time	668	28.1	-	21-30 hours	240	10.1	11.3
Total	2,376	100.0	-	31-40 hours	664	27.9	31.2
				Over 40 hours	911	38.3	42.8
				Missing	247	10.4	100.0
				Total	2,376	100.0	

(a) How many hours per week do you spend on work related to your paid employment?

Table 8.2 describes the distribution of hours worked according to socioeconomic and demographic factors. Overall, higher socioeconomic position was associated with longer working hours. A lower proportion of adults with secondary education, compared to adults with further education, reported working longer than 40 hours. More than half of those in the highest household income category (51.3%) worked in excess of 40 hours, as did 70.9% of managers and administrators. Among occupational groups, a smaller proportion of clerks worked over 40 hours (18.2%), followed by sales and personal service workers (20.6%). These occupational categories dominated the less than 21 hours category. A positive relationship in hours worked by occupational prestige was observed, with proportions working less than 21 hours increasing from 3.8% in the high prestige quintile through to 28.0% with low prestige scores. An inverse trend in hours worked by area disadvantage was also observed.

Numbers of hours worked varied according to demographic characteristics. Females dominated the two under 31 hours categories, and males dominated the 41+ hours group. There was no difference in the proportion of males and females working 31-40 hours. Working hours increased from those in early adulthood to a peak reported by the 50-59 year old group, before declining abruptly. A higher proportion of respondents living in larger households reported working fewer hours. Differences based on country of birth and language spoken at home were not statistically significant.

Table 8.2: Hours worked by socioeconomic and demographic factors (dentate persons, weighted data)

	Weekly hours worked [a]			
	<21	21-30	31-40	>40
	Row percentages			
Household income n	**290**	**228**	**638**	**872**
<$12,000	52.2	21.7	8.7	17.4
$12 - $20,000	43.2	19.8	25.9	11.1
$20-30,000	13.3	18.5	30.6	37.6
$30-40,000	14.7	11.5	42.3	31.5
$40-50,000	19.5	11.1	32.8	36.5
>$50,000	10.1	9.3	29.3	51.3
Total	14.3	11.2	31.5	43.0
Pearson's Chi-square = 181.808 (df=15; p<0.001)				
Educational attainment	**313**	**239**	**663**	**907**
Secondary or less	12.9	12.0	39.4	35.7
Vocational or other	15.4	12.3	29.2	43.1
Tertiary	15.2	9.9	28.6	46.3
Total	14.8	11.3	31.2	42.7
Pearson's Chi-square = 25.545 (df=6; p<0.001)				
Occupational group [b]	**297**	**235**	**650**	**877**
Manager/administrator	6.2	4.6	18.3	70.9
Professional	11.4	8.0	27.3	53.3
Paraprofessional	5.4	8.9	50.6	35.1
Tradesperson	3.6	8.8	35.2	52.4
Clerk	24.8	20.5	36.5	18.2
Sales/Personal services	32.4	23.1	23.8	20.6
Plant/machine op; Driver	10.9	4.5	39.1	45.5
Labourers/related	17.7	8.2	45.6	28.6
Total	14.4	11.4	31.6	42.6
Pearson's Chi-square = 440.503 (df=21; p<0.001)				
Occupational prestige [c] n	**314**	**237**	**661**	**909**
Low	28.0	14.1	30.0	27.8
Low-moderate	17.2	19.3	33.7	29.8
Moderate	14.2	11.2	39.3	35.3
Moderate-high	12.5	8.1	29.6	49.8
High	3.8	4.7	24.4	67.1
Total	14.8	11.2	31.2	42.9
Pearson's Chi-square = 259.750 (df=12; p<0.001)				
Area disadvantage [d] n	**309**	**237**	**657**	**890**
Quintile 1 (highest)	19.0	9.5	36.6	34.9
Quintile 2	10.8	9.1	36.6	43.6
Quintile 3	16.6	12.4	33.8	37.3
Quintile 4	11.8	11.3	29.3	47.8
Quintile 5	14.8	12.7	25.3	47.2
Total	14.8	11.3	31.4	42.5
Pearson's Chi-square = 42.198 (df=12; p<0.001)				

	Weekly hours worked [a]			
	<21	21-30	31-40	>40
	Row percentages			
Sex n	**314**	**240**	**664**	**911**
Male	5.0	7.5	31.0	56.6
Female	27.6	16.3	31.5	24.6
Total	14.7	11.3	31.2	42.8
Pearson's Chi-square = 342.270 (df=3; p<0.001)				
Age group n	**313**	**240**	**665**	**911**
18-29 years	20.5	10.2	30.9	38.4
30-39 years	13.0	8.2	33.3	45.5
40-49 years	12.3	16.6	30.1	41.0
50-59 years	8.5	9.4	29.1	53.0
60-69 years	24.6	11.6	36.2	27.5
70+ years	62.5	12.5	25.0	0.0
Total	14.7	11.3	31.2	42.8
Pearson's Chi-square = 81.196 (df=15; p<0.001)				
Country of birth n	**314**	**239**	**656**	**895**
Australia	14.7	11.2	31.1	43.0
Overseas	16.0	12.1	31.5	40.3
Total	14.9	11.4	31.2	42.5
Pearson's Chi-square = 1.211 (df=3; p=0.750)				
Language at home n	**314**	**240**	**664**	**911**
Other than English	11.6	6.9	31.7	49.7
English	15.1	11.7	31.1	42.1
Total	14.7	11.3	31.2	42.8
Pearson's Chi-square = 7.271 (df=3; p=0.064)				
Employment n	**314**	**240**	**664**	**911**
Full-time	3.3	5.3	36.9	54.5
Part-time	50.8	30.0	13.2	6.0
Total	14.7	11.3	31.2	42.8
Pearson's Chi-square = 1090.351 (df=3; p<0.001)				
Householders aged 5 + n	**314**	**238**	**664**	**911**
One person	9.5	4.7	39.8	46.0
Two persons	9.3	10.5	34.1	46.2
Three-four persons	18.2	11.6	30.6	39.6
More than four persons	23.5	17.8	16.5	42.2
Total	14.8	11.2	31.2	42.8
Pearson's Chi-square = 83.910 (df=9; p<0.001)				
ARIA category [e] n	**397**	**286**	**745**	**981**
Highly accessible	16.0	11.8	31.5	40.7
Accessible	22.1	12.9	29.2	35.8
Moderately accessible	14.5	7.2	21.7	56.6
Remote	8.3	20.8	16.7	54.2
Very remote	4.5	13.6	50.0	31.8
Total	16.5	11.9	30.9	40.7
Pearson's Chi-square = 22.258 (df=12; p=0.007)				

(a) How many hours per week do you spend on work related to your paid employment?
(b) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(c) Daniel Prestige Scale
(d) Index of Relative Socio-Economic Disadvantage - Australian Bureau of Statistics' Socio-Economic Indexes for Areas
(e) Accessibility/Remoteness Index of Australia

8.2 Job security and skill obsolescence

As presented in Table 8.3, 44.1% answered affirmatively to the item examining expectations of job security for the next five years. A similar proportion (42.3%) answered negatively to the item examining perceived risk of skill obsolescence. A cross-tabulation of these items revealed that only 2.0 % of workers expected that their job would not be secure for the next five years, and that their job skills would be, or probably would be, obsolete within ten years (Table 8.4).

Table 8.3: Response to job security and skill obsolescence items (dentate persons, weighted data)

	Count	%	Valid %		Count	%	Valid %
Job security [(a)]				**Skill obsolescence** [(b)]			
Yes	939	39.5	44.1	Yes	106	4.5	5.0
Probably	830	34.9	39.0	Probably	284	12.0	13.3
Unlikely	222	9.4	10.4	Unlikely	840	35.3	39.4
No	139	5.8	6.5	No	902	37.9	42.3
Missing	246	10.4	100.0	Missing	244	10.3	100.0
Total	2,376	100.0		Total	2,376	100.0	

(a) Do you expect that your job will be secure for the next five years?
(b) Do you expect that your present job skills will be obsolete within ten years?

Table 8.4: Cross-tabulation of job security and skill obsolescence items (dentate persons, weighted data)

		Perceived skill obsolescence (Percent of total)				Total
		Yes	Probably	Unlikely	No	
Job security (percent of total)	Yes	1.1	3.2	14.8	24.7	43.8
	Probably	2.1	6.4	19.7	11.0	39.2
	Unlikely	1.1	2.5	3.5	3.4	10.5
	No	0.7	1.3	1.5	3.1	6.6
	Total	5.0	13.3	39.5	42.2	100.0

Table 8.5 presents associations between social position and job security and skill obsolescence. Workers were less likely to report job insecurity and a threat of skill obsolescence if their household income was high and if they held post-secondary qualifications. Over a third (34.8%) in the lowest income category perceived a threat of skill obsolescence, compared with half this proportion (17.1%) in the highest income group. Paraprofessionals expressed highest job security of all occupational groups, followed by professionals and managers and administrators. Plant operators and drivers, and labourers and related workers expressed least confidence in their job security. Managers/administrators and professionals reported the lowest threat of skill obsolescence (possibly due to opportunities to upgrade knowledge). Similar trends in job security and skill obsolescence were observed across quintiles of prestige and area disadvantage scores. Workers with greater occupational prestige and those living in less disadvantaged areas were also advantaged in terms of these characteristics.

Table 8.5: Job security and skill obsolescence by socioeconomic indicators (dentate persons, weighted data)

		Job security [a]				Skill obsolescence [b]			
		Row percentages				Row percentages			
		Yes	Probably	Unlikely	No	Yes	Probably	Unlikely	No
Household income	n	**903**	**795**	**210**	**127**	**100**	**260**	**820**	**851**
<$12,000		25.0	25.0	12.5	37.5	8.7	26.1	34.8	30.4
$12 - $20,000		32.9	42.7	19.5	4.9	9.5	16.7	33.3	40.5
$20-30,000		33.1	39.5	15.7	11.6	5.7	16.7	34.5	43.1
$30-40,000		46.0	34.0	9.8	10.2	5.0	7.9	46.4	40.7
$40-50,000		44.9	41.5	8.3	5.2	4.6	13.8	42.8	38.8
>$50,000		46.7	39.6	9.5	4.2	4.5	12.6	39.7	43.2
Total		44.4	39.1	10.3	6.2	4.9	12.8	40.4	41.9
Pearson's Chi-square = 89.817 (df=15; p<0.001)						Chi-square = 24.930 (df=15; p=0.051)			
Educational attainment	n	**937**	**828**	**220**	**139**	**106**	**282**	**840**	**898**
Secondary or less		44.6	43.2	6.2	6.0	3.8	17.3	40.4	38.5
Vocation or other		43.4	36.3	14.1	6.2	4.2	14.4	37.8	43.6
Tertiary		44.4	39.0	9.5	7.1	6.3	10.1	40.5	43.1
Total		44.1	39.0	10.4	6.5	5.0	13.3	39.5	42.2
Pearson's Chi-square = 23.324 (df=6; p<0.001)						Chi-square = 21.462 (df=6; p=0.002)			
Occupational group [d]	n	**905**	**814**	**217**	**128**	**101**	**278**	**818**	**864**
Manager/administrator		47.0	38.0	10.0	5.0	4.6	9.9	39.0	46.4
Professional		52.8	34.0	7.8	5.5	5.0	9.6	38.3	47.1
Paraprofessional		54.7	41.2	2.9	1.2	5.4	16.1	35.1	43.5
Tradesperson		41.8	36.7	15.9	5.6	5.3	17.3	30.5	46.9
Clerk		38.9	40.8	12.5	7.7	4.5	17.0	50.3	28.2
Sales/Personal services		32.5	49.3	11.8	6.4	5.3	12.5	40.9	41.3
Plant operator; Driver		35.8	38.5	14.7	11.0	2.8	16.5	43.1	37.6
Labourers/related		36.6	42.1	10.3	11.0	5.4	17.0	38.8	38.8
Total		43.8	39.4	10.5	6.2	4.9	13.5	39.7	41.9
Pearson's Chi-square = 81.652 (df=21; p<0.001)						Chi-square = 22.220 (df=21; p<0.001)			
Occupational prestige [e]	n	**935**	**827**	**223**	**138**	**107**	**282**	**839**	**896**
Low		35.3	41.5	14.0	9.3	7.7	12.7	42.5	37.1
Low-moderate		37.7	44.1	11.8	6.4	3.6	20.2	36.1	40.2
Moderate		39.5	41.5	11.9	7.2	4.9	15.2	42.3	37.6
Moderate-high		51.0	34.4	8.5	6.0	6.3	9.7	35.5	48.4
High		54.0	34.8	7.2	4.0	2.7	9.8	41.5	46.1
Total		44.0	39.0	10.5	6.5	5.0	13.3	39.5	42.2
Pearson's Chi-square = 58.259 (df=12; p<0.001)						Chi-square = 54.295 (df=12; p<0.001)			
Area disadvantage [f]	n	**922**	**817**	**219**	**135**	**106**	**277**	**831**	**883**
Quintile 1 (highest)		45.6	39.7	7.8	6.9	3.7	13.3	37.4	45.6
Quintile 2		39.8	41.2	9.9	9.2	3.8	15.9	34.9	45.3
Quintile 3		44.4	40.5	9.0	6.1	5.0	12.6	43.9	38.5
Quintile 4		49.3	32.0	11.8	7.0	4.5	15.8	36.1	43.6
Quintile 5		41.4	41.2	12.7	4.7	7.0	10.5	42.3	40.2
Total		44.1	39.0	10.5	6.5	5.1	13.2	39.6	42.1
Pearson's Chi-square = 24.475 (df=12; p=0.018)						Chi-square = 24.148 (df=12; p=0.019)			

(a) Do you expect that your job will be secure for the next five years?
(b) Do you expect that your present job skills will be obsolete within ten years?
(c) Australian Standard Classification of Occupation (ASCO) Major Groups (First Edition)
(d) Daniel Prestige Scale
(e) Index of Relative Socio-Economic Disadvantage - Australian Bureau of Statistics' Socio-Economic Indexes for Areas

Table 8.6 presents associations between job security and skill obsolescence and demographic characteristics. Differences based on sex and geographical location were not statistically significant. Lower perceptions of job security and higher perceived risk of skill obsolescence were reported by older age groups. Nearly half of those younger than 40 years were confident in their job security and approximately 44% of these adults perceived no risk of skill obsolescence within ten years.

Australian-born workers reported greater job security than workers born overseas, but differences in skill obsolescence were not significant. In addition, differences in perceived skill obsolescence between full- and part-time workers were not significant, but full-time workers reported higher levels of job security.

A high proportion of workers living in large households had secure jobs. In fact, 91.1% of those living with four of more persons reported that their job was probably or definitely secure. This group also reported less threat of skill obsolescence than workers living alone or in smaller households.

Table 8.6: Job security and skill obsolescence by demographic characteristics (dentate persons, weighted data)

		Job security [(a)]				Skill obsolescence [(b)]			
		Row percentages				Row percentages			
		Yes	Probably	Unlikely	No	Yes	Probably	Unlikely	No
Sex	n	940	829	223	139	106	285	840	902
Male		45.8	37.0	10.8	6.5	5.2	14.1	40.6	40.1
Female		41.9	41.5	10.1	6.6	4.7	12.4	37.8	45.1
Total		44.1	38.9	10.5	6.5	5.0	13.4	39.4	42.3
Pearson's Chi-square		χ^2 = 4.823 (df=3; p=0.185)				χ^2 = 5.611 (df=3; p=0.132)			
Age group	n	939	830	221	138	107	285	840	902
18-29 years		48.8	33.7	10.2	7.3	5.6	11.6	38.3	44.5
30-39 years		49.9	36.3	7.2	6.6	4.8	12.1	40.1	43.1
40-49 years		38.8	43.6	13.2	4.4	3.7	13.1	41.1	42.1
50-59 years		38.5	44.6	9.5	7.3	6.7	17.6	38.2	37.6
60-69 years		29.4	44.1	16.2	10.3	4.2	19.4	38.9	37.5
70+ years		12.5	25.0	50.0	12.5	11.1	22.2	0.0	66.7
Total		44.1	39.0	10.4	6.5	5.0	13.4	39.4	42.3
Pearson's Chi-square		χ^2 = 61.419 (df=15; p<0.001)				χ^2 = 22.424 (df=15; p=0.097)			
Country of birth	n	922	823	220	139	99	284	829	894
Australia		45.3	38.2	10.3	6.2	4.8	12.6	39.8	42.8
Overseas		37.1	43.0	11.3	8.5	4.2	17.6	37.3	40.9
Total		43.8	39.1	10.5	6.6	4.7	13.5	39.4	42.5
Pearson's Chi-square		χ^2 = 9.710 (df=3; p=0.021)				χ^2 = 6.813 (df=3; p=0.078)			
Language at home	n	939	829	223	139	107	285	839	902
Other than English		48.2	39.3	5.8	6.8	8.7	18.5	26.6	46.2
English		43.7	38.9	10.9	6.5	4.7	12.9	40.5	41.9
Total		44.1	38.9	10.5	6.5	5.0	13.4	39.3	42.3
Pearson's Chi-square		χ^2 = 5.272 (df=3; p=0.153)				χ^2 = 18.369 (df=3; p<0.001)			
Employment status	n	939	830	223	139	106	285	840	902
Full-time		47.3	37.9	9.1	5.7	4.7	13.8	39.9	41.6
Part-time		33.9	42.1	14.8	9.2	5.9	12.0	37.7	44.4
Total		44.1	38.9	10.5	6.5	5.0	13.4	39.4	42.3
Pearson's Chi-square		χ^2 = 36.945 (df=3; p<0.001)				χ^2 = 3.397 (df=3; p=0.334)			
Householders aged 5+	n	939	828	222	139	107	285	837	902
One person		42.4	39.0	10.0	8.6	7.1	12.7	49.5	30.7
Two persons		46.8	35.7	11.4	6.2	4.0	12.3	34.0	49.8
Three-four persons		43.4	38.5	11.0	7.1	5.4	15.5	39.9	39.2
More than four persons		40.2	50.9	5.6	3.4	5.2	9.0	44.6	41.2
Total		44.1	38.9	10.4	6.5	5.0	13.4	39.3	42.3
Pearson's Chi-square		χ^2 = 24.662 (df=9; p=0.003)				χ^2 = 43.071 (df=9; p<0.001)			
ARIA category [(c)]	n	1,017	919	257	216	141	322	916	1027
Highly accessible		41.8	38.5	10.9	8.8	6.1	12.9	38.5	42.6
Accessible		43.4	39.3	8.1	9.2	5.1	16.2	35.7	43.0
Moderately accessible		50.0	27.5	11.3	11.3	6.0	14.5	30.1	49.4
Remote		32.0	40.0	8.0	20.0	0.0	17.4	43.5	39.1
Very remote		52.4	28.6	19.0	0.0	0.0	19.0	52.4	28.6
Total		42.2	38.1	10.7	9.0	5.9	13.4	38.1	42.7
Pearson's Chi-square		χ^2 = 14.759(df=12; p=0.255)				χ^2 = 10.980 (df=12; p=0.531)			

(a) Do you expect that your job will be secure for the next five years?
(b) Do you expect that your present job skills will be obsolete within ten years?
(c) Accessibility/Remoteness Index of Australia

8.2.1 Hours, security, obsolescence and oral health

Hours worked, job security and skill obsolescence were examined for their relation with decayed and missing teeth (Table 8.7). Although workers faced with job insecurity and skill obsolescence reported higher mean scores for decayed teeth, differences failed to reach statistical significance. Similarly, workers threatened by job insecurity and skill obsolescence reported more missing teeth, but differences were not significant.

Table 8.7: Decayed and missing teeth by job characteristics (dentate persons, weighted data)

	Decayed teeth				Missing teeth			
	Mean	SD	95% CI for mean		Mean	SD	95% CI for mean	
			Lower	Upper			Lower	Upper
Weekly hours worked								
Up to 20 hours	0.83	1.43	0.66	1.00	2.12	5.03	1.55	2.68
21-30 hours	0.72	1.47	0.52	0.93	1.97	3.75	1.49	2.45
31-40 hours	0.69	1.33	0.58	0.80	2.06	4.26	1.73	2.39
More than 40 hours	0.84	1.52	0.73	0.94	2.17	4.50	1.87	2.47
Total	0.78	1.45	0.71	0.84	2.11	4.43	1.91	2.30
Test of significance	F(3,1799) = 1.364, p= 0.252				F(3,2068) = 0.155, p= 0.926			
Job security								
Yes	0.74	1.51	0.64	0.85	1.82	3.94	1.57	2.08
Probably	0.81	1.35	0.71	0.91	2.34	4.85	2.01	2.68
Unlikely	0.71	1.55	0.48	0.94	2.39	4.87	1.72	3.06
No	0.91	1.44	0.65	1.17	2.02	4.08	1.33	2.71
Total	0.78	1.45	0.71	0.84	2.10	4.42	1.90	2.29
Test of significance	F(3,1803) = 0.736, p= 0.531				F(3,2070) = 2.316, p= 0.074			
Perceived skill obsolescence								
Yes	1.08	1.54	0.74	1.42	2.92	4.59	1.99	3.84
Probably	0.73	1.35	0.54	0.91	2.15	4.02	1.67	2.63
Unlikely	0.76	1.32	0.66	0.85	2.11	4.73	1.79	2.43
No	0.72	1.40	0.62	0.81	1.97	4.23	1.69	2.25
Total	0.75	1.37	0.69	0.81	2.09	4.43	1.90	2.28
Test of significance	F(3,1800) = 1.785, p= 0.148				F(3,2071) = 1.357, p= 0.254			

These three work characteristics were examined for their relationship with the social impact of oral conditions and the oral symptoms experienced over the preceding 12 months.

Statistically significant differences emerged for each work characteristics on social impact. Mean social impact scores decreased as workers worked longer hours, experienced greater job security and perceived less threat from skill obsolescence.

However, differences in oral symptom experience were not significantly associated with these characteristics (Table 8.8).

Table 8.8: Social impact and oral symptom experience by job characteristics (dentate persons, weighted data)

	Social impact				Oral symptom experience			
	Mean	SD	95% CI for mean		Mean	SD	95% CI for mean	
			Lower	Upper			Lower	Upper
Weekly hours worked								
Up to 20 hours	0.59	0.57	0.52	0.65	1.15	1.12	1.03	1.28
21-30 hours	0.57	0.47	0.51	0.63	1.22	1.07	1.08	1.35
31-40 hours	0.50	0.51	0.46	0.54	1.13	1.01	1.05	1.20
More than 40 hours	0.51	0.51	0.48	0.54	1.14	0.99	1.08	1.21
Total	0.53	0.52	0.50	0.55	1.15	1.02	1.10	1.19
Test of significance	F(3,2097) = 2.912, p= 0.033				F(3,2124) = 0.471, p= 0.702			
Job security								
Yes	0.43	0.43	0.40	0.45	1.14	1.00	1.08	1.21
Probably	0.60	0.57	0.56	0.64	1.17	1.07	1.10	1.25
Unlikely	0.59	0.49	0.52	0.65	1.10	1.01	0.97	1.23
No	0.60	0.61	0.50	0.70	1.19	0.98	1.02	1.35
Total	0.52	0.51	0.50	0.54	1.15	1.02	1.11	1.20
Test of significance	F(3,2098) = 20.100, p< 0.001				F(3,2125) = 0.401, p= 0.752			
Perceived skill obsolescence								
Yes	0.73	0.67	0.60	0.85	1.11	0.86	0.95	1.28
Probably	0.63	0.55	0.56	0.69	1.31	1.02	1.19	1.43
Unlikely	0.55	0.54	0.51	0.59	1.15	1.08	1.07	1.22
No	0.45	0.45	0.42	0.48	1.12	0.98	1.06	1.19
Total	0.53	0.52	0.50	0.55	1.16	1.02	1.11	1.20
Test of significance	F(3,2108) = 15.830, p< 0.001				F(3,2128) = 2.519, p= 0.056			

Although differences in self-rated oral health based on hours worked were not significant, differences based on job security and skill obsolescence were (Table 8.9). A higher proportion of adults whose jobs were definitely *not* secure reported poor oral health (4.3%) than those whose jobs were secure (3.2%). Notably, a considerably higher proportion of workers whose job was *unlikely* to remain secure rated their oral health poorly (12.2), raising the possibility that *uncertainty* was an important risk factor for perceived oral health.

A smaller proportion of people who faced the threat of skill obsolescence rated their oral health favourably. While 27% and 33% of workers facing definite and probable skill obsolescence rated their oral health as average or poorer, 20% of those with no risk of skill obsolescence rated their oral health in these categories.

Table 8.9: Self-rated oral health according to job characteristics (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
	Very poor or poor	Average	Good	Very good	Excellent	Pearson's Chi-square		
	Row %	Row %	Row %	Row %	Row %	Value	df	Asymp. sig. (2-sided)
Weekly hours worked								
n	101	358	677	747	245	18.882	12	0.091
Up to 20 hours	4.5	19.5	28.4	35.5	12.1			
21-30 hours	7.1	13.8	38.9	31.8	8.4			
31-40 hours	4.8	16.0	34.0	33.7	11.5			
More than 40 hours	4.1	17.3	29.5	37.0	12.2			
Total	4.7	16.8	31.8	35.2	11.5			
Job security								
n	101	358	677	747	245	92.912	12	<0.001
Yes	3.2	15.3	28.5	39.4	13.5			
Probably	4.6	19.0	38.5	30.7	7.2			
Unlikely	12.2	14.4	27.5	29.3	16.7			
No	4.3	18.0	20.9	41.7	15.1			
Total	4.7	16.8	31.8	35.1	11.5			
Skill obsolescence								
n	100	363	669	752	245	85.571	12	<0.001
Yes	5.6	21.5	45.8	19.6	7.5			
Probably	7.0	26.0	21.8	40.0	5.3			
Unlikely	5.3	14.2	36.7	33.5	10.4			
No	3.3	16.3	27.9	37.4	15.0			
Total	4.7	17.1	31.4	35.3	11.5			

Summarising findings, although length of working hours was positively related to social position, variation in working hours was not associated with differences in oral health. However, uncertain job security and the risk of skill obsolescence were both associated with greater social impact scores and poorer self-rated oral health.

8.3 Psychosocial workplace environment

The psychosocial workplace environment is a social context that differentially supports worker wellbeing and health. Contributing prominently to the understanding of how workplace dynamics affect health has been Karasek and Theorell's Job Control-Demand Model.[4] Central to the model is the interaction between job demands and job control. According to the model, high job demand in combination with low job control places the worker under job strain that can adversely affect health. Johnson and Hall have since expanded the theoretical framework to include a third dimension of co-worker social support. This study measured and tested these constructs using the three sets of items constructed and refined in the annual Swedish Survey of Living Conditions, * cited by Johnson and Hall. Eleven items were used to measure workplace control (decision-making authority, task variety and personal freedom on the job). Five items measured social support at work, and a single global item measured psychological job demands.

Univariate distribution

The 11 workplace control items are referred to as the workplace autonomy scale. Table 8.10 presents summary statistics of this scale and the subscales extracted in factor analysis. Three response categories – rarely or not at all, sometimes, and often were coded 0-2. The response category 'rarely or not at all' is a minor amendment of the Swedish category labelled 'never'. The most frequently occurring (modal) value was 1.82 and the mean was 1.37, indicating a negatively skewed distribution. Skewness values were greatest for the personal freedom and skill discretion subscales, indicating that some respondents perceived little flexibility in their job for these characteristics. However, the majority of workers scored these factors more highly and almost one third of respondents reported maximum scores.

Table 8.10: Summary statistics for the workplace autonomy scale (dentate persons, weighted data)

	Workplace autonomy			
	Scale	Subscales		
		Decision-making authority	Personal freedom	Skill discretion
N	2,113	2,115	2,115	2,115
Missing	263	261	261	261
N items	11	5	3	3
Mean	1.37	1.30	1.41	1.44
Median	1.45	1.40	1.67	1.67
Mode	1.82	1.80	2.00	2.00
Std. deviation	0.43	0.55	0.57	0.54
Skewness	-0.51	-0.58	-0.76	-0.76
SE skewness	0.05	0.05	0.05	0.05
Kurtosis	-0.39	-0.63	-0.38	-0.27
SE kurtosis	0.11	0.11	0.11	0.11
Percent floor	0.38	2.41	3.30	2.18
Percent ceiling	6.41	15.03	31.00	31.80
Minimum	0.00	0.00	0.00	0.00
Maximum	2.00	2.00	2.00	2.00

* Vogel J. The Swedish annual Level of Living Survey: social indicators and social reporting as an official statistics program. Paper presented at the Tenth World Congress of Sociology Mexico City, August 16, 1982, p30.

As presented in Table 8.11, approximately 89% of workers completed valid responses to this scale with a maximum of one missed or invalid item. The greatest restriction reported by workers was the inability to work flexible hours. The item over which workers reported greatest autonomy was the ability to receive a phone call. More than two thirds of workers reported that their job had varied levels of skill and varied work procedures.

Table 8.11: Response to workplace autonomy scale items (dentate persons, weighted data)

	Response categories							
	Rarely or not at all		Sometimes		Often		Missing	
	N	Valid %	N	Valid %	N	Valid %	N	%
Able to influence planning of your work?	266	12.6	733	34.7	1114	52.7	264	11.1
Able to influence the pace you are required to work?	344	16.3	779	36.8	990	46.9	263	11.1
Able to influence how your time is used at work?	288	13.7	648	30.7	1173	55.6	267	11.2
Able to plan when you take your work breaks?	419	19.8	539	25.5	1157	54.7	262	11.0
Able to plan when you take your holidays?	343	16.3	552	26.2	1212	57.5	269	11.3
Able to work flexible working hours?	712	33.7	610	28.9	788	37.3	267	11.2
Free to receive phone call during working hours?	213	10.1	490	23.2	1411	66.7	262	11.0
Free to receive a private visitor at work?	428	20.2	717	33.9	969	45.8	263	11.1
Does your work have varied skill levels?	185	8.8	575	27.2	1352	64.0	264	11.1
Does your work have varied work procedures?	197	9.3	640	30.3	1277	60.4	263	11.1
Possibilities for ongoing education part of your work?	446	21.1	695	32.9	973	46.0	263	11.1

8.3.1 Factor analysis of the workplace autonomy scale items

Scale items were subjected to a principal components factor analysis, with varimax rotation and with listwise deletion for missing data to determine whether clusters of correlated items were meaningful. Three factors were extracted that together explained 60% of the variance in workplace autonomy scores (Table 8.12). Five items loaded onto factor 1, labelled 'decision-making authority' (α=0.78), and three items loaded onto both factors 2 and 3, labelled 'personal freedom' (α=0.66) and 'skill discretion' (α=0.66) respectively. Of note, these subscales confirmed the constructs identified in the Swedish national survey.

Table 8.12: Factor analysis of the workplace autonomy scale items (dentate persons, weighted data)

Initial statistics [a]					Final statistics [b]		
		Variance			Factor loadings		
Factor	Eigenvalue	%	Cum. %	Item number and label	Decision-making authority	Personal freedom	Skill discretion
1	3.87	35.15	35.15	1 Influence planning	0.69	0.10	0.30
2	1.57	14.30	49.45	2 Influence pace	0.81	0.09	0.09
3	1.12	10.16	59.61	3 Influence use of time	0.79	0.26	0.17
4	0.94	8.57	68.17	4 Plan work breaks	0.59	0.48	0.08
5	0.73	6.68	74.85	5 Plan when holidays	0.30	0.55	-0.10
6	0.71	6.48	81.32	6 Work flexible hours	0.42	0.42	0.01
7	0.50	4.57	85.90	7 Receive phone call	0.12	0.84	0.14
8	0.46	4.18	90.07	8 Receive private visitor	0.08	0.81	0.18
9	0.41	3.68	93.76	9 Varied skill levels	0.08	0.11	0.84
10	0.35	3.15	96.91	10 Varied work procedures	0.08	0.04	0.84
11	0.34	3.09	100.00	11 Ongoing education	0.20	0.04	0.58
				Cronbach's alpha	0.78	0.66	0.66
				N of cases	2,099	2,105	2,109

(a) Extraction method: principal component analysis
(b) Rotation method: varimax with Kaiser normalization. Rotation converged in 6 iterations
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.81

8.3.2 Workplace autonomy and socioeconomic indicators

Mean and standard deviation scores for the scale and three subscales were examined for their relation with social position.

As all items were positively worded, high scores indicate higher autonomy. As presented in Table 8.13, scores were positively associated with each social position indicator. Adults with higher household income, higher educational attainment, those in higher ranked occupations with greater prestige and those who lived in areas with less social disadvantage reported statistically significant higher scores on each of the three subscales. (One minor exception was observed on the skill discretion subscale for workers with lowest income (n=24).)

8.3.3 Workplace autonomy and demographic characteristics

Associations with other social indicators are presented in Table 8.14. Males scored significantly higher on the decision-making and personal freedom subscales. Older workers also reported higher scores on decision-making and personal freedom subscales. Workers born overseas reported higher scores on all subscales, although differences were only significant for decision-making authority. Workers who spoke English in the home reported greater decision-making scores, but no difference emerged on the other two subscales based on language at home. Full-time workers reported better conditions than those working fewer hour,s and this finding may contribute to the lower scores reported by females. Respondents in households with only one person aged five years or over (ie themselves) reported higher scores than those in larger households. A threshold effect was observed at the 'more than four persons' household size characterised by lower scores reported by these workers. Although speculative, one explanation is that workers with greater commitment outside the workplace are less able (or less motivated) to pursue psychosocial reward at work.

Table 8.13: Workplace autonomy subscales by socioeconomic indicators (dentate persons, weighted data)

		Subscales of the workplace autonomy scale					
		Decision-making authority		Personal freedom		Skill discretion	
	N	Mean	SD	Mean	SD	Mean	SD
Household income							
<$12,000	24	1.21	0.74	1.11	0.77	1.55	0.46
$12 - $20,000	81	1.14	0.63	1.17	0.60	1.16	0.66
$20-30,000	169	1.19	0.62	1.26	0.57	1.31	0.57
$30-40,000	274	1.25	0.51	1.41	0.53	1.41	0.53
$40-50,000	312	1.26	0.54	1.42	0.55	1.38	0.50
>$50,000	1,159	1.36	0.54	1.47	0.55	1.51	0.52
Total	2,020	1.30	0.55	1.42	0.56	1.45	0.53
Test of significance		F(5,2108)=6.199, p<0.001		F(5,2108)=8.941, p< 0.001		F(5,2108)=11.970, p<0.001	
Educational attainment							
Secondary or less	481	1.25	0.59	1.34	0.55	1.28	0.57
Vocation or other	742	1.30	0.54	1.37	0.59	1.42	0.51
Tertiary	886	1.34	0.55	1.48	0.55	1.54	0.53
Total	2,109	1.30	0.55	1.41	0.57	1.44	0.54
Test of significance		F(2,2105)=4.169, p=0.016		F(2,2105)=12.915, p<0.001		F(2,2105)= 36.587, p< 0.001	
Occupational group [(a)]							
Manager/administrator	319	1.58	0.37	1.61	0.45	1.58	0.40
Professional	473	1.36	0.55	1.38	0.60	1.66	0.43
Paraprofessional	166	1.29	0.47	1.43	0.49	1.68	0.45
Tradesperson	234	1.28	0.60	1.42	0.57	1.47	0.49
Clerk	288	1.31	0.55	1.52	0.48	1.38	0.51
Sales/Personal services	279	1.17	0.52	1.45	0.51	1.09	0.63
Plant/machine op; Driver	107	0.99	0.63	1.06	0.74	1.03	0.49
Labourer/related	146	1.06	0.58	1.16	0.56	1.18	0.62
Total	2,012	1.30	0.55	1.42	0.56	1.44	0.54
Test of significance		F(7,2004)=26.005, p<0.001		F(7,2004)=18.978, p<0.001		F(7,2004)=58.384, p<0.001	
Occupational prestige [(b)]							
Low	387	1.03	0.58	1.20	0.61	1.06	0.61
Low-moderate	376	1.29	0.56	1.44	0.56	1.30	0.54
Moderate	396	1.27	0.57	1.49	0.50	1.50	0.47
Moderate-high	467	1.35	0.53	1.37	0.58	1.58	0.45
High	446	1.51	0.45	1.57	0.49	1.67	0.42
Total	2,074	1.30	0.56	1.42	0.56	1.44	0.54
Test of significance		F(4,2068)=43.157, p<0.001		F(4,2068)=25.790, p<0.001		F(4,2068)=97.576, p<0.001	
Area disadvantage [(c)]							
Quintile 1 (highest)	349	1.25	0.62	1.34	0.64	1.37	0.55
Quintile 2	281	1.29	0.58	1.40	0.55	1.42	0.55
Quintile 3	455	1.33	0.54	1.40	0.55	1.42	0.55
Quintile 4	421	1.26	0.55	1.37	0.60	1.42	0.52
Quintile 5	573	1.34	0.51	1.50	0.51	1.51	0.53
Total	2,079	1.30	0.55	1.41	0.57	1.44	0.54
Test of significance		F(4,2074)=2.383, p=0.049		F(4,2074)=5.532, p<0.001		F(4,2074)=4.434, p=0.001	

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage - Australian Bureau of Statistics' Socio-Economic Indexes for Areas

Table 8.14: Workplace autonomy subscales by demographic characteristics (dentate persons, weighted data)

		Subscales of the workplace autonomy scale					
		Decision-making authority		Personal freedom		Skill discretion	
	N	Mean	SD	Mean	SD	Mean	SD
Sex							
Male	1,181	1.35	0.54	1.46	0.56	1.45	0.53
Female	934	1.24	0.57	1.35	0.56	1.42	0.55
Total	2,115	1.30	0.55	1.41	0.57	1.44	0.54
Test of significance		F(1,2113)=17.676;p<0.001		F(1,2113)=17.219; p<0.001		F(1,2113)=2.672; p=0.102	
Age group							
18-29 years	593	1.18	0.59	1.36	0.63	1.40	0.59
30-39 years	575	1.37	0.55	1.45	0.51	1.46	0.51
40-49 years	549	1.29	0.53	1.37	0.57	1.44	0.55
50-59 years	321	1.37	0.51	1.47	0.53	1.47	0.51
60-69 years	69	1.51	0.48	1.60	0.51	1.44	0.44
70+ years	8	1.82	0.37	1.39	0.63	1.24	0.79
Total	2,115	1.30	0.55	1.41	0.57	1.44	0.54
Test of significance		F(5,2109)=11.662; p<0.001		F(5,2109)=4.421; p=0.001		F(5,2109)=1.495; p=0.188	
Country of birth							
Australia	1,727	1.29	0.55	1.40	0.58	1.43	0.55
Overseas	364	1.37	0.56	1.45	0.52	1.45	0.52
Total	2,090	1.30	0.55	1.41	0.57	1.44	0.54
Test of significance		F= 6.954; p=0.008		F= 1.966; p=0.161		F= 0.374; p=0.541	
Language at home							
Other than English	182	1.20	0.58	1.40	0.51	1.47	0.43
English	1,933	1.31	0.55	1.41	0.57	1.43	0.55
Total	2,115	1.30	0.55	1.41	0.57	1.44	0.54
Test of significance		F(5,2109)=7.056; p=0.008		F(5,2109)=0.116; p=0.734		F(5,2109)=0.556; p=0.456	
Employment status							
Full-time	1,595	1.34	0.55	1.46	0.54	1.50	0.50
Part-time	520	1.20	0.56	1.25	0.62	1.25	0.60
Total	2,115	1.30	0.55	1.41	0.57	1.44	0.54
Test of significance		F(1,2113)=24.896; p<0.001		F(1,2113)=54.812; p<0.001		F(1,2113)=90.428; p<0.001	
Householders aged 5+							
One person	206	1.33	0.54	1.50	0.54	1.49	0.54
Two persons	758	1.31	0.56	1.41	0.55	1.51	0.52
Three-four persons	916	1.32	0.52	1.43	0.55	1.38	0.55
More than four	234	1.19	0.63	1.25	0.67	1.38	0.54
Total	2,113	1.30	0.55	1.41	0.57	1.44	0.54
Test of significance		F(3,2108)=3.677; p=0.012		F(3,2108)=8.517; p<0.001		F(3,2108)=9.009; p<0.001	
ARIA category [(a)]							
Highly accessible	2,006	1.30	0.55	1.41	0.57	1.44	0.54
Accessible	259	1.31	0.60	1.42	0.56	1.40	0.57
Moderately accessible	83	1.32	0.61	1.34	0.59	1.54	0.50
Remote	24	1.43	0.52	1.48	0.54	1.32	0.54
Very remote	21	1.41	0.51	1.50	0.51	1.40	0.54
Total	2,393	1.30	0.56	1.41	0.57	1.44	0.54
Test of significance		F(4,2388)= 0.573; p=0.682		F(4,2388)= 0.586; p=0.673		F(4,2388)= 1.370; p=0.242	

Accessibility/Remoteness Index of Australia

8.3.4 Workplace autonomy and oral health

Decayed and missing teeth

Workplace autonomy was examined for its relation with oral health. As presented in Table 8.15, differences in mean decayed teeth were significant on the overall scale and the personal freedom and skill discretion subscales. Although differences in missing teeth were significant for the overall scale score, differences on the subscales were not significant.

An examination of mean decayed teeth scores for the personal freedom subscale revealed an inverse graded relationship between personal freedom and decay (Table 5.15). Workers with least freedom reported 0.98 decayed teeth, and workers with greatest freedom reported 0.67 decayed teeth. This relationship was less clear for skill discretion and the overall scale, although the trends suggested decreasing decay with increasing autonomy. However, the relationship between missing teeth and workplace autonomy on the overall scale was not consistent with earlier patterns of graded relationships. An inverted U-shaped relationship in missing teeth was observed, with most missing teeth reported by workers with mid-range scores for control at work.

Social impact and oral symptom experience

The associations between workplace autonomy and social impact and symptomatology are presented in Table 8.16.

Differences in social impact were significant on the overall scale and decision-making and personal freedom subscales. Although differences in mean social impact scores across the skill discretion subscale failed to reach statistical significance, the trend of decreasing impact with increasing autonomy was observed.

Differences in the sum of oral symptoms experienced were significant on all four scales, although once portioned into quintiles differences in skill discretion failed to be related to differences in oral symptom experience.

Table 8.15: Decayed and missing teeth by workplace autonomy (dentate persons, weighted data)

	Decayed			Missing teeth		
	df	F	Sig.	df	F	Sig.
Workplace autonomy scale	33, 1759	2.539	<0.001	33, 2025	1.667	0.010
Decision-making authority subscale	15, 1777	1.625	0.060	15, 2043	1.073	0.376
Personal freedom subscale	8, 1784	2.352	0.016	8, 2050	0.888	0.526
Skill discretion subscale	8, 1784	1.911	0.054	8, 2050	0.982	0.448

	Decayed teeth					Missing teeth				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Workplace autonomy										
Low	255	0.79	1.29	0.63	0.95	280	1.86	4.18	1.37	2.35
Low-moderate	391	0.83	1.43	0.68	0.97	460	1.78	3.92	1.42	2.14
Moderate	380	0.98	1.57	0.82	1.14	421	2.70	5.32	2.19	3.21
Moderate-high	405	0.54	1.17	0.42	0.65	464	2.16	4.46	1.75	2.57
High	361	0.66	1.34	0.52	0.80	433	1.86	3.98	1.48	2.23
Total	1,793	0.75	1.38	0.69	0.82	2,060	2.08	4.42	1.89	2.27
Test of significance	F (4, 1788) = 5.866; p < 0.001					F (4, 2054) = 3.092; p = 0.015				
Decision-making										
Low	297	0.77	1.31	0.62	0.92	334	2.00	4.39	1.52	2.47
Low-moderate	319	0.88	1.38	0.73	1.03	356	2.01	4.07	1.58	2.43
Moderate	408	0.80	1.38	0.67	0.94	472	1.92	4.44	1.52	2.33
Moderate-high	515	0.65	1.43	0.53	0.78	588	2.18	4.46	1.82	2.54
High	254	0.70	1.32	0.53	0.86	310	2.30	4.70	1.78	2.83
Total	1,793	0.75	1.38	0.69	0.82	2,060	2.08	4.42	1.89	2.27
Test of significance	F (4, 1788) = 1.619; p = 0.167					F (4, 2054) = 0.476; p = 0.753				
Personal freedom										
Low	327	0.98	1.47	0.82	1.14	373	1.82	3.81	1.43	2.21
Low-moderate	214	0.67	1.26	0.50	0.84	244	1.80	4.40	1.24	2.35
Moderate	313	0.74	1.28	0.59	0.88	368	2.04	4.29	1.60	2.48
Moderate-high	383	0.75	1.56	0.59	0.90	431	2.36	4.72	1.92	2.81
High	556	0.67	1.27	0.56	0.77	644	2.17	4.60	1.82	2.53
Total	1,793	0.75	1.38	0.69	0.82	2,060	2.08	4.42	1.89	2.27
Test of significance	F (4, 1788) = 2.911; p = 0.020					F (4, 2054) = 1.099; p = 0.356				
Skill discretion										
Low	274	0.71	1.49	0.53	0.89	306	2.38	5.17	1.80	2.96
Low-moderate	231	0.91	1.51	0.71	1.11	285	2.21	4.23	1.72	2.70
Moderate	358	0.85	1.44	0.70	1.00	393	2.07	4.32	1.64	2.50
Moderate-high	369	0.63	1.19	0.50	0.75	421	2.25	4.67	1.80	2.69
High	562	0.73	1.33	0.62	0.84	655	1.79	3.98	1.48	2.09
Total	1,793	0.75	1.38	0.69	0.82	2,060	2.08	4.42	1.89	2.27
Test of significance	F (4, 1788) = 2.066; p = 0.020					F (4, 2054) = 1.286; p = 0.273				

Table 8.16: Social impact and oral symptom experience by workplace autonomy (dentate persons, weighted data)

	Social impact			Oral symptom experience		
	df	F	Sig.	df	F	Sig.
Workplace autonomy scale	34, 2058	2.430	<0.001	34, 2080	3.164	<0.001
Decision-making authority subscale	15, 2077	5.113	<0.001	15, 2099	2.916	<0.001
Personal freedom subscale	8, 2084	7.914	<0.001	8, 2106	4.234	<0.001
Skill discretion subscale	8, 2084	1.573	0.128	8, 2106	2.252	0.021

	Social impact					Oral symptom experience				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Workplace autonomy										
Low	291	0.61	0.55	0.55	0.68	293	1.19	1.03	1.07	1.31
Low-moderate	465	0.58	0.56	0.53	0.63	469	1.20	1.04	1.10	1.29
Moderate	428	0.60	0.55	0.54	0.65	429	1.22	1.00	1.12	1.31
Moderate-high	474	0.49	0.49	0.45	0.54	480	1.03	0.95	0.95	1.12
High	437	0.39	0.41	0.36	0.43	444	1.16	1.05	1.06	1.26
Total	2,094	0.53	0.52	0.51	0.55	2,115	1.16	1.01	1.11	1.20
Test of significance	F (4, 2088) = 12.945; p < 0.001					F (4, 2110) = 2.418; p = 0.006				
Decision-making										
Low	343	0.59	0.51	0.54	0.65	347	1.35	1.07	1.23	1.46
Low-moderate	359	0.60	0.56	0.54	0.65	361	1.23	1.06	1.12	1.34
Moderate	479	0.61	0.60	0.56	0.67	482	1.06	0.91	0.97	1.14
Moderate-high	596	0.44	0.45	0.41	0.48	608	1.05	0.97	0.97	1.13
High	318	0.42	0.44	0.37	0.47	318	1.22	1.09	1.10	1.34
Total	2,094	0.53	0.52	0.51	0.55	2,115	1.16	1.01	1.11	1.20
Test of significance	F (4, 2088) = 13.554; p < 0.001					F (4, 2110) = 6.817; p < 0.001				
Personal freedom										
Low	381	0.71	0.68	0.64	0.78	384	1.31	1.04	1.21	1.42
Low-moderate	253	0.48	0.45	0.43	0.54	254	0.95	1.01	0.82	1.07
Moderate	365	0.51	0.46	0.47	0.56	372	1.11	0.93	1.02	1.21
Moderate-high	441	0.50	0.49	0.46	0.55	449	1.09	0.99	1.00	1.18
High	654	0.47	0.47	0.43	0.51	656	1.22	1.04	1.14	1.30
Total	2,094	0.53	0.52	0.51	0.55	2,115	1.16	1.01	1.11	1.20
Test of significance	F (4, 2088) = 14.650; p < 0.001					F (4, 2110) = 6.291; p < 0.001				
Skill discretion										
Low	315	0.56	0.50	0.50	0.61	315	1.13	1.04	1.02	1.25
Low-moderate	288	0.59	0.57	0.52	0.66	292	1.09	0.97	0.98	1.20
Moderate	394	0.49	0.44	0.44	0.53	402	1.09	0.94	1.00	1.18
Moderate-high	432	0.53	0.52	0.48	0.58	434	1.16	1.00	1.07	1.26
High	665	0.52	0.55	0.47	0.56	673	1.23	1.07	1.15	1.31
Total	2,094	0.53	0.52	0.51	0.55	2,115	1.16	1.01	1.11	1.20
Test of significance	F (4, 2088) = 14.650; p = 0.105					F (4, 2110) = 1.634; p = 0.163				

Self-rated oral health

As presented in Table 8.17, there were significant differences in self-rated oral health based on workers' levels of autonomy. On all four scale/subscales, a greater proportion of those with high autonomy rated their oral health more favourably. The relationship was most apparent on the overall scale. While 59.2% of workers with high autonomy scores rated their oral health as very good or excellent, only 36.0% of those with low scores rated their oral health in these categories.

Table 8.17: Self-rated oral health by workplace autonomy (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
						Pearson's Chi-square		
	Very poor or poor	Average	Good	Very good	Excellent			
	Row %	Row %	Row %	Row %	Row %	Value	df	Asymp. sig. (2-sided)
Workplace autonomy						99.166	16	<0.001
n	98	352	666	758	236			
Low	5.9	18.1	40.0	25.6	10.4			
Low-moderate	3.1	25.6	27.4	34.2	9.7			
Moderate	6.1	15.0	34.8	36.7	7.5			
Moderate-high	4.0	12.7	33.5	40.0	9.8			
High	4.3	13.7	22.7	41.0	18.2			
Total	4.6	16.7	31.6	35.9	11.2			
Decision-making subscale						75.903	16	<0.001
n	98	352	666	757	237			
Low	5.2	19.5	37.0	25.9	12.2			
Low-moderate	4.4	23.9	34.7	29.4	7.5			
Moderate	4.4	16.0	34.9	36.7	8.1			
Moderate-high	5.4	12.5	25.5	43.2	13.3			
High	3.1	14.5	28.6	38.7	15.1			
Total	4.6	16.7	31.6	35.9	11.2			
Personal freedom subscale						45.454	16	<0.001
n	99	353	667	758	237			
Low	6.3	21.9	32.3	30.7	8.9			
Low-moderate	3.6	19.1	26.3	40.2	10.8			
Moderate	2.1	16.9	34.3	38.6	8.0			
Moderate-high	5.6	15.4	28.5	39.4	11.1			
High	5.0	13.5	33.6	33.2	14.6			
Total	4.7	16.7	31.6	35.9	11.2			
Skill discretion subscale						41.752	16	<0.001
n	99	352	666	759	238			
Low	8.2	15.8	35.4	31.0	9.5			
Low-moderate	2.8	24.1	33.1	28.3	11.7			
Moderate	4.7	15.5	32.2	38.4	9.2			
Moderate-high	3.5	14.7	32.5	37.3	12.0			
High	4.6	15.8	27.9	39.1	12.6			
Total	4.7	16.7	31.5	35.9	11.3			

In summary, workers with higher autonomy reported better oral health. Significant differences in oral health were found for mean decayed teeth, social impact, oral symptom experience and global self-rated oral health. Differences based on missing teeth were not significant.

8.4 Job strain

Workplace autonomy subscales relate closely to 'job decision latitude,' defined by Karasek as worker ability to use skills on the job as well as authority to make decisions. Low decision latitude together with high psychological demands is the aversive combination referred to as 'job strain'. Typically, psychological demand measures address excessive work, conflicting demands, insufficient time and working at a hard, fast pace. The Swedish national study used two items to measure psychological job demands. These were, 'Is your job hectic?' and more broadly, 'Is your job psychologically demanding?' In this study, the single global item was used – 'Is your job psychologically demanding?' A second variable, 'Does your job require you to work at a hard, fast pace?' was found in pilot testing to be ambiguous and, although retained, was not used in analysis. The global item enables respondents to interpret the notion of psychological demand subjectively rather than imposing meaning on the construct.

A strong positive association was observed between psychological demand and education, occupational group and prestige. For income, the distribution was bimodal, and no clear relationship was apparent according to area disadvantage (Table 8.18).

Table 8.18: Psychological demand by socioeconomic indicators (dentate sample, weighted data)

	Psychologically demanding	
	Yes	No
	Valid %	Valid %
Household income		
<$12,000	73.9	26.1
$12 - $20,000	48.8	51.3
$20-30,000	63.9	36.1
$30-40,000	59.5	40.5
$40-50,000	68.4	31.6
>$50,000	71.0	29.0
Total	67.6	32.4
Pearson's Chi-square	χ^2= 28.79 (df=5; p <0.001)	
Occupational group [(a)]		
Manager/administrator	81.6	18.4
Professional	81.2	18.8
Paraprofessional	88.2	11.8
Tradesperson	56.0	44.0
Clerk	59.1	40.9
Sales/Personal services	57.1	42.9
Plant/machine op; Driver	50.9	49.1
Labourer/related	40.1	59.9
Total	67.7	32.3
Pearson's Chi-square	χ^2= 200.33 (df=7; p <0.001)	

	Psychologically demanding	
	Yes	No
	Valid %	Valid %
Educational attainment		
Secondary or less	58.6	41.4
Vocation or other	64.6	35.4
Tertiary	74.0	26.0
Total	67.2	32.8
Pearson's Chi-square	χ^2= 36.70 (df=2; p <0.001)	
Occupational prestige [(b)]		
Low	46.7	53.3
Low-moderate	59.8	40.2
Moderate	63.3	36.7
Moderate-high	82.1	17.9
High	80.6	19.4
Total	67.4	32.6
Pearson's Chi-square	χ^2= 170.34 (df=4; p <0.001)	
Area disadvantage [(c)]		
Quintile 1 (highest)	61.0	39.0
Quintile 2	71.2	28.8
Quintile 3	67.0	33.0
Quintile 4	64.1	35.9
Quintile 5	71.3	28.7
Total	67.2	32.8
Pearson's Chi-square	χ^2= 14.13 (df=4; p = 0.007)	

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage - Australian Bureau of Statistics' Socio-Economic Indexes for Areas

Differences in perceived psychological job strain according to sex and geographical location were not statistically significant. A higher proportion of full-time workers, those born outside of Australia and workers who spoke a language other than English at home described their work conditions as psychologically demanding. Fewer workers in large households described their work as psychologically demanding. Consistent with stress scores reported earlier, psychological job demand was related to age group, with a higher proportion in middle-age perceiving work requirements as psychologically demanding (Table 8.19).

Table 8.19: Psychological demand by demographic characteristics (dentate persons, weighted data)

	Psychological demand	
	Valid % Yes	Valid % No
Sex		
Male	66.7	33.3
Female	67.7	32.3
Total	67.1	32.9
Pearson's Chi-square	χ^2 = 0.259 (df=1; p=0.611)	
Country of birth		
Australia	65.7	34.3
Other	72.6	27.4
Total	67.0	33.0
Pearson's Chi-square	χ^2 = 6.479 (df=1; p=0.011)	
Employment status		
Full-time	71.9	28.1
Part-time	52.2	47.8
Total	67.1	32.9
Pearson's Chi-square	χ^2 = 68.341 (df=1; p<0.001)	
ARIA category [(a)]		
Highly accessible	34.1	65.9
Accessible	35.1	64.9
Moderately accessible	21.8	78.2
Remote	41.7	58.3
Very remote	19.0	81.0
Total	33.8	66.2
Pearson's Chi-square	χ^2 = 8.034 (df=4; p=0.090)	

	Psychological demand	
	Valid % Yes	Valid % No
Age group		
18-29 years	58.4	41.6
30-39 years	70.8	29.2
40-49 years	70.2	29.8
50-59 years	75.9	24.1
60-69 years	47.0	53.0
70+ years	44.4	55.6
Total	67.1	32.9
Pearson's Chi-square	χ^2 = 51.364 (df=5; p<0.001)	
Speak LOTE at home		
Yes	76.4	23.6
No	66.2	33.8
Total	67.1	32.9
Pearson's Chi-square	χ^2 = 7.745 (df=1; p=0.005)	
Householders aged 5+		
One	71.1	28.9
Two	73.6	26.4
Three or four	65.3	34.7
More than four	49.8	50.2
Total	67.1	32.9
Pearson's Chi-square	χ^2 = 49.729 (df=3; p<0.001)	

(a) Accessibility/Remoteness Index of Australia

8.4.1 Job strain and oral health

Despite a positive relationship with those indicators of social position most closely linked to workplace (education, occupational group and prestige), psychological job demand was not positively related to oral health. In fact, workers who described their job as psychologically demanding reported significantly more missing teeth and higher social impact scores. Although they also reported more decayed teeth and oral symptoms, these differences did not reach statistical significance. No relationship was found with self-rated oral health. Results are presented in Table 8.20 and 8.21.

Table 8.20: Social impact and oral symptom experience by psychological demand (dentate persons, weighted data)

	Decayed teeth					Missing teeth				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Psychological demand										
Yes	1193	0.77	1.39	0.69	0.85	1380	2.24	4.49	2.00	2.47
No	598	0.71	1.34	0.60	0.82	672	1.73	4.23	1.41	2.05
Total	1791	0.75	1.38	0.69	0.81	2052	2.07	4.42	1.88	2.26
Test of significance	F (1,1789) = 0.663; p = 0.415					F (1, 2050) = 6.081; p = 0.014				

	Social impact					Oral symptom experience				
Psychological demand										
Yes	1401	0.55	0.55	0.52	0.58	1415	1.16	1.03	1.11	1.22
No	686	0.48	0.46	0.45	0.52	693	1.15	0.99	1.08	1.22
Total	2087	0.53	0.52	0.51	0.55	2108	1.16	1.01	1.12	1.20
Test of significance	F (1, 2084) = 8.093; p = 0.004					F (1, 2105) = 0.053; p = 0.818				

Table 8.21: Self-rated oral health by psychological demand (dentate persons, weighted data)

		Self-rated oral health					Test of significance		
		Very poor or poor	Average	Good	Very good	Excellent	Pearson's Chi-square		
		Row %	Row %	Row %	Row %	Row %	Value	df	Asymp. sig. (2-sided)
Psychological demand							7.198	4	0.126
	n	98	358	660	750	238			
Yes		4.3	17.1	30.1	37.4	11.1			
No		5.3	16.9	33.9	32.0	11.8			
Total		4.7	17.0	31.4	35.6	11.3			

A two-way between-subjects ANOVA with occupational group and age entered as covariates, showed significant main effects for psychological demand and workplace autonomy, having adjusted for occupational group and age, and a significant interaction effect between job control and demand was also obtained (Table 8.22 – estimated marginal means not shown).

Table 8.22: Two-way ANOVA job control/demand on social impact (dentate persons, weighted data)

Dependent variable: Social impact (OHIP-14) Source of variation	Sum of squares	df	Mean square	F-ratio	Sig. level
Intercept	545.38	1	545.38	2049.114	<0.001
Occupational main groups (ASCO)	4.51	1	4.51	16.959	<0.001
Age (in years)	1.89	1	1.89	7.104	0.008
Psychological demand	5.14	1	5.14	19.314	<0.001
Workplace autonomy (mean scale score)	18.16	33	0.55	2.067	<0.001
Psychological demand * workplace autonomy	10.92	21	0.52	1.954	0.006
Error	483.07	1815	0.27		

R squared = .078 (adjusted R squared = 0.049)

8.5 Workplace social interaction

Johnson and Hall added to Karasek and Theorell's concept of job-strain, the dimension of co-worker social support. This inclusion brought into use the term 'iso-strain' or 'isolated high strain work', which is the combination of job strain and low social support. Table 8.23 presents summary statistics for the five items that addressed workplace social interaction. Response categories are 'No' and 'Yes', coded 1 and 2 respectively. The measures of central tendency indicate that most workers spoke with co-workers on the job, and had some social interaction with colleagues outside the work environment.

Table 8.23: Summary statistics for the workplace social interaction scale (dentate persons, weighted data)

	Workplace social interaction		
	Scale	Subscales	
	Social interaction	At work interaction	Outside work interaction
N	2103	2103	2103
Missing	274	274	274
N items	5	3	2
Mean	1.79	1.86	1.69
Median	1.80	2.00	2.00
Mode	2.00	2.00	2.00
Std. deviation	0.24	0.24	0.41
Skewness	-1.11	-1.91	-0.81
SE skewness	0.05	0.05	0.05
Kurtosis	0.78	3.43	-1.06
SE kurtosis	0.11	0.11	0.11
Percent floor	1.60	3.22	22.38
Percent ceiling	44.18	69.10	60.56
Minimum	1.00	1.00	1.00
Maximum	2.00	2.00	2.00

The individual items are presented in Table 8.24 along with response counts, percentage of missing values and valid percent values for each item. Arguably, items are more precisely a measure of interaction than support, and hence in this study this scale is referred to as the workplace social interaction scale.

Table 8.24: Response to the social interaction scale (dentate persons, weighted data)

	Yes		No		Missing	
	N	Valid %	N	Valid %	N	%
Are you able to talk to colleagues during your work?	1953	93.0	147	7.0	276	11.6
Are you able to leave your job to talk with colleagues?	1482	70.8	612	29.2	282	11.9
Are you able to interact with colleagues as part of your work?	1984	94.5	116	5.5	277	11.7
Do you meet with colleagues outside the workplace?	1302	62.1	794	37.9	280	11.8
Met with co-worker within last 6 months outside the workplace?	1597	75.9	506	24.1	274	11.5

8.5.1 Factor analysis of the workplace social interaction items

A principal component factor analysis was conducted on the correlations of the five items. Two factors were extracted with eigenvalues greater than one. Varimax rotation of the factors yielded the factor structure presented in Table 8.25. The first factor accounted for 36% of the variance and the second factor 33%. Factor one addressed social interaction at work (3 items) and factor two addressed co-worker interaction outside of the workplace (2 items).

Table 8.25: Factor analysis of the workplace social interaction scale (dentate persons, weighted data)

Initial statistics [a]					Final statistics [b]	
		Variance			Factor loadings	
Factor	Eigenvalue	%	Cum. %	Item number and label	In the workplace	Outside workplace
1	2.04	40.74	40.74	1 Talk to colleagues	0.84	0.06
2	1.41	28.11	68.85	2 Leave job talk to colleagues	0.64	0.05
3	0.77	15.38	84.22	3 Interact with colleagues	0.82	0.09
4	0.44	8.77	93.00	4 Meet colleagues outside work	0.04	0.91
5	0.35	7.00	100.00	5 Met co-worker within 6 months	0.13	0.90
				Cronbach's alpha	0.57	0.78
				N of cases	2,088	2,097

(a) Extraction method: principal component analysis
(b) Rotation method: Varimax with Kaiser normalization. Rotation converged in 3 iterations
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.58

8.5.2 Workplace social interaction and socioeconomic indicators

Findings of the relation between social interaction scores and social indicators are presented in Tables 8.26 and 8.27. Consistent with other scales examined in this study, higher mean scores were associated with higher household income, occupational group and higher prestige. There was no apparent relationship with educational attainment and although differences were significant, there was no meaningful relationship with area.

8.5.3 Workplace social interaction and demographic indicators

Males reported higher interaction scores, as did full-time workers and those aged 30-39 years. Workers who lived alone reported higher workplace interaction scores than those in households with several occupants.

There were no differences in social interaction scores according to country of birth and language spoken at home. Workers living in remote areas reported greater social interaction with colleagues outside of work compared with workers in more accessible geographical locations.

Table 8.26: Workplace social interaction by socioeconomic indicators (dentate persons, weighted data)

		Scale		Subscales			
		Workplace social interaction		At work interaction		Outside work interaction	
	N	Mean	SD	Mean	SD	Mean	SD
Household income							
<$12,000	23	1.69	0.32	1.77	0.31	1.57	0.44
$12 - $20,000	79	1.66	0.26	1.73	0.28	1.55	0.46
$20-30,000	168	1.75	0.26	1.82	0.26	1.66	0.42
$30-40,000	274	1.78	0.24	1.86	0.24	1.67	0.42
$40-50,000	321	1.79	0.23	1.88	0.22	1.65	0.43
>$50,000	1,146	1.81	0.23	1.87	0.23	1.73	0.40
Total	2,011	1.79	0.23	1.86	0.24	1.69	0.41
Test of significance		F(5,2005)=9.293, p< 0.001		F(5,2005)=7.393, p< 0.001		F(1,2105)= 4.984, p< 0.001	
Educational attainment							
Secondary or less	476	1.80	0.23	1.87	0.23	1.69	0.41
Vocation or other	735	1.78	0.24	1.85	0.26	1.68	0.42
Tertiary	886	1.80	0.24	1.86	0.23	1.70	0.41
Total	2,096	1.79	0.24	1.86	0.24	1.69	0.41
Test of significance		F(2,2093)=0.784, p=0.457		F(2,2093)=0.425, p=0.654		F(2,2093)=0.490, p=0.613	
Occupational group [(a)]							
Manager/administrator	311	1.88	0.19	1.95	0.17	1.77	0.36
Professional	474	1.79	0.26	1.85	0.26	1.71	0.42
Paraprofessional	166	1.82	0.18	1.87	0.19	1.75	0.39
Tradesperson	233	1.78	0.21	1.88	0.22	1.62	0.42
Clerk	293	1.83	0.21	1.92	0.17	1.69	0.42
Sales/Personal services	276	1.75	0.25	1.81	0.27	1.67	0.42
Plant/machine op; Driver	107	1.68	0.24	1.75	0.34	1.58	0.43
Labourer/related	141	1.75	0.27	1.82	0.26	1.64	0.42
Total	2,002	1.80	0.23	1.87	0.24	1.69	0.41
Test of significance		F(7,1994)=12.968, p<0.001		F(7,1994)=15.216, p<0.001		F(7,1994)=4.775, p<0.001	
Occupational prestige [(b)]							
Low	392	1.72	0.26	1.77	0.29	1.64	0.43
Low-moderate	372	1.77	0.23	1.85	0.23	1.64	0.42
Moderate	390	1.80	0.23	1.89	0.22	1.65	0.43
Moderate-high	465	1.81	0.22	1.86	0.23	1.74	0.40
High	443	1.86	0.22	1.92	0.20	1.76	0.37
Total	2,061	1.79	0.24	1.86	0.24	1.69	0.41
Test of significance		F(4,2056)=20.653, p<0.001		F(4,2056)=22.849, p<0.001		F(4,2056)=8.948, p<0.001	
Area disadvantage [(c)]							
Quintile 1 (highest)	342	1.76	0.24	1.82	0.28	1.68	0.42
Quintile 2	276	1.82	0.22	1.88	0.21	1.72	0.39
Quintile 3	449	1.80	0.24	1.85	0.25	1.72	0.40
Quintile 4	420	1.82	0.21	1.89	0.21	1.72	0.40
Quintile 5	580	1.78	0.26	1.87	0.24	1.64	0.44
Total	2,067	1.79	0.24	1.86	0.24	1.69	0.41
Test of significance		F(4,2061)=4.416, p=0.001		F(4,2061)=5.012, p=0.001		F(4,2061)=3.881, p=0.004	

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage - Australian Bureau of Statistics' Socio-Economic Indexes for Areas

Table 8.27: Workplace social interaction by demographic characteristics (dentate persons, weighted data)

		Scale		Subscale			
		Workplace social interaction		At work		Outside of work	
	N	Mean	SD	Mean	SD	Mean	SD
Sex							
Male	1,179	1.81	0.22	1.88	0.24	1.70	0.41
Female	924	1.77	0.25	1.84	0.25	1.68	0.42
Total	2,103	1.79	0.24	1.86	0.24	1.69	0.41
Test of significance		F(1,2100)= 10.648; p=0.001		F(1,2100)=14.278;p<0.001		F(1,2100)=2.068; p=0.151	
Age group							
18-29 years	591	1.78	0.23	1.81	0.26	1.72	0.40
30-39 years	571	1.83	0.22	1.90	0.20	1.72	0.40
40-49 years	549	1.77	0.26	1.85	0.26	1.65	0.42
50-59 years	320	1.79	0.24	1.89	0.24	1.65	0.43
60-69 years	63	1.79	0.24	1.91	0.20	1.62	0.47
70+ years	9	1.79	0.27	1.78	0.29	1.81	0.38
Total	2,103	1.79	0.24	1.86	0.24	1.69	0.41
Test of significance		F(5,2096)=4.006; p=0.001		F(5,2096)=9.134; p<0.001		F(5,2096)=3.519; p=0.004	
Country of birth							
Australia	1,708	1.79	0.24	1.86	0.24	1.70	0.41
Overseas	369	1.80	0.23	1.88	0.22	1.67	0.41
Total	2,078	1.79	0.24	1.86	0.24	1.69	0.41
Test of significance		F(1,2075)=0.300; p=0.584		F(1,2075)=3.708; p=0.054		F(1,2075)=0.858; p=0.354	
Language at home							
Other than English	180	1.80	0.21	1.86	0.19	1.70	0.40
English	1,923	1.79	0.24	1.86	0.24	1.69	0.42
Total	2,103	1.79	0.24	1.86	0.24	1.69	0.41
Test of significance		F(1,2100)=7.082; p=0.775		F(1,2100)=0.034; p=0.854		F(1,2100)=0.056; p=0.814	
Employment status							
Full-time	1,597	1.81	0.23	1.88	0.23	1.70	0.41
Part-time	506	1.74	0.26	1.79	0.26	1.66	0.43
Total	2,103	1.79	0.24	1.86	0.24	1.69	0.41
Test of significance		F(1,2100)= 37.355; p<0.001		F(1,2100)=56.159; p<0.001		F(1,2100)=4.785; p=0.029	
Householders aged 5+							
One person	204	1.81	0.22	1.90	0.20	1.69	0.42
Two persons	751	1.80	0.22	1.86	0.22	1.70	0.40
Three-four persons	906	1.80	0.25	1.87	0.25	1.70	0.42
More than four	240	1.74	0.25	1.81	0.29	1.63	0.44
Total	2,101	1.79	0.24	1.86	0.24	1.69	0.41
Test of significance		F(3,2096)=5.198; p=0.001		F(3,2096)=5.075; p=0.002		F(3,2096)=1.990; p=0.113	
ARIA category [(a)]							
Highly accessible	2,014	1.79	0.24	1.87	0.24	1.68	0.42
Accessible	255	1.79	0.24	1.83	0.26	1.74	0.40
Moderately accessible	81	1.83	0.24	1.86	0.25	1.79	0.37
Remote	23	1.90	0.17	1.93	0.21	1.87	0.30
Very remote	21	1.86	0.23	1.87	0.26	1.84	0.29
Total	2,394	1.80	0.24	1.86	0.24	1.69	0.41
Test of significance		F(4,2388)=2.191; p=0.068		F(4,2388)=1.890; p=0.109		F(4,2388)=4.106; p=0.003	

(a) Accessibility/Remoteness Index of Australia

8.5.4 Workplace social interaction and oral health

To assess the association between workplace social interaction and oral health, mean scale and subscale scores were dichotomised into scores summing to less than 2, and 2. Workers scoring a 2 on either of the subscales or the overall scale, responded affirmatively to each item.

Decayed and missing teeth

As presented in Table 8.28, variation in mean counts of decayed and missing teeth were statistically significant on overall scale, but failed to reach significance when dichotomised for decayed teeth. Workers with greater opportunity for social interaction reported higher mean numbers of decayed teeth. Similarly, social interaction was positively associated with missing teeth on the overall scale.

Table 8.28: Decayed and missing teeth by social interaction (dentate persons, weighted data)

	Decayed			Missing teeth		
	df	F	Sig.	df	F	Sig.
Workplace social interaction scale	8, 1775	2.800	0.004	8, 2037	2.176	0.027
At work subscale	4, 1779	3.269	0.011	4, 2041	1.070	0.370
Outside of work subscale	2, 1781	0.247	0.781	2, 2043	0.788	0.455

	Decayed teeth					Missing teeth				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Social interaction (scale)										
Low interaction	991	0.72	1.29	0.63	0.80	1141	1.80	4.19	1.56	2.04
High interaction	794	0.80	1.48	0.69	0.90	906	2.41	4.62	2.10	2.71
Total	1785	0.75	1.38	0.69	0.82	2047	2.07	4.40	1.88	2.26
Test of significance	F (1, 1782) = 1.588; p = 0.208					F (1, 2044) = 9.616; p = 0.002				
At work										
Low interaction	556	0.75	1.23	0.64	0.85	628	1.88	4.39	1.53	2.22
High interaction	1229	0.75	1.44	0.67	0.84	1418	2.15	4.39	1.92	2.38
Total	1785	0.75	1.38	0.69	0.82	2047	2.07	4.40	1.88	2.26
Test of significance	F (4, 1782) = 0.015; p = 0.904					F (1, 2044) = 1.746; p = 0.187				
Outside of work										
Low interaction	698	0.73	1.33	0.63	0.83	804	1.92	4.38	1.62	2.22
High interaction	1087	0.77	1.40	0.68	0.85	1243	2.16	4.40	1.92	2.41
Total	1785	0.75	1.38	0.69	0.82	2047	2.07	4.40	1.88	2.26
Test of significance	F (1, 1782) = 0.398; p = 0.582					F (1, 2044) = 1.517; p = 0.218				

Social impact and oral symptom experience

Workers with greater opportunity for social interaction reported significantly lower social impact scores on each scale/subscale. Unexpectedly, they also reported significantly greater oral symptom experience (although this relation was not reflected with the 'workplace' subscale).

Table 8.29: Social impact and oral symptom experience by social interaction (dentate persons, weighted data)

	Social impact			Oral symptom experience		
	df	F	Sig.	df	F	Sig.
Workplace social interaction	8, 2072	1.929	0.052	8, 2093	2.869	0.004
At work subscale	4, 2076	3.582	0.006	4, 2097	2.302	0.056
Outside of work subscale	2, 2078	1.259	0.284	2, 2099	8.582	<0.001

	Social impact					Oral symptom experience				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Social interaction										
Low interaction	1157	0.55	0.54	0.52	0.58	1174	1.11	1.01	1.05	1.17
High interaction	925	0.50	0.50	0.47	0.54	929	1.22	1.01	1.16	1.29
Total	2082	0.53	0.52	0.51	0.55	2103	1.16	1.01	1.12	1.20
Test of significance	F (1, 2079) = 4.027; p = 0.045					F (1, 2100) = 6.177; p = 0.013				
At work										
Low interaction	637	0.58	0.58	0.54	0.63	650	1.21	1.07	1.13	1.29
High interaction	1444	0.50	0.49	0.48	0.53	1453	1.14	0.99	1.09	1.19
Total	2082	0.53	0.52	0.51	0.55	2103	1.16	1.01	1.12	1.20
Test of significance	F (1, 2079) = 10.116; p = 0.001					F (1, 2100) = 2.189; p = 0.139				
Outside of work										
Low interaction	815	0.55	0.54	0.51	0.59	829	1.05	0.99	0.98	1.11
High interaction	1267	0.51	0.51	0.49	0.54	1274	1.23	1.02	1.18	1.29
Total	2082	0.53	0.52	0.51	0.55	2103	1.16	1.01	1.12	1.20
Test of significance	F (1, 2079) = 2.477; p = 0.016					F (1, 2100) = 16.905; p < 0.001				

The inclusion of social interaction into the job strain model enables a view of workplace stress that looks beyond the job itself to the social context in which the job is situated. It's important to note that stress experienced on the job does not necessarily come from the job itself. Some stress is brought into the workplace from personal situations or from inner conflicts.

Self-rated oral health

As presented in Table 8.30, differences in the proportion of workers rating their oral health as favourable or unfavourable did not differ significantly based on scores for the overall scale.

Workers who met with co-workers outside the workplace tended to rate their oral health significantly better than those who did not, suggesting that the two subscales reflect different forms of social contact. By contrast, a higher proportion of workers with opportunities for social interaction in the workplace rated their oral health poorly.

Table 8.30: Self-rated oral health by social interaction (dentate persons, weighted data)

	Self-rated oral health					Test of significance		
						Pearson's Chi-square		
	Very poor or poor	Average	Good	Very good	Excellent			
	Row %	Row %	Row %	Row %	Row %	Value	df	Asymp. sig. (2-sided)
Social interaction						3.886	4	0.422
n	96	359	661	746	238			
Low interaction	5.2	17.4	30.9	35.8	10.7			
High interaction	3.8	16.7	32.2	35.1	12.2			
Total	4.6	17.1	31.5	35.5	11.3			
At work						9.861	4	0.043
n	95	359	661	746	237			
Low interaction	6.5	15.6	32.0	34.2	11.6			
High interaction	3.7	17.8	31.3	36.2	11.2			
Total	4.5	17.1	31.5	35.6	11.3			
Outside of work						13.422	4	0.009
n	95	359	661	745	237			
Low interaction	5.3	19.9	31.4	33.9	9.4			
High interaction	4.0	15.3	31.6	36.6	12.5			
Total	4.5	17.1	31.5	35.5	11.3			

8.6 Work-home interference

Not only are workers at risk of role overload because of long hours and job strain – a high proportion also report spillover arising from dual demands of workplace and family or other domains of life. Research has given increasing attention to the changing ways that males and females balance and prioritise these responsibilities, but the associations with oral health remain to be investigated. This research addresses the associations between dual role strain and oral health using the work-home interference scale.

Responses to the work-home interference scale are coded 0-4, indicating level of agreement with descriptions of interference. As demonstrated by the skewness and kurtosis values in Table 8.31, the distribution of responses on this scale approached normality.

Table 8.31: Summary statistics for the work-home interference scale (dentate persons, weighted data)

	Work-home Interference		
	Scale	Subscales	
	Work-home interference	Work interferes home	Home interferes work
N	2127	2127	2127
Missing	250	250	250
N items	8	4	4
Mean	1.32	1.70	0.93
Medlan	1.25	1.50	1.00
Mode	1.25	1.00	1.00
Std. deviation	0.59	0.87	0.57
Skewness	0.04	0.27	0.41
SE skewness	0.05	0.05	0.05
Kurtosis	-0.05	-0.31	0.40
SE kurtosis	0.11	0.11	0.11
Percent floor	2.51	3.52	11.05
Percent ceiling	nil	1.17	nil
Minimum	0.00	0.00	0.00
Maximum	3.43	4.00	4.00

The distribution of responses to the eight items on this scale is presented in Table 8.32. Responses on the Likert scale of agreement were coded from 0 to 4, with higher scores indicating greater interference. More than a quarter of Australian workers (27% and 28%) agreed that they were too tired after work for leisure activities, family time or household chores, and that work took them away from their personal interests (#1, #2). In fact, 38% reported that work took up time that they'd like to spend with family or friends (# 4). A higher percentage agreed with the first four items than agreed with items 5 to 8, indicating that personal life was less intrusive of work time than work was on personal life.

Table 8.32: Response to the work-home interference scale (dentate persons, weighted data)

	Strongly disagree		Disagree		Neither agree nor disagree		Agree		Strongly agree		Missing	
	N	Valid %	N	Valid %	N	Valid %	N	Valid %	N	Valid %	N	%
After work, too tired	221	10.4	784	36.9	539	25.4	480	22.6	101	4.8	251	10.6
So much work	232	10.9	833	39.2	474	22.3	462	21.7	125	5.9	250	10.5
Family/friends dislike	398	18.8	918	43.2	451	21.2	294	13.8	64	3.0	251	10.6
Work takes up time	223	10.5	644	30.3	455	21.4	622	29.2	182	8.6	251	10.5
Too tired at work	327	15.4	1195	56.3	403	19.0	178	8.4	20	1.0	253	10.6
Personal demands	451	21.2	1262	59.4	311	14.6	89	4.2	12	0.6	251	10.6
Superiors/peers dislike	849	40.1	1040	49.2	192	9.1	18	0.8	16	0.8	261	11.0
Personal life takes up	897	42.2	1013	47.6	163	7.7	39	1.8	14	0.6	251	10.5

8.6.1 Factor analysis of the work-home interference scale items

Items were subjected to principal components factor analysis with varimax rotation and two factors were extracted with eigenvalues greater than one. Results are presented in Table 8.33. Factor loadings for each variable after rotation were high, ranging from 0.72 to 0.83, except for item 5, with a correlation coefficient of 0.57. Conceptually the factors made good sense, separating items that impact on work life from items at work that impact on life outside of work. Cronbach's alpha coeffficients were above 0.70 for both factors, indicating good internal consistency of the derived subscales.

Table 8.33: Factor analysis of the work-home interference scale (dentate persons, weighted data)

Initial statistics [a]				Final statistics [b]			
		Variance				Factor loadings	
Factor	Eigenvalue	%	Cum. %		Item number and label	Work interferes	Home interferes
1	3.17	39.63	39.63	1	After work, too tired	0.72	0.05
2	1.64	20.52	60.16	2	Work interferes personal interests	0.83	0.14
3	0.84	10.54	70.70	3	Family/friends dislike	0.78	0.12
4	0.64	7.99	78.68	4	Work takes up time	0.80	0.11
5	0.56	7.00	85.69	5	Often too tired at work	0.40	0.57
6	0.43	5.41	91.10	6	Personal demands interfere work	0.14	0.83
7	0.38	4.72	95.82	7	Superiors and peers dislike	0.06	0.75
8	0.33	4.18	100.00	8	Personal life takes up time	0.01	0.75
					Cronbach's alpha	0.80	0.73
					N of cases	2,122	2,110

(a) Extraction method: principal component analysis.
(b) Rotation method: varimax with Kaiser normalization. Rotation converged in 3 iterations.
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.77

8.6.2 Work-home interference and socioeconomic indicators

Table 8.34 describes the distribution and direction of work-home interference according to socioeconomic indicators. Scores on the two subscales were dissimilar, indicating different social patterning in these types of interference.

Compared with the seven other occupational groups, workers in sales and personal service occupations comprised a considerably higher proportion of part-time workers (53.9%, results not shown). Consistent with a commitment to responsibilities outside the workplace, this occupational group reported higher scores on the work interferes with home subscale. In addition, they reported lowest scores to indicate that work responsibilities intruded on home life. By contrast, only 9.6% of managers/administrators worked part-time (results not shown), and this group reported highest conflict in the direction of work interfering with home life. They also reported highest overall scale scores. Workers with tertiary education reported particularly high inter-role conflict, with work interfering with home life more than home life intruding on work. The distribution in interference scores on the overall scale tended to form a U-shape that was most apparent for occupational group.

8.6.3 Work-home interference and demographic characteristics

The relationship between work-home interference and demographic characteristics is presented in Table 8.35.

Males reported higher 'work interferes with home' conflict, but there was no difference between males and females on the 'home interferes with work' subscale. Scale scores were highest for the 30-39 year age group and decreased abruptly after 60 years of age. Although part-time workers experienced most home interferes with work conflict, full-time workers reported highest overall inter-role conflict. Workers living in large households reported highest work interference with home life, and lowest home interference with work life. Work interfered with home life more for workers in remote areas compared with those workers in more accessible areas.

Table 8.34: Work-home interference by socioeconomic indicators (dentate persons, weighted data)

		Scale		Subscales			
		Work-home interference		Work interferes with home		Home interferes with work	
	N	Mean	SD	Mean	SD	Mean	SD
Household income							
<$12,000	24	1.79	0.86	2.32	1.14	1.26	0.80
$12 - $20,000	81	1.24	0.65	1.38	0.88	1.09	0.59
$20-30,000	169	1.40	0.55	1.84	0.88	0.96	0.53
$30-40,000	282	1.22	0.58	1.51	0.83	0.93	0.57
$40-50,000	321	1.26	0.63	1.62	0.87	0.90	0.56
>$50,000	1,155	1.34	0.57	1.77	0.85	0.90	0.56
Total	2,032	1.32	0.59	1.71	0.87	0.92	0.56
Test of significance		F(5,2026)=6.431, p<0.001		F(5,2026)=10.280, p<0.001		F(5,2026)=3.712, p=0.002	
Educational attainment							
Secondary or less	489	1.27	0.57	1.58	0.81	0.95	0.56
Vocation or other	746	1.28	0.63	1.67	0.92	0.89	0.57
Tertiary	885	1.37	0.56	1.80	0.83	0.95	0.57
Total	2,120	1.32	0.59	1.70	0.86	0.93	0.57
Test of significance		F(2,2117)=7.169, p = 0.001		F(2,2117)=11.094, p < 0.001		F(2,2117)=2.788, p = 0.662	
Occupational group [(a)]							
Manager/administrator	318	1.41	0.52	1.90	0.81	0.92	0.56
Professional	473	1.39	0.58	1.88	0.87	0.89	0.52
Paraprofessional	163	1.25	0.53	1.56	0.79	0.94	0.52
Tradesperson	242	1.28	0.62	1.67	0.86	0.88	0.58
Clerk	296	1.06	0.62	1.33	0.82	0.79	0.57
Sales/Personal services	281	1.28	0.53	1.53	0.77	1.03	0.59
Plant/machine op; Driver	107	1.38	0.65	1.78	0.92	0.98	0.49
Labourer/related	146	1.37	0.66	1.75	0.97	0.99	0.63
Total	2,026	1.30	0.59	1.69	0.86	0.91	0.56
Test of significance		F(7,2017)=11.064, p<0.001		F(7,2017)=16.018, p<0.001		F(7,2017)=4.511, p<0.001	
Occupational prestige [(b)]							
Low	397	1.28	0.65	1.59	0.92	0.98	0.67
Low-moderate	378	1.29	0.59	1.58	0.79	0.99	0.57
Moderate	395	1.23	0.58	1.57	0.83	0.88	0.54
Moderate-high	472	1.33	0.59	1.79	0.92	0.87	0.54
High	443	1.42	0.54	1.92	0.79	0.91	0.52
Total	2,085	1.31	0.59	1.70	0.87	0.92	0.57
Test of significance		F(4,2080)=6.015, p<0.001		F(4,2080)=14.085, p<0.001		F(4,2080)=4.078, p=0.003	
Area disadvantage [(c)]							
Quintile 1 (highest)	356	1.27	0.66	1.66	0.97	0.87	0.55
Quintile 2	278	1.31	0.59	1.72	0.82	0.91	0.59
Quintile 3	453	1.35	0.54	1.72	0.82	0.97	0.53
Quintile 4	418	1.31	0.59	1.67	0.85	0.95	0.57
Quintile 5	584	1.33	0.59	1.74	0.87	0.91	0.59
Total	2,091	1.32	0.59	1.70	0.87	0.93	0.57
Test of significance		F(4,2085)= 0.989, p=0.412		F(4,2085)= 0.714, p=0.582		F(4,2085)= 1.891, p=0.109	

(a) Australian Standard Classification of Occupation (ASCO) Major Groups (First edition)
(b) Daniel Prestige Scale
(c) Index of Relative Socio-Economic Disadvantage - Australian Bureau of Statistics' Socio-Economic Indexes for Areas

Table 8.35: Work-home interference by social indicators (dentate persons, weighted data)

		Scale		Subscale			
		Work-home interference		Work interferes with home		Home interferes with work	
	N	Mean	SD	Mean	SD	Mean	SD
Sex							
Male	1,198	1.33	0.59	1.73	0.86	0.93	0.58
Female	929	1.30	0.60	1.67	0.88	0.93	0.56
Total	2,127	1.32	0.59	1.70	0.87	0.93	0.57
Test of significance		F(1,2124)=1.533; p=0.216		F(1,2124)=2.746; p=0.098		F(1,2124)=0.002;p=0.966	
Age group							
18-29 years	599	1.28	0.60	1.58	0.88	0.99	0.59
30-39 years	572	1.37	0.59	1.80	0.91	0.94	0.56
40-49 years	557	1.32	0.61	1.75	0.86	0.89	0.56
50-59 years	321	1.30	0.54	1.74	0.78	0.86	0.55
60-69 years	69	1.18	0.49	1.46	0.63	0.89	0.57
70+ years	9	1.19	0.82	1.53	1.03	0.83	0.67
Total	2,127	1.32	0.59	1.70	0.87	0.93	0.57
Test of significance		F(5,2120)=2.145; p=0.058		F(5,2120)=5.581; p<0.001		F(5,2120)=3.035; p=0.010	
Country of birth							
Australia	1,721	1.31	0.58	1.71	0.86	0.92	0.56
Overseas	381	1.30	0.63	1.65	0.88	0.96	0.60
Total	2,102	1.31	0.59	1.70	0.87	0.93	0.57
Test of significance		F(1,2099)=0.096; p=0.756		F(1,2099)=1.347; p=0.246		F(1,2099)=1.364; p=0.243	
Language at home							
Other than English	190	1.40	0.68	1.78	1.02	1.01	0.59
English	1,937	1.31	0.58	1.70	0.85	0.92	0.57
Total	2,127	1.32	0.59	1.70	0.87	0.93	0.57
Test of significance		F(1,2124)=3.873; p=0.049		F(1,2124)=1.653; p=0.199		F(1,2124)=4.636; p=0.031	
Employment status							
Full-time	1,610	1.35	0.59	1.78	0.87	0.91	0.55
Part-time	517	1.22	0.60	1.47	0.81	0.97	0.61
Total	2,127	1.32	0.59	1.70	0.87	0.93	0.57
Test of significance		F(1,2124)=17.807;p<0.001		F(1,2124)=50.722; p<0.001		F(1,2124)=3.991; p=0.056	
Householders aged 5+							
One person	206	1.30	0.57	1.64	0.86	0.96	0.57
Two persons	755	1.34	0.56	1.76	0.83	0.92	0.52
Three-four persons	920	1.30	0.59	1.65	0.84	0.94	0.60
More than four	243	1.33	0.71	1.78	1.04	0.88	0.61
Total	2,125	1.32	0.59	1.70	0.87	0.93	0.57
Test of significance		F(1,2120)=0.816; p=0.485		F(1,2120)= 3.014; p=0.029		F(1,2120)=0.979; p=0.403	
ARIA category [(a)]							
Highly accessible	2,035	1.30	0.61	1.67	0.88	0.94	0.58
Accessible	258	1.36	0.55	1.76	0.77	0.95	0.59
Moderately accessible	82	1.48	0.63	1.92	0.87	1.04	0.60
Remote	24	1.54	0.46	2.06	0.81	1.00	0.63
Very remote	21	1.08	0.66	1.40	0.96	0.75	0.51
Total	2,419	1.31	0.60	1.69	0.87	0.94	0.58
Test of significance		F(4,2414)= 3.652; p=0.006		F(4,2414)= 3.864; p=0.004		F F(4,2414)= 1.210; p=0.304	

(a) Accessibility/Remoteness Index of Australia

8.6.4 Work-home interference and oral health

Decayed and missing teeth

The relationships between interference scores and mean numbers of decayed and missing teeth are reported in Table 8.36. Workers with higher interference scores on the overall scale and both subscales reported significantly greater numbers of decayed teeth.

Difference in missing teeth according to levels of inter-role conflict were only significant on the home interferes with work subscale. Workers reporting a mid-range level of interference, reported the highest numbers of missing teeth.

Table 8.36: Decayed and missing teeth by work-home interference (dentate persons, weighted data)

	Decayed			Missing teeth		
	df	F	Sig.	df	F	Sig.
Work-home interference	37, 1768	3.696	<0.001	37, 2033	1.298	0.109
Work interferes home subscale	19, 1786	4.518	<0.001	19, 2051	2.116	0.003
Home Interferes work subscale	18, 1787	2.933	<0.001	18, 2052	1.017	0.436

	Decayed teeth					Missing teeth				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Work-home interference										
Low	417	0.68	1.55	0.53	0.83	463	1.65	3.65	1.32	1.98
Low-moderate	347	0.73	1.30	0.59	0.87	403	2.50	5.01	2.01	2.99
Moderate	327	0.69	1.27	0.55	0.83	388	1.96	4.22	1.54	2.38
Moderate-High	430	0.63	1.21	0.52	0.75	488	2.08	4.61	1.67	2.49
High	285	1.30	1.83	1.09	1.51	330	2.23	4.31	1.76	2.70
Total	1806	0.78	1.45	0.71	0.85	2071	2.07	4.38	1.88	2.26
Test of significance	F (4, 1801) = 11.353; p <0.001					F (4, 2066) = 2.202; p = 0.067				
Work interferes home										
Low	510	0.77	1.57	0.64	0.91	589	2.05	4.42	1.70	2.41
Low-moderate	406	0.70	1.26	0.57	0.82	473	2.20	4.49	1.79	2.60
Moderate	324	0.63	1.26	0.49	0.77	372	1.74	4.07	1.32	2.15
Moderate-high	275	0.78	1.38	0.62	0.94	306	2.26	4.76	1.72	2.79
High	292	1.07	1.69	0.88	1.27	331	2.10	4.16	1.65	2.55
Total	1806	0.78	1.45	0.71	0.85	2071	2.07	4.38	1.88	2.26
Test of significance	F(4, 1801) =4.266; p = 0.002					F(4, 2066) = 0.776; p = 0.541				
Home interferes work										
Low	511	0.62	1.42	0.50	0.75	574	1.85	4.03	1.52	2.18
Low-moderate	262	0.80	1.37	0.63	0.96	278	1.54	3.24	1.16	1.92
Moderate	555	0.67	1.27	0.56	0.77	654	2.41	4.63	2.05	2.77
Moderate-high	162	1.18	1.85	0.89	1.47	190	2.32	5.57	1.53	3.12
High	317	1.01	1.55	0.84	1.18	375	2.07	4.48	1.62	2.53
Total	1806	0.78	1.45	0.71	0.85	2071	2.07	4.38	1.88	2.26
Test of significance	F (4, 1801) = 7.452; p < 0.001					F (4, 2066) = 2.540; p = 0.038				

Social impact and oral symptom experience

A significant graded relationship between inter-role conflict and the social impact of oral conditions was observed. On the overall scale, each quintile of increasing interference was matched with an increased level of social impact ranging from 0.37 to 0.74. Differences in social impact were also significant on the two subscales characterised by increasing impact with increasing interference. In terms of oral symptom experience, workers reporting greater interference on each scale/subscale also reported having experienced more oral symptoms over the previous 12 months. Differences were statistically significant.

Table 8.37: Social impact and oral symptom experience by work-home interference (dentate persons, weighted data)

	Social impact			Oral symptom experience		
	df	F	Sig.	df	F	Sig.
Work-home interference	37, 2060	4.962	<0.001	37, 2088	3.108	<0.001
Work interferes home subscale	19, 2078	5.069	<0.001	19, 2106	3.332	<0.001
Home Interferes work subscale	18, 2079	9.156	<0.001	18, 2107	4.227	<0.001

	Social impact					Oral symptom experience				
	N	Mean	SD	95% CI mean		N	Mean	SD	95% CI mean	
				Lower	Upper				Lower	Upper
Work-home interference										
Low	458	0.37	0.39	0.33	0.41	473	1.00	1.02	0.91	1.09
Low-moderate	403	0.47	0.46	0.43	0.52	408	1.07	0.98	0.97	1.17
Moderate	395	0.55	0.55	0.50	0.60	398	1.15	0.95	1.06	1.25
Moderate-high	502	0.56	0.51	0.51	0.60	505	1.10	0.95	1.02	1.19
High	340	0.74	0.63	0.67	0.81	342	1.53	1.10	1.41	1.65
Total	2098	0.53	0.52	0.51	0.55	2127	1.15	1.01	1.11	1.19
Test of significance	F(4, 2093) = 27.658; p <0.001					F(4, 2121) = 16.036; p <0.001				
Work interferes										
Low	590	0.48	0.51	0.44	0.52	599	1.10	1.06	1.02	1.19
Low-moderate	480	0.47	0.48	0.43	0.52	494	1.05	0.93	0.97	1.13
Moderate	379	0.48	0.46	0.44	0.53	382	1.07	0.95	0.97	1.16
Moderate-high	309	0.59	0.50	0.53	0.65	312	1.16	1.03	1.05	1.28
High	339	0.68	0.63	0.61	0.75	340	1.46	1.05	1.35	1.58
Total	2098	0.53	0.52	0.51	0.55	2127	1.15	1.01	1.11	1.19
Test of significance	F(4, 2093) = 11.942; p <0.001					F(4, 2121) = 10.510; p <0.001				
Home interferes										
Low	568	0.38	0.42	0.34	0.41	584	0.95	0.93	0.87	1.02
Low-moderate	279	0.58	0.53	0.52	0.65	284	1.28	1.04	1.16	1.40
Moderate	668	0.52	0.49	0.48	0.56	673	1.13	0.96	1.06	1.21
Moderate-high	192	0.50	0.44	0.43	0.56	192	1.35	1.03	1.20	1.49
High	390	0.74	0.64	0.67	0.80	394	1.29	1.11	1.18	1.40
Total	2098	0.53	0.52	0.51	0.55	2127	1.15	1.01	1.11	1.19
Test of significance	F (4, 2093) = 30.545; p < 0.001					F (4, 2121) = 10.955; p < 0.001				

Self-rated oral health

A decreasing proportion of workers rated their oral health as excellent with each successive quintile of interference scores. While 15.6% of those with least interference rated their oral health as excellent, only 9.4% of those in quintile 5 perceived their oral health to be excellent. More than a quarter of those with most interference (27.4%) rated their oral health as average or poorer, compared with 17.7% of workers with least interference. Differences were statistically significant on each scale/subscale.

Table 8.38: Self-rated oral health by work-home interference (dentate persons, weighted data)

		Self-rated oral health					Test of significance		
		Very poor or poor	Average	Good	Very good	Excellent	Pearson's Chi-square		
		Row %	Row %	Row %	Row %	Row %	Value	df	Asymp. sig. (2-sided)
Work-home interference							66.047	16	<0.001
	n	99	362	670	755	237			
Low		6.5	11.2	28.3	38.4	15.6			
Low-moderate		3.4	17.0	30.8	33.7	15.0			
Moderate		2.8	19.3	35.3	32.3	10.3			
Moderate-high		4.6	17.9	31.0	40.9	5.8			
High		5.9	21.5	33.5	29.7	9.4			
Total		4.7	17.1	31.6	35.6	11.2			
Work interferes home							65.194	16	<0.001
	n	98	362	670	754	239			
Low		5.5	14.5	33.2	32.9	13.9			
Low-moderate		4.3	14.4	30.8	38.7	11.8			
Moderate		1.6	18.9	35.2	32.3	12.1			
Moderate-high		7.4	19.2	21.8	45.8	5.8			
High		4.4	21.3	34.6	29.6	10.1			
Total		4.6	17.1	31.6	35.5	11.3			
Home interferes work							66.652	16	<0.001
	n	98	361	671	755	238			
Low		5.8	14.4	25.9	36.0	18.0			
Low-moderate		3.9	17.3	34.6	40.6	3.5			
Moderate		3.6	18.4	32.5	35.8	9.7			
Moderate-high		3.1	18.7	39.9	30.1	8.3			
High		5.9	17.6	32.3	33.6	10.7			
Total		4.6	17.0	31.6	35.6	11.2			

8.7 Summary of bivariate associations

Conditions of the work environment were associated with adult oral health (Table 8.39). Adults who worked up to 20 hours had greatest social impact. Other oral health differences were not significant. Adults in secure jobs had least social impact and the smallest proportion with poor self-rated oral health. Other oral health differences were not significant. Adults at no risk of skill obsolescence had least social impact and a small proportion rated their oral health poorly. Other oral health differences were not significant. Adults with lowest decision-making authority had most oral symptoms, while adults with greatest authority had least social impact and the smallest proportion with poor self-rated oral health. Other oral health differences were not significant. Adults with lowest personal freedom had the highest mean decayed teeth, greatest social impact, most oral symptoms and the smallest proportion with poor self-rated oral health. Oral health differences based on levels of skill discretion were only significant for self-rated oral health, where a smaller proportion of workers with higher skill discretion rated their oral health poorly. Adults who perceived their job to be psychologically demanding had significantly more missing teeth and more oral symptoms. Other oral health differences were not significant. Adults with higher opportunity for social interaction at work reported significantly lower social impact scores. Other oral health differences were not significant. Adults who met with co-workers outside work reported lower social impact and a smaller proportion rated their oral health poorly. However, they reported more oral symptoms compared with those who did not meet co-workers outside work. Adults with high scores for work interfering with home had highest mean decayed teeth, greatest social impact and most oral symptoms. A higher proportion had poor self-rated health than those with low to moderate levels of work interference with home. Adults with low levels of home interfering with work reported fewest decayed teeth, lowest social impact and fewest oral symptoms. They had fewer missing teeth than adults with scores in the moderate to high range.

Table 8.39: Summary of bivariate associations between work-related factors and oral health

	Decayed	Missing teeth	Social impact	Symptoms	Self-rated average or poorer
Structure of work					
Hours worked (increase)	p>0.05	p>0.05	p<0.001 -	p>0.05	p>0.05
Job security (decrease)	p>0.05	p>0.05	p<0.001 +	p>0.05	P<0.05 +
Skill obsolescence (decrease)	p>0.05	p>0.05	p<0.001 -	p>0.05	p<0.001 -
Workplace autonomy					
Decision-making	p>0.05	p>0.05	p<0.001 -	p<0.001 -	p<0.01 -
Personal freedom	p<0.05 -	p>0.05	p<0.001 -	p<0.001	p<0.01
Skill discretion	p>0.05	p>0.05	p>0.05	p>0.05	p<0.05 -
Psych demanding	p>0.05	p<0.05 -	p<0.01 -	p>0.05	p>0.05
Work-related interaction					
Social interaction at work	p>0.05	p>0.05	p<0.01 -	p>0.05	p>0.05
Outside of work	p>0.05	p>0.05	p>0.05	p<0.001 +	p<0.01 -
Work-home interference					
Work interferes home	p<0.01 +	p>0.05	p<0.001 +	p<0.001 +	p<0.05 +
Home interferes work	p<0.01 +	p<0.001 +	p<0.05 +	p<0.01 +	p>0.05

ns p>0.05 level (ANOVA or chi-square)
* p<0.05 (ANOVA or chi-square)
† p<0.01 (ANOVA or chi-square)
‡ p<0.001 (ANOVA or chi-square)

The independent variables were examined for the strength and direction of their association. Correlation and probability values were computed (Table 8.40). Correlations between workplace factors were generally significant and modest. The strongest association between decision authority and personal freedom was in the weak to moderate range (Pearson coefficient = 0.54). Other coefficient values were lower. As expected, the work-home interference variables tended to be negatively associated with other variables, but most associations were positive.

Table 8.40: Correlation matrix of work-related subscales (dentate persons, weighted data)

		Decision authority	Personal freedom	Skill discretion	Psych demand	Work interaction	Outside interaction	Work interferes	Home interferes
Decision authority	Coefficient	1.000	0.539**	0.323**	0.063**	0.336**	0.084**	-0.178**	-0.123**
	p value	.	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001
	N	2,401	2,401	2,401	2,379	2,371	2,371	2,388	2,388
Personal freedom	Coefficient		1.000	0.200**	0.028	0.409**	0.122**	-0.188**	-0.132**
	p value		.	<0.001	0.174	<0.001	<0.001	<0.001	<0.001
	N		2,401	2,401	2,379	2,371	2,371	2,388	2,388
Skill discretion	Coefficient			1.000	0.350**	0.172**	0.168**	0.066**	-0.109**
	p value			.	<0.001	<0.001	<0.001	0.001	<0.001
	N			2,401	2,379	2,371	2,371	2,388	2,388
Psych demanding	Coefficient				1.000	-0.005	0.107**	0.210**	-0.040
	p value				.	0.800	<0.001	<0.001	0.051
	N				2,411	2,386	2,386	2,401	2,401
Work interaction	Coefficient					1.000	0.182**	-0.119**	-0.072**
	p value					.	<0.001	<0.001	<0.001
	N					2,402	2,402	2,395	2,395
Outside interaction	Coefficient						1.000	-0.037	-0.026
	p value						.	0.068	0.208
	N						2,402	2,395	2,395
Work interferes	Coefficient							1.000	0.357**
	p value							.	<0.001
	N							2,427	2,427
Home interferes	Coefficient								1.000
	p value								.
	N								2,427

*** Correlation is significant at the 0.01 level (2-tailed).*

8.8 Multivariate analysis

Decayed teeth

The model explained 7.4% of the variance in decayed teeth (Table 8.41). Of variables entered in block 2, occupational prestige had the greatest effect followed by household income of $20,000-$50,000. After controlling for demographic and socioeconomic factors, three work-related factors were significant in the model. Part-time work (relative to the standard working week) and both work-home and home-work interference were positively associated with decayed teeth.

Table 8.41: Multiple linear regression model: Decayed teeth (dentate persons, weighted data, all workers)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1	0.055	0.048	0.055	7.429	12,1528	<0.001
2	0.088	0.074	0.033	4.553	12,1516	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	0.335	0.736		0.649
	Male	0.150	0.080	0.052	0.061
	Age in years	0.005	0.003	0.043	0.107
	Australian-born	0.035	0.098	0.009	0.722
	Speaks English at home	-0.277	0.144	-0.049	0.055
	Householders aged 5+	0.015	0.031	0.013	0.630
	ARIA score	-0.003	0.023	-0.003	0.910
	Income <$20,000	0.333	0.181	0.050	0.066
	Income $20 to $50,000	0.357	0.081	0.121	<0.001
	Income >$50,000 (ref)				
	Up to secondary eduction	-0.014	0.104	-0.004	0.895
	Vocational education or other	0.130	0.088	0.043	0.143
	Tertiary education (ref)				
	Occupational prestige†	0.017	0.004	0.127	<0.001
	IRSD Area Disadvantage	-0.001	0.001	-0.076	0.006
Step 2	Work up to 30 hours	0.217	0.103	0.066	0.035
	Work 30-40 hours (ref)				
	Work >40 hours	0.156	0.092	0.055	0.090
	Job is secure	0.012	0.076	0.004	0.871
	Skills won't be obsolete	-0.048	0.074	-0.017	0.515
	Decision-making authority	0.035	0.081	0.014	0.664
	Personal freedom	-0.066	0.079	-0.026	0.401
	Skill discretion	0.073	0.077	0.028	0.343
	Psych demanding	0.089	0.086	0.029	0.303
	Interaction at work	0.025	0.170	0.004	0.884
	Interaction outside work	0.139	0.089	0.041	0.121
	Work interferes with home	0.130	0.049	0.079	0.008
	Home interferes with work	0.275	0.070	0.106	<0.001

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Missing teeth

As presented in Table 8.42, the model explained 24.1% of the variance in missing teeth for all workers. After controlling for sociodemographic variables, work-related variables contributed less than 2% of the explained variance. Apart from age, other significant sociodemographic variables positively associated with missing teeth were secondary education, low occupational prestige and area disadvantage. Of the work-related variables, personal freedom, psychological demand, social interaction outside work and home interfering with work were positively associated with missing teeth. Negatively associated were social interaction at work and work interfering with home.

Table 8.42: Multiple linear regression model: Missing teeth (dentate persons, weighted data, all workers)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1	0.233	0.227	0.233	44.042	12, 1742	<0.001
2	0.252	0.241	0.019	3.617	12, 1730	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	-1.021	1.941		0.599
	Male	0.209	0.209	0.024	0.317
	Age in years	0.179	0.009	0.478	<0.001
	Australian-born	0.396	0.256	0.034	0.121
	Speaks English at home	-0.608	0.368	-0.036	0.099
	Householders aged 5+	-0.152	0.081	-0.042	0.061
	ARIA score	-0.004	0.059	-0.002	0.945
	Income <$20,000	0.822	0.462	0.041	0.075
	Income $20 to $50,000	0.197	0.210	0.022	0.349
	Income >$50,000 (ref)				
	Up to secondary eduction	0.584	0.266	0.055	0.028
	Vocational education or other	0.343	0.228	0.037	0.133
	Tertiary education (ref)				
	Occupational prestige†	0.040	0.011	0.098	<0.001
	IRSD Area Disadvantage	-0.005	0.001	-0.089	<0.001
Step 2	Work up to 30 hours	0.457	0.269	0.045	0.090
	Work 30-40 hours (ref)				
	Work >40 hours	0.083	0.239	0.009	0.729
	Job is secure	-0.083	0.199	-0.009	0.676
	Skills won't be obsolete	-0.150	0.193	-0.017	0.435
	Decision-making authority	-0.206	0.213	-0.026	0.333
	Personal freedom	0.730	0.207	0.093	<0.001
	Skill discretion	-0.332	0.203	-0.041	0.103
	Psych demanding	0.644	0.226	0.068	0.004
	Interaction at work	-0.973	0.446	-0.052	0.029
	Interaction outside work	0.562	0.233	0.053	0.016
	Work interferes with home	-0.082	0.127	-0.016	0.521
	Home interferes with work	0.549	0.183	0.069	0.003

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Social impact

The model for all workers explained 16.1% of the variance in social impact scores and work-related factors accounted for more than 10% of the explained variance (Table 8.43). Among sociodemographic factors, age, LOTE at home, low prestige and area disadvantage were each positively associated with social impact scores. Of the work-related variables, part-time work, skill discretion, psychologically demanding work, work-home interference and home-work interference were positively associated with social impact. Factors negatively associated with social impact scores were job security, no risk of skill obsolescence and decision-making authority. Of all significant factors in the model, the greatest effect was for LOTE.

Table 8.43: Multiple linear regression model: Social impact (dentate, weighted, all workers)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1	0.064	0.057	0.064	9.982	12, 1766	<0.001
2	0.172	0.161	0.108	19.126	12, 1754	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	0.516	0.244		0.035
	Male	0.003	0.026	0.003	0.911
	Age in years	0.003	0.001	0.070	0.003
	Australian-born	-0.047	0.032	-0.034	0.141
	Speaks English at home	-0.334	0.045	-0.170	<0.001
	Householders aged 5+	-0.001	0.010	-0.002	0.926
	ARIA score	-0.004	0.007	-0.012	0.605
	Income <$20,000	0.011	0.057	0.004	0.854
	Income $20 to $50,000	-0.011	0.026	-0.010	0.672
	Income >$50,000 (ref)				
	Up to secondary eduction	-0.007	0.033	-0.006	0.834
	Vocational education or other	0.048	0.028	0.043	0.092
	Tertiary education (ref)				
	Occupational prestige†	0.005	0.001	0.113	<0.001
	IRSD Area Disadvantage	<0.001	<0.001	-0.057	0.021
Step 2	Work up to 30 hours	0.094	0.033	0.078	0.005
	Work 30-40 hours (ref)				
	Work >40 hours	-0.019	0.030	-0.018	0.523
	Job is secure	-0.066	0.025	-0.063	0.008
	Skills won't be obsolete	-0.093	0.024	-0.088	<0.001
	Decision-making authority	-0.096	0.026	-0.101	<0.001
	Personal freedom	-0.020	0.026	-0.022	0.430
	Skill discretion	0.059	0.025	0.061	0.021
	Psych demanding	0.097	0.028	0.087	0.001
	Interaction at work	0.096	0.058	0.042	0.097
	Interaction outside work	0.015	0.029	0.012	0.611
	Work interferes with home	0.088	0.016	0.146	<0.001
	Home interferes with work	0.140	0.022	0.149	<0.001

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Oral symptom experience

The model for all workers explained only 5.4% of the variance in oral symptom experience (Table 8.44). However, work-related explained more variance than demographic and socioeconomic factors combined. Three of the 12 sociodemographic factors were positively associated with oral symptom experience. These were geographic remoteness, secondary education (relative to tertiary) and area disadvantage. Six of the 12 work-related factors were significant in the model and all were positively associated with oral symptom experience. These were decision-making authority, skill discretion, psychologically demanding work, social interaction outside of work, and both subscales on the home and interference scale.

Table 8.44: Multiple linear regression model: Oral symptom experience (dentate, weighted, all workers)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1	0.023	0.017	0.023	3.538	12, 1785	<0.001
2	0.067	0.054	0.044	6.940	12, 1773	<0.001

Block 2		β	**Std. error**	**Beta**	**Sig.**
Step 1	(Constant)	1.752	0.504		0.001
	Male	0.013	0.054	0.006	0.811
	Age in years	-0.001	0.002	-0.011	0.655
	Australian-born	-0.059	0.066	-0.022	0.368
	Speaks English at home	-0.137	0.093	-0.035	0.142
	Householders aged 5+	-0.001	0.021	-0.001	0.978
	ARIA score	-0.047	0.015	-0.075	0.002
	Income <$20,000	0.125	0.119	0.027	0.293
	Income $20 to $50,000	0.005	0.054	0.002	0.930
	Income >$50,000 (ref)				
	Up to secondary eduction	-0.205	0.069	-0.083	0.003
	Vocational education or other	0.065	0.059	0.030	0.271
	Tertiary education (ref)				
	Occupational prestige†	<0.001	0.003	0.003	0.933
	IRSD Area Disadvantage	-0.001	<0.001	-0.064	0.013
Step 2	Work up to 30 hours	0.046	0.070	0.019	0.509
	Work 30-40 hours (ref)				
	Work >40 hours	-0.077	0.062	-0.037	0.213
	Job is secure	0.084	0.052	0.040	0.105
	Skills won't be obsolete	-0.086	0.050	-0.041	0.086
	Decision-making authority	-0.148	0.055	-0.079	0.007
	Personal freedom	0.044	0.054	0.024	0.409
	Skill discretion	0.162	0.053	0.085	0.002
	Psych demanding	-0.155	0.058	-0.070	0.008
	Interaction at work	-0.105	0.115	-0.024	0.361
	Interaction outside work	0.275	0.060	0.110	<0.001
	Work interferes with home	0.131	0.033	0.111	<0.001
	Home interferes with work	0.150	0.047	0.081	0.001

* Low ARIA scores indicate greater remoteness
† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

Self-rated oral health

Binary logistic regression was used to calculate odds ratios (OR) and 95% confidence intervals (95% CI) for assessing the associations of work-related factors with average or poor self-rated oral health. Two models were constructed; one for all workers and one for those classified as managers, administrators or professionals (OR = 3.67, 95% CI: 2.39-5.64).

Speaking a LOTE was associated with a 2.3-fold increase in the odds of reporting only average or poorer oral health (95% CI: 1.6 to 3.4) for all workers and a 2.9-fold increase for managers, administrators and professionals. Education was a significant construct in the model, but household income and hours worked were not. Compared to tertiary education, having vocational education was associated with increased odds in both models for self-rating oral health unfavourably.

Several other factors were significant in the model for all workers, but were not important for those in more highly skilled occupations. People with low income had a 1.7-fold increase in the odds of rating their oral health poorly relative to those with income >$50,000. The interference of work on home life was associated with greater odds, and social interaction with colleagues outside work was associated with lower odds. The Nagelkerke R^2 statistics for the models was 1.104 for all workers and 0.150 for managers, administrators and professionals.

Table 8.45: Odds ratios and 95% C.I. for self-rating oral health as average or poorer (dentate only, weighted data)

	All workers				Manager/administer and professional			
	Odds ratio	95% C.I.		Sig.	Odds ratio	95% C.I.		Sig.
Sex								
Female	0.702	0.542	0.910	0.008	0.685	0.440	1.066	0.094
Male (ref)	1.000				1.000			
Age in years	1.022	1.011	1.032	<0.001	1.018	1.001	1.036	0.040
Overseas-born	0.943	0.698	1.274	0.702	0.934	0.569	1.533	0.786
Australian-born (ref)	1.000				1.000			
LOTE at home	2.309	1.557	3.424	<0.001	2.915	1.600	5.311	<0.001
English at home (ref)								
Householders 5+ years	1.021	0.926	1.126	0.678	1.166	0.992	1.370	0.062
ARIA score *	1.042	0.973	1.116	0.237	1.056	0.934	1.195	0.384
Household income				0.074				0.430
<$20,000	1.719	1.068	2.768	0.026	0.846	0.305	2.345	0.748
$20,000-$50,000	1.032	0.798	1.336	0.808	1.301	0.834	2.030	0.246
>$50,000 (ref)	1.000				1.000			
Educational attainment				<0.001				<0.001
Secondary or less	1.369	0.975	1.921	0.070	1.308	0.721	2.374	0.377
Vocational or other	2.193	1.659	2.900	<0.001	3.423	2.164	5.415	<0.001
Tertiary (ref)	1.000				1.000			
Occupational prestige †	0.996	0.983	1.009	0.533	0.979	0.948	1.011	0.198
Area disadvantage ‡	1.000	0.998	1.001	0.682	1.002	0.998	1.005	0.316
Hours worked				0.466				0.213
Up to 30 hours (ref)	1.000				1.000			
30-40 hours	0.987	0.713	1.366	0.936	0.574	0.308	1.070	0.081
>40 hours	0.835	0.585	1.190	0.318	0.748	0.416	1.343	0.331
Job security at risk	0.914	0.713	1.172	0.480	1.020	0.680	1.529	0.924
Job is secure (ref)	1.000				1.000			
Risk of skill obsolescence	1.115	0.876	1.418	0.377	1.014	0.685	1.502	0.944
No risk of skill obsolescence (ref)								
Decision-making authority	0.636	0.491	0.824	0.001	0.825	0.500	1.360	0.451
Personal freedom	1.117	0.866	1.440	0.395	0.993	0.628	1.570	0.976
Skill discretion	0.846	0.661	1.084	0.186	0.756	0.459	1.244	0.271
Not psych demanding	0.881	0.669	1.161	0.370	1.146	0.683	1.922	0.607
Psych demanding (ref)	1.000				1.000			
Social interaction at work	1.475	0.853	2.552	0.164	0.490	0.200	1.205	0.120
Social interaction outside	0.707	0.534	0.935	0.015	1.028	0.603	1.754	0.919
Work interferes with home	1.255	1.073	1.467	0.004	1.255	0.969	1.624	0.085
Home interferes with work	1.037	0.833	1.291	0.746	1.253	0.858	1.830	0.243
Constant	0.158			0.128	0.101			0.272
Nagelkerke R square	0.104				0.150			

* Low ARIA scores indicate greater remoteness

† Low prestige scores indicate higher prestige

‡ Low IRSD values indicate more disadvantaged areas

8.9 References to Chapter 8

[1] Australian Bureau of Statistics. Australian Social Trends 2000. July 2000. Catalogue No. 4102.0.

[2] Australian Bureau of Statistics. Working Arrangements, Australia. November 2000. Catalogue No. 6342.0.

[3] Australian Council of Trade Unions. Written Submission in The Unions Reasonable Hours Test Case presented to the Australian Industrial Relations Commission, September 2001.

[4] Karasek RA, Theorell T. (1990). Healthy work: Stress, productivity and the reconstruction of working life. New York: Basic Books.

9. Conceptual framework and final multivariate models

Although the role of social factors in affecting oral health is well documented, the mechanisms by which they produce variation in population oral health are poorly understood. Indeed, these relationships are seemingly so intractable that very little progress has been made in developing policy and programs to reduce social variation in oral health. This study attempted to close the research gap by advancing the understanding of how social determinants are associated with self-reported oral health. Reported in the previous five chapters were the empirical findings of this study. Each of these chapters investigated a separate construct introduced in the conceptual framework in Chapter 1. In Chapter 9 the associations investigated separately in the earlier chapters are integrated in multivariate analyses for each of the five outcome variables. The conceptual framework shows that political and economic processes operating at a macrosocial level shape the social contexts in which people live and work. Over the life course characteristics of these environments constrain or promote access to material and psychosocial resources necessary to buffer against exposure to health risks, maintain health and influence health-relevant behaviours.

9.1 Conceptual framework

Before proceeding with the final multivariate analyses, the associations investigated in Chapters 4 to 8 are discussed with reference to the conceptual framework. These associations are depicted in Figure 9.1. Analysis began in Chapter 4 with the investigation of the socioeconomic distribution of oral health. The central objective was to evaluate whether variation in oral health was found using self-assessed measures among dentate adults in a nationally representative sample. Having confirmed this premise, and so that these inequalities might be better understood, Chapters 5 to 8 examined the associations between oral health and each of dental behaviour, psychosocial factors, childhood environment and workplace environment. Also assessed were the socioeconomic and demographic distributions of these variables to test the hypothesis that mechanisms that potentially produce variation in oral health are similarly distributed across a socioeconomic gradient.

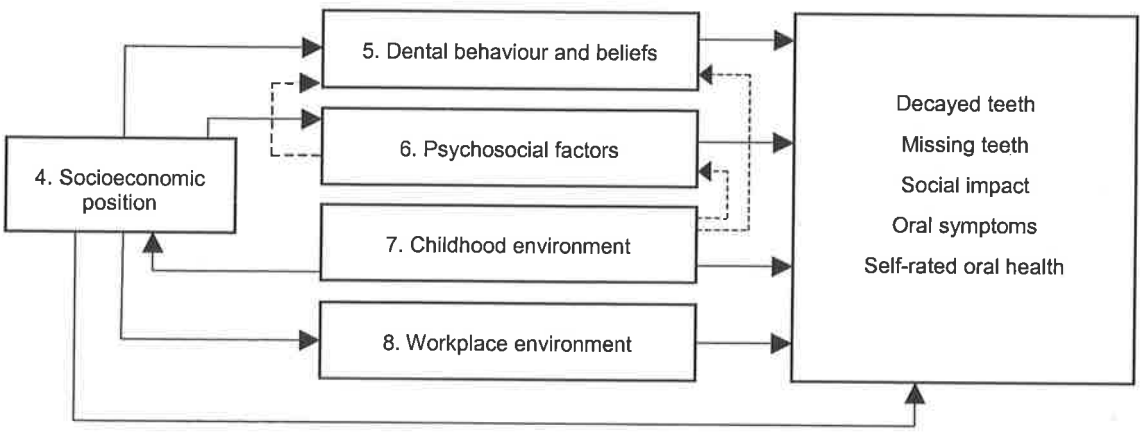

Figure 9.1: Summary of relationships explored in Chapters 4 to 8

In Chapter 6 the analysis was extended to examine the relationship between psychosocial factors and dental behaviour. Findings indicated positive associations between dental behaviours and the psychosocial resources of personal control, social support, coping capacity and life satisfaction.

In Chapter 7 further analysis examined associations between childhood conditions and dental behaviour and psychosocial resources in adulthood. Obtaining information about childhood circumstance enabled some indication of the temporal ordering of circumstances. Results showed clear associations between socioeconomic and psychosocial advantage in childhood and greater psychosocial resource in adulthood. Also revealed were positive associations between socioeconomic and psychosocial advantages in childhood and favourable dental behaviours in adulthood.

The conceptual framework (Figure 9.2) depicts the social determinants that are the major pathways that underlie population oral health. Other pathways not presented schematically are also likely to operate. Bi-directional relationships may occur; for instance where physiological change may prompt behaviour modification or where poor oral health disrupts social networks and health self-efficacy. Because this study was limited to intermediate determinants at a mesosocial level, not all relationships depicted were examined. The effect of macrosocial determinants was not addressed and neither were the effects of psychosocial and behavioural factors on physiological outcomes. Also not examined was the independent effect on oral health of contextual factors such as neighbourhood living conditions.

The conceptual framework shows that the macrosocial environment and social context establish conditions that influence individual socioeconomic circumstance. Childhood environment also influences social circumstance in adulthood. Ultimately biological expressions of relative inequality are mediated through the psychosocial impact of different material circumstances (for which socioeconomic indicators are a proxy) experienced across the life course. These psychosocial risk and protective factors are distributed across a socioeconomic gradient and act as pathways through which progressively more distal social conditions are channelled. The most proximal determinants of oral morbidity are dental behaviours. Psychosocial factors either affect health directly via the body's defence mechanisms or are indirectly relayed via health relevant behaviour.

In the past oral health research has examined many of these relationships in isolation, but to a large extent these studies have not been integrated and have lacked a theoretical underpinning. Only recently with the work of Holst and colleagues[1] has a theoretical model emerged in the dental literature to serve as a useful framework for investigating oral health inequalities from a social epidemiological perspective.

The importance of the framework presented in this study rests not only in showing that social conditions are associated with oral health, but also in making clear the implicit message that social conditions can potentially be altered to improve oral health through social and economic policies.

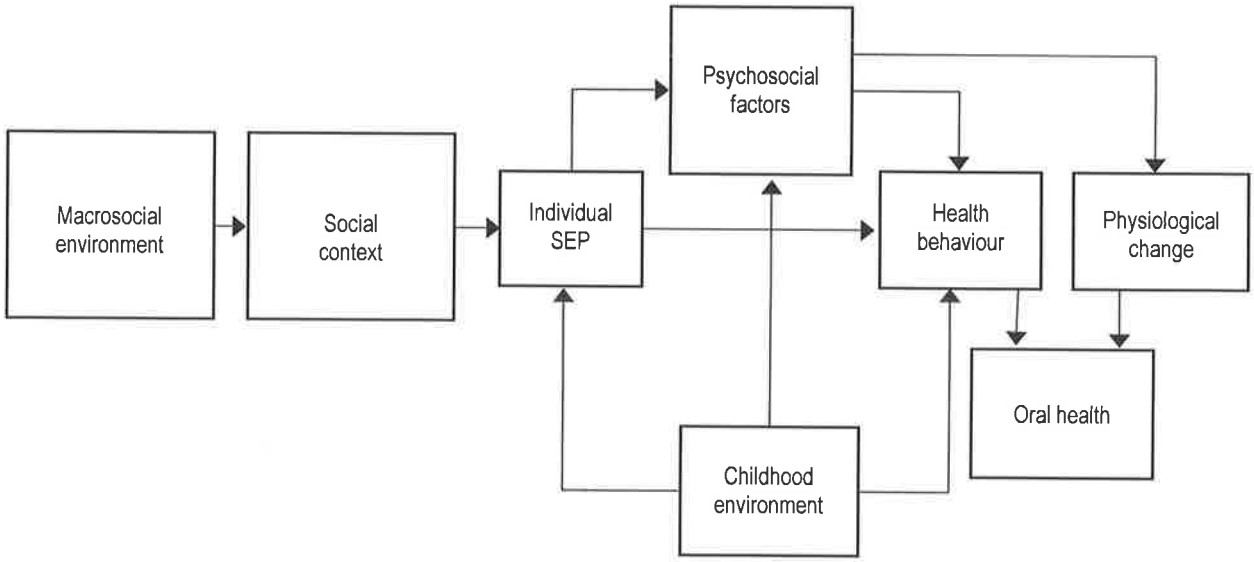

Figure 9.2: Revisiting the conceptual framework explaining social variation in adult oral health

9.2 Multivariate models

A final multivariate statistical model was constructed for each oral health outcome so that significant independent variables from earlier analysis could be jointly analysed. Hierarchical multiple linear regression techniques were used for four continuous dependent variables. In this procedure, the order of entry of the variables was determined a priori, on the basis of theoretical considerations guided by the conceptual framework. The framework proposed five major domains that contribute to social variation in oral health in dentate adults: (1) childhood; (2) socioeconomic; (3) contextual; 4) psychosocial; and 5) dental behavioural.

Independent variables were entered in the combination and order proposed in the conceptual framework. Entered in the first step were factors relating to childhood, as these precede social circumstances in adulthood. Following these, demographic and socioeconomic factors were entered together in the second step. Entered in the third step were work-related factors, as the workplace represented a social context. These were followed in step 4 by psychosocial factors, and finally factors pertaining to dental behaviours and beliefs argued to be proximal correlates of oral health were entered in the fifth step.

Age, sex, country of birth, language spoken at home and concession card status were included in all models. This provided some consistency when the models for different oral health outcomes were compared.

In addition, it enabled their independent effect to be observed while controlling for potential confounding, such as gender differences in utilisation behaviour. The subscales that formed scales were not treated as unique constructs, so where only one subscale was significantly associated with the dependent variable, both subscales were entered into regression models.

Through observation of the change in R^2 at each step, the relative importance of the major domains in explaining variation in the dependent variable could be evaluated. Tables presenting regression coefficients have been abbreviated to show only results for the combined variables at the final (fifth) step. Some information is omitted by doing this, such as the changes in significance of associations and changes in direction of relationship with the introduction of subsequent blocks of variables.

9.2.1 Decayed teeth

Summarised in Table 9.1 are the regression results for decayed teeth. A summary table displays R squared, adjusted R squared, and the standard error. Change statistics show the change in the R squared statistic produced with each additional block of variables. The R^2 statistic was 0.231 (adjusted R^2 21.9). The R^2 change statistic revealed that dental behaviour accounted for 13.3% of the explained variance.

Regression coefficients are presented for all independent variables at the fifth step. Childhood factors were important to self-assessed dental caries in adulthood. Adults whose parents were separated when they were aged 10 reported a higher level of untreated dental caries in adulthood than adults whose parents cohabited. Adults who rated the rearing style of their primary care-giver as positive and supportive reported less decay than adults who perceived a negative rearing style. Maternal occupation as manager, administrator or professional was predictive of a higher level of decay.

Of the demographic factors, sex was not significantly associated with decayed teeth. Decay increased with age and was positively associated with being Australian-born. There was no effect for language at home. Socioeconomic inequality in decayed teeth was apparent. Low prestige, eligibility for concession, and area disadvantage were positively associated with decayed teeth. Household income of $20,000 to $50,000 (but not lower income) was positively associated with decay.

After controlling for demographic and socioeconomic characteristics, two workplace variables were positively associated with tooth decay. Workers who perceived their job to be psychologically demanding reported more decay, as did workers for whom home activities interfered with their work. Of the two stress subscales, coping was not significant, but distress was positively associated with decayed teeth, as was socioeconomic inequality within small geographical areas.

Of all independent variables, dental visiting had the greatest effect and was inversely related to decay. However, there was no significant relationship between self-care and decayed teeth. The average time between visits was also significant, with adults who reported two or more visits in a year reporting less decay. A sense of assurance was negatively associated with decay, but diffidence was not a significant factor. Satisfaction with dental care was inversely related to decayed teeth, and after dental visiting had the greatest effect.

Table 9.1: Multiple linear regression model: Decayed teeth (dentate persons, weighted data)

Model Summary

	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1. Childhood	0.003	0.002	0.003	1.933	3, 1681	0.122
2. Sociodemographic	0.063	0.057	0.060	11.893	9, 1672	<0.001
3. Workplace	0.086	0.078	0.023	13.752	3, 1669	<0.001
4. Psychosocial	0.098	0.088	0.012	7.380	3, 1666	<0.001
5. Dental behaviour	0.231	0.219	0.133	40.868	7, 1659	<0.001

Step 5. Decayed teeth		β	**Std. error**	**Beta**	**Sig.**
	(Constant)	3.502	0.738		<0.001
Childhood	Parents lived together	-0.268	0.115	-0.052	0.020
	Rearing positive and supportive	0.280	0.108	0.059	0.009
	Maternal occupation manager, administrator or professional	0.192	0.088	0.050	0.030
Sociodemographic	Sex (Male)	0.018	0.063	0.006	0.781
	Age in years	0.014	0.003	0.124	<0.001
	Country of birth (Australia)	0.164	0.080	0.047	0.039
	Language at home (English)	-0.189	0.120	-0.036	0.114
	Occupational prestige †	0.010	0.003	0.086	0.001
	Concession card holder	0.361	0.127	0.072	0.005
	IRSD Area Disadvantage ‡	-0.001	<0.001	-0.066	0.014
	Income <$20,000	-0.188	0.146	-0.033	0.196
	Income $20 to $50,000	0.230	0.066	0.081	0.001
	Income >$50,000 (ref)				
Workplace	Psychologically demanding	0.203	0.068	0.070	0.003
	Work interferes with home	-0.035	0.039	-0.023	0.374
	Home interferes with work	0.132	0.057	0.056	0.021
Psychosocial	Distress	0.100	0.069	0.041	0.150
	Coping	-0.052	0.074	-0.021	0.478
	Socioeconomic inequality	-0.001	<0.001	-0.047	0.068
Dental behaviour	Dental visiting	-0.427	0.043	-0.267	<0.001
	Dental self-care	0.007	0.054	0.003	0.898
	Average visit frequency (2+ year)	0.271	0.077	0.084	<0.001
	Need dental visit	-0.493	0.063	-0.181	<0.001
	Diffidence	-0.048	0.066	-0.023	0.473
	Assurance	-0.205	0.087	-0.075	0.019
	Satisfaction with services	-0.169	0.043	-0.095	<0.001

† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

9.2.2 Missing teeth

While behavioural factors were most important in explaining decayed teeth, sociodemographic factors, specifically age, dominated the variance explained in missing teeth (Table 9.2). The proportion of the variance explained by the model was 26.9%, and sociodemographic factors accounted for 21.0%. Despite the dominance of age in explaining population variation in missing teeth, several other factors significantly accounted for differences.

Among childhood factors, both paternal and maternal occupations as manager administrator or professional were significant in step 1 of the regression model (not shown) and both were negatively related to missing teeth. However, they failed to reach statistical significance in the presence of other of variables and the direction of maternal occupation altered.

In contrast to findings for other oral health outcomes, being Australian-born and speaking English at home were not associated with greater tooth retention. Being Australian-born was positively associated with missing teeth (borderline significance), and the effect of language spoken was not significant. Missing teeth was negatively associated with socioeconomic resource. Low occupational prestige, eligibility for concession card, area disadvantage and low income were each associated with greater missing teeth. The effect of income was stronger for those with household income between $20,000-$50,0000 than for income <$20,000.

Of the workplace factors, three variables were positively associated with missing teeth. A perception of being in a job that was psychologically demanding, interacting with colleagues outside of the workplace and home interfering with work were associated with greater missing teeth. The effect of social interaction at work was not significant, and work interfering with home was negatively associated with missing teeth.

There were four significant psychosocial factors associated with missing teeth. Social support was positively related to missing teeth, but number of social networks was negatively related to missing teeth. Strongly contrasting findings for other oral health outcomes, the effect of distress was not significant. However, coping was significant and was positively related to missing teeth. Also positively associated with missing teeth was relative inequality, as measured by the dispersion of IRSD values within CDs allocated to postcode areas.

After age, strongest effects were for dental behaviour. Dental visiting and dental self-care were negatively associated with missing teeth, while frequent visiting, diffidence and dental satisfaction were negatively associated with missing teeth.

Table 9.2: Multiple linear regression model: Missing teeth (dentate persons, weighted data)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1. Childhood	0.015	0.014	0.015	15.427	2, 1962	<0.001
2. Sociodemographic	0.225	0.221	0.210	58.767	9, 1953	<0.001
3. Workplace	0.231	0.225	0.006	3.063	5, 1948	0.009
4. Psychosocial	0.240	0.232	0.009	4.654	5, 1943	<0.001
5. Dental behaviour	0.279	0.269	0.038	17.103	6, 1937	<0.001

Step 5. Missing teeth		β	**Std. error**	**Beta**	**Sig.**
	(Constant)	-1.378	2.258		0.542
Childhood	Paternal occupation manager, administrator or professional	-0.188	0.183	-0.021	0.305
	Maternal occupation manager, administrator or professional	0.275	0.258	0.022	0.286
Sociodemographic	Sex (Male)	-0.105	0.175	-0.012	0.549
	Age in years	0.173	0.008	0.498	<0.001
	Country of birth (Australia)	0.427	0.224	0.039	0.056
	Language at home (English)	-0.384	0.322	-0.024	0.233
	Occupational prestige †	0.027	0.008	0.074	0.001
	Concession card holder	0.538	0.353	0.034	0.128
	IRSD Area Disadvantage ‡	-0.006	0.001	-0.108	<0.001
	Income <$20,000	0.729	0.385	0.042	0.059
	Income $20 to $50,000	0.433	0.184	0.049	0.019
	Income >$50,000 (ref)				
Workplace	Psychologically demanding	0.373	0.195	0.041	0.055
	Interaction at work	-0.378	0.382	-0.021	0.323
	Interaction outside work	0.539	0.210	0.052	0.010
	Work interferes with home	-0.241	0.112	-0.050	0.031
	Home interferes with work	0.346	0.162	0.047	0.033
Psychosocial	Social support	0.350	0.142	0.049	0.014
	Sum of social networks	-0.139	0.059	-0.047	0.018
	Distress	0.204	0.189	0.026	0.279
	Coping	0.710	0.201	0.091	<0.001
	Relative inequality	-0.003	0.001	-0.052	0.024
Dental behaviour	Dental visiting	-0.432	0.119	-0.086	<0.001
	Dental self-care	-0.986	0.150	-0.151	<0.001
	Average visit frequency (2+ year)	0.386	0.213	0.039	0.070
	Diffidence	0.655	0.183	0.103	<0.001
	Assurance	0.250	0.242	0.030	0.302
	Satisfaction with dental service	0.310	0.119	0.055	0.009

† Low prestige scores indicate higher prestige
‡ Low IRSD values indicate more disadvantaged areas

9.2.3 Social impact

Presented in Table 9.3 is the regression model for social impact. The model accounts for 25.1% of the variance in social impact, with workplace variables contributing most. The majority of variables were significantly associated with social impact scores. Those that were not were rearing style, sex, country of birth, work interferes with home, sum of social networks and coping capacity. A supportive rearing style in childhood was negatively associated with the social impact of oral conditions. This relationship persisted in the presence of demographic, socioeconomic and workplace factors. However, with the inclusion of psychosocial variables entered in step 4, differences were no longer significant. Of the demographic factors, social impact was greater for females, older people and those who did not speak English in the home. Country of birth was not significant. Social impact was greater among concession cardholders and adults living in areas with greater disadvantage. Having controlled for sociodemographic factors, social impact was negatively associated with job security and positively associated with a risk of skill obsolescence. Also positively associated with social impact were psychologically demanding work and the interference of home life on work.

The sum of networks was negatively associated with social impact. Thus, adults who were strongly integrated into the community reported less impact. Of all independent variables, distress had the greatest effect and was positively associated with social impact. Relative inequality was positively associated with social impact. There were five dental behavioral factors that were significantly associated with social impact. Dental visiting, self-care, perceived need for a visit and satisfaction with dental care were negatively associated with social impact, while frequent visiting was positively associated with impact scores.

Table 9.3: Multiple linear regression model: Social impact (dentate persons, weighted data)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1. Childhood	0.003	0.003	0.003	7.186	1, 2059	0.007
2. Sociodemographic	0.045	0.042	0.042	15.031	6, 2053	<0.001
3. Workplace	0.137	0.132	0.092	43.526	5, 2048	<0.001
4. Psychosocial	0.196	0.190	0.059	37.743	5, 2044	<0.001
5. Dental behaviour	0.259	0.251	0.062	34.396	5, 2039	<0.001

Step 5. Social impact		β	**Std. error**	**Beta**	**Sig.**
	(Constant)	1.820	0.206		<0.001
Childhood	Rearing positive and supportive	-0.019	0.036	-0.010	0.604
Sociodemographic	Sex (Male)	-0.040	0.021	-0.039	0.055
	Age in years	0.004	0.001	0.091	<0.001
	Country of birth (Australia)	-0.033	0.027	-0.025	0.213
	Language at home (English)	-0.227	0.038	-0.119	<0.001
	Concession card holder	0.095	0.038	0.049	0.013
	IRSD Area Disadvantage ‡	-0.001	<0.001	-0.104	<0.001
Workplace	Job is secure	-0.084	0.022	-0.080	<0.001
	Skills won't be obsolete	-0.081	0.021	-0.077	<0.001
	Psychologically demanding	0.075	0.023	0.068	0.001
	Work interferes with home	-0.006	0.013	-0.010	0.645
	Home interferes with work	0.088	0.019	0.099	<0.001
Psychosocial	Sum of social networks	-0.008	0.007	-0.021	0.279
	Distress	0.181	0.022	0.194	<0.001
	Coping	-0.035	0.023	-0.037	0.122
	Relative inequality	-0.001	<0.001	-0.098	<0.001
Dental behaviour	Dental visiting	-0.080	0.014	-0.131	<0.001
	Dental self-care	-0.079	0.017	-0.100	<0.001
	Average visit frequency (2+ year)	0.203	0.025	0.168	<0.001
	Need dental visit	-0.047	0.021	-0.046	0.023
	Satisfaction with dental service	-0.082	0.014	-0.120	<0.001

‡ Low IRSD values indicate more disadvantaged areas

9.2.4 Oral symptom experience

The regression model explained 9.1% of the variance in oral symptom experience and sociodemographic and workplace factors contributed most to the explained variance. The largest effect was for dental self-care, which was negatively associated with symptom experience. This finding makes sense since some of the symptoms (broken or chipped tooth, soft tissue pain or bleeding, and bad breath or taste) are responsive to self-care practices.

There was an effect for parental occupation. Paternal and maternal occupation in the manager, administrator or professional category was negatively associated with oral symptom experience.

No effects were observed for age, country of birth or language spoken at home. There was a socioeconomic effect. Secondary education relative to tertiary, and eligibility for a concession, were positively associated with symptom experience.

Psychosocial factors that had greatest effects were social interaction with colleagues outside of the workplace and distress. Both were positively associated with oral symptom experience. While social interaction outside of work was positively associated with oral symptoms, social support was negatively associated with symptom experience. Both home-work and work-home interference were positively associated with the experience of oral symptoms.

Perceived need for dental visiting and dental self-care were negatively associated with oral symptom experience, while the other behavioural variable – and dental visiting – was not significant.

Table 9.4: Multiple linear regression model: Oral symptom experience (dentate persons, weighted data)

Model summary

Block	R^2	Adjusted R^2	Change statistics			
			R^2 change	F change	df	Sig. F change
1. Childhood	0.006	0.005	0.006	4.757	3, 2204	0.003
2. Sociodemographic	0.033	0.028	0.026	8.462	7, 2197	<0.001
3. Workplace	0.059	0.053	0.027	15.621	4, 2193	<0.001
4. Psychosocial	0.073	0.066	0.014	10.896	3, 2190	<0.001
5. Dental behaviour	0.100	0.091	0.026	21.337	3, 2187	<0.001

Block 5.		β	**Std. error**	**Beta**	**Sig.**
	(Constant)	1.223	0.301		<0.001
Childhood	Rearing positive and supportive	-0.061	0.072	-0.018	0.392
	Paternal occupation manager, administrator or professional	-0.082	0.045	-0.040	0.070
	Maternal occupation manager, administrator or professional	-0.155	0.062	-0.054	0.013
Sociodemographic	Sex (Male)	-0.072	0.043	-0.036	0.096
	Age in years	<0.001	0.002	-0.005	0.816
	Country of birth (Australia)	-0.053	0.055	-0.021	0.342
	Language at home (English)	-0.058	0.080	-0.015	0.471
	Up to secondary education	-0.210	0.056	-0.087	<0.001
	Vocation or other education	0.065	0.048	0.031	0.178
	Tertiary education (ref)				
	Concession card holder	0.355	0.077	0.096	<0.001
Workplace	Interaction at work	0.133	0.091	0.031	0.145
	Interaction outside work	0.259	0.051	0.107	<0.001
	Work interferes with home	0.058	0.026	0.051	0.026
	Home interferes with work	0.082	0.039	0.048	0.037
Psychosocial	Social support	-0.101	0.035	-0.061	0.004
	Distress	0.170	0.045	0.094	<0.001
	Coping	0.087	0.045	0.048	0.052
Dental behaviour	Dental visiting	0.008	0.028	0.007	0.771
	Dental self-care	-0.200	0.035	-0.131	<0.001
	Need dental visit	-0.192	0.043	-0.096	<0.001

9.2.5 Self-rated oral health

The odds ratios and their 95% confidence intervals for rating oral health as average or poorer are reported in Table 9.5. Individuals with a perceived need for a dental visit had 2.2 times the odds (CI 1.9 to 2.7) of rating their oral health unfavourably compared with individuals with no perceived need. Individuals with vocational education had 1.7 times the odds (CI 1.3 to 2.1) compared with individuals with tertiary education. Also associated with greater odds for poor self-rated oral health were age, LOTE and diffidence. Dental visiting, frequent visiting and dental self-care were associated with lower odds for poor self-rated oral health. The pseudo R-square indicated that the model accounted for almost 20% of the variance in poor self-rated oral health.

Table 9.5: Odds ratios and 95% C.I. for self-rating oral health as average or poorer (dentate only, weighted data)

		Odds ratio	95% C.I.		Sig.
Sociodemographic	Female	1.073	0.891	1.293	0.456
	Male (ref)	1.00			
	Age in years	1.025	1.018	1.031	<0.001
	Country of birth (overseas)	0.968	0.765	1.225	0.786
	Country of birth Australia (ref)	1.00			
	Language at home (LOTE)	1.369	1.001	1.873	0.049
	Language at home English (ref)	1.00			
	Educational attainment				<0.001
	Secondary or less	1.143	0.895	1.440	0.284
	Vocational or other	1.644	1.320	2.048	<0.001
	Tertiary (ref)	1.00			
	Concession card holder	1.025	0.812	1.295	0.835
	Concession status no card (ref)	1.00			
Psychosocial	Relative inequality	0.999	0.998	1.000	0.091
Dental behaviour	Dental visiting	0.593	0.522	0.674	<0.001
	Dental self-care	0.610	0.519	0.716	<0.001
	Average visit frequency <twice year	0.577	0.461	0.723	<0.001
	Average visit frequency 2+ year (ref)	1.00			
	Need dental visit	2.222	1.837	2.687	<0.001
	No perceived need for visit (ref)	1.00			
	Diffidence	1.282	1.097	1.498	0.002
	Assurance	0.821	0.660	1.020	0.075
	Constant	1.064			0.887
	Nagelkerke R square =0.19.9				

9.3 Summary of final multivariate models

In the final multivariate models, blocks of variables were entered in the sequence nominated in the conceptual framework: childhood environment; sociodemographic factors; workplace environment; psychosocial factors; and dental behaviours and beliefs. Those that were significant are summarised in Table 9.6.

Childhood factors were important predictors of decayed teeth, and maternal occupation was associated with oral symptom experience. Of the demographic factors, sex was not significant in any model. Age was positively associated with all outcomes except oral symptoms. LOTE was associated with social impact and self-rated oral health. Socioeconomic indicators were present in all models. Low (but not lowest) income was a significant predictor of decayed and missing teeth. Concession status and area disadvantage were significant in three models. Home-work interference was positively associated with decayed teeth, missing teeth, social impact and oral symptoms.

Social support or social networks were associated with three outcomes: missing teeth, social impact and oral symptoms. Generally, but not always, these factors were negatively related to oral health outcomes. Dental visiting, self-care and perceived need for a visit were each negatively associated with four outcomes. Average time between visits and satisfaction with dental care were each a significant predictor of three outcomes.

A number of other variables were of borderline statistical significance in the models, or in the range of 0.06 to 0.1. Country of birth, low income and psychologically demanding work were variables in this range in the model for decayed teeth. Socioeconomic inequality approached significance with decayed teeth, and also with poor self-rated oral health. Coping was of borderline significance to oral symptom experience, and assurance was of borderline significance with poor self-rated oral health.

Table 9.6: Summary table of significant variables in multivariate models (dentate persons, weighted data)

Decayed teeth		Missing teeth		Social impact		Oral symptoms		Average or poor self-rated oral health	
				Childhood					
P cohabitation	-								
Positive rearing	+								
Mother: manager or professional	+					Mother: manager or professional	-		
				Demographic					
Age	+	Age	+	Age	+			Age	+
Australian-born	+								
				English at home	-			English at home	-
				Socioeconomic					
Income (mid-low)	+	Income (mid-low)	+						
						School education	-	Voc education	+
Prestige	-	Prestige	-						
Concession card	+			Concession card	+	Concession card	+		
Area IRSD	+	Area IRSD	+	Area IRSD	+				
				Workplace					
				Job security	-				
				Skill not obsolete	+				
Psych demanding	+			Psych demanding	+				
		Interaction at work	+						
		Interaction outside	-			Interaction outside	+		
		Work interferes	-			Work interferes	+		
Home interferes	+	Home interferes	+	Home interferes	+	Home interferes	+		
				Psychosocial					
		Social support	+			Social support	-		
		Sum of networks	-						
				Distress	+	Distress	+		
		Coping	+						
		Relative inequality	-	Relative inequality	-				
				Behaviour					
Visiting	-	Visiting	-	Visiting	-			Visiting	-
		Self-care	-	Self-care	-	Self-care	-	Self-care	-
Frequent visits	+			Frequent visits	+			Frequent visits	-
Need visit	+			Need visit	-	Need visit	-	Need visit	+
		Diffidence	+					Diffidence	+
Assurance	-								
Satisfaction	-	Satisfaction	+	Satisfaction	-				

9.4 References to Chapter 9

[1] Holst D, Schuller AA, Aleksejuniene J, Eriksen HM. Caries in populations--a theoretical, causal approach. Eur J Oral Sci. 2001 Jun;109(3):143-8.

10. Discussion

In this final chapter, an overview of the major findings is presented and these findings are discussed. This is followed by a consideration of the limitations of this study, and concludes with comments on the significance and implications of findings.

The overarching objective of this study was to advance the understanding of relative inequality in adult oral health, and to expand upon the materialist and behavioural explanations that are predominant in the dental literature. The former contends that disadvantaged adults face higher risks associated with effects of exposure to poor material circumstances linked to low income, less education and unskilled occupations. The latter contends that behaviour plays a key role in producing and sustaining health differentials. Yet a substantial literature shows that socioeconomic gradients are as steep, if not steeper, in affluent populations and that well-known behavioural risk factors leave most of the social gradient in health unexplained. In fact, several prospective studies have demonstrated that material and behavioural risk factors even when combined with biological parameters fail to account for more than half of the gradient in health. Moreover, attempts to improve health by evoking sustained behavioural change have not been successful. Taken together, the evidence suggests that material circumstances and health behaviour impact on health and wellbeing but are insufficient to explain social variation in oral health.

A comparatively new direction has been to build psychosocial factors into these existing explanations. The view is that population health is affected by the nexus of materialist, psychosocial and behavioural determinants. Importantly, the psychosocial focus shifts the emphasis from inanimate structures and circumstances such as material resource to give primacy to the behavioural and biological responses to *human interactions*, and hence is fundamentally social by definition. Consistent with this direction, this research examined the psychosocial impact of social position on oral health behaviours and outcomes. The selection of psychosocial and other potential explanatory variables was guided by an expansive body of research that has produced consistent evidence of the social determinants of health across different populations and under different sociopolitical conditions.

10.1. Overview

10.1.1 Social inequality in oral health

The first hypothesis stated that there is socioeconomic inequality in population adult oral health. This hypothesis was confirmatory rather than exploratory, since previous Australian research has reported inequalities in population adult oral health. Currently, the strongest evidence of socioeconomic inequality is for edentulism; however, the salience of edentulism to population oral health is diminished in light of the rapidly declining prevalence of edentulism in all age groups. In order to capture concepts of oral health that have universal relevance to dentate adults, this research expanded the range of subjective assessments of oral health, and compared the relative burden of these across different socioeconomic and demographic population subgroups. Whether these self-assessments are sensitive to relative differences in SEP, and whether systematic differences are found by demographic characteristics have not previously been investigated at a population level. Chapter 4 described the social distribution of self-assessed oral health in a nationally representative sample of dentate adults.

10.1.1.1 Socioeconomic distribution

Typically, SEP is assessed using indictors of social status such as income, education and occupation. These reveal a robust inverse association between SEP and health status for most health outcomes. The causal direction has been debated and a consensus reached that although health-driven downward social mobility occurs, it makes only a minor contribution to socioeconomic differences in health. It is now widely accepted that higher incomes as a marker of wider access to material resources are associated with better health. Educational attainment is related to health through the advantages it gives people in their later socioeconomic trajectories, and because education encourages healthy behaviours. Occupational status tends to be more stable than income across the life course and reflects educational attainment and earning potential. These measures were supplemented with an area-based measure. The Index of Relative Socioeconomic Disadvantage (IRSD) is a composite measure produced by the ABS from data collected in the 1996 population census. IRSD values are a single score derived from multiple weighted variables relating to education, occupation, non-English-speaking background, indigenous origin and the economic resources of households.[1] Lower values indicate lower SEP.

In bivariate analysis, the associations of six socioeconomic indicators with five oral health outcomes produced 30 observations. Twenty-seven observations revealed a socioeconomic gap between advantaged and disadvantaged groups. Two observations failed to reach statistical significance, and the other showed no relationship. Irrespective of the socioeconomic indicator used, people who were less advantaged had poorer oral health for each outcome.

A socioeconomic gap was most apparent for concession status, where differences between cardholders and other adults were significant for all five outcomes at the <0.001 level. Of the outcome measures, socioeconomic differentials were strongest for decayed teeth and social impact and weakest for oral symptom experience. In addition to confirming the socioeconomic gap, analysis revealed a clear socioeconomic gradient in decayed teeth, missing teeth and social impact in all socioeconomic indicators apart from educational attainment. Although tertiary educated adults reported best oral health for all outcomes except oral symptom experience, people with vocational education fared worse than adults with secondary education for social impact, oral symptoms and self-rated oral health.

10.1.1.2 Demographic distribution

There were no differences between males and females for any oral health outcome assessed. There were, however, considerable differences in oral health by age. Apart from the positive relationship between age and missing teeth, other measures of morbidity generally peaked in midlife. There were no significant differences between Australian-born and overseas-born adults in decayed teeth, missing teeth, oral symptoms, or self-rated oral health. However, compared to English-speaking adults, persons who spoke a LOTE at home reported significantly more decayed teeth, missing teeth, social impact and oral symptoms, and a greater proportion self-rated their oral health poorly. Oral health outcomes for adults self-classified as not employed (unemployed and not employed) were poorer than those for workers and retirees for decayed teeth, social impact and self-rated oral health.

10.1.1.3 Multivariate analysis

In multivariate analysis a hierarchical procedure was used for continuous dependent variables, with demographic variables (sex, age, country of birth, language spoken at home) entered in the first step and socioeconomic indicators entered on the second step. This analysis tested whether socioeconomic inequality accounted for a significant proportion of the variance in oral health once the variance attributable to other demographic characteristics had been removed.

The results in Chapter 4 supported the hypothesis of socioeconomic inequality in adult oral health that showed that inequality persisted after controlling for age, cultural and other demographic differences. Low income was positively associated with tooth decay, missing teeth, social impact and greater odds of rating oral health poorly. Low occupational prestige was positively associated with missing teeth, and social impact. Area disadvantage was positively associated with decayed teeth, missing teeth social impact and oral symptom experience. The effect of education was less easily interpreted. Adults for whom secondary education was their highest level of education reported greater missing teeth, but lower scores for social impact and oral symptom experience compared with tertiary-educated adults.

10.1.2 Dental behaviour and beliefs

A core assumption of the behavioural explanation is that health behaviour follows a socioeconomic gradient. It was contended in Chapter 5 that socioeconomic position may affect oral health partly through dental behaviours that covary with socioeconomic position and that a socioeconomic gradient in oral health-related behaviour augments the effect of socioeconomic gradient. Thus, the objective of Chapter 5 was to examine whether dental behaviour was associated with oral health, and to test the hypotheses that dental behaviour follows a socioeconomic gradient and contributes to oral health differences after controlling for SEP.

To ascertain whether dental behaviour was associated with differences in oral health, dental behaviour was measured with ten items based on the Dental Neglect Scale.[2] Factor analysis of the items yielded two subscales labelled visiting and self-care and quintiles were constructed from subscale scores so that a linear relationship, if present, could be observed.

10.1.2.1 Behavioural variation in oral health

In bivariate analysis, the associations of the two dental behavioural subscales with five oral health outcomes produced ten observations. Nine observations revealed significant, inverse relationships between these behaviours and oral morbidity. Incremental increases in visiting and self-care scores were associated with monotonic decreases in decayed teeth, social impact, oral symptoms and the odds of rating oral health poorly.

Other aspects of dental utilisation were assessed: time between visits (2+ visits annually, or less); perceived need for visit (need, no need); usual reason for visit (check-up, problem); continuity of care (usual dentist, no usual dentist) and dental insurance (insurance, no insurance). The associations of these items with five oral health outcomes produced 25 observations. Nineteen observations showed significant differences in the expected direction. People who visited frequently, had no perceived need for an immediate visit, usually visited for a check-up, had a usual dentist, and were dentally insured had better oral health. As anticipated, the findings showed close associations between behaviour-related factors and oral health. These associations supported the link in the conceptual framework between dental behaviour and oral health status.

Health self-efficacy and dental satisfaction were presented as immediate precursors of dental behaviour. Factor analysis of the items measuring health self-efficacy yielded two factors, labelled diffidence and assurance. Diffidence referred to a perceived lack of competence to self-manage health and a reticence to alter health behaviour, whereas assurance was an orientation that health challenges could be competently met. Factor analysis of the dental satisfaction scale confirmed the unidemensional nature of the construct. Quintiles were constructed from scale/subscale scores so that graded relationships, if present, could be observed.

The associations of the health self-efficacy subscales and dental satisfaction scale with five oral health outcomes produced 15 observations. All 15 observations were significant, graded, and in the expected direction. Diffidence was positively associated with decayed teeth, missing teeth, social impact, oral symptoms and poor self-rated oral health. In addition, assurance and dental satisfaction were negatively associated with each of these outcome measures.

10.1.2.2 Demographic distribution

There were significant inequalities in dental behaviour by sex, age, ethnicity and geographical location. Females scored significantly higher than males for visiting, self-care, assurance and dental satisfaction. Significantly more females visited for a check-up, had a usual dentist and had dental insurance. Positive graded relationships were noted between age and visiting, self-care, diffidence and assurance. Older adults made more frequent visits. Scores for other dental behaviours peaked in midlife. A greater proportion of middle-aged adults attended because of a dental problem, had a usual dentist and were dentally insured compared with younger and older adults. Dental satisfaction was highest in midlife.

Compared with people born overseas, Australian-born adults scored lower for dental visiting and self-care, but higher for assurance and dental satisfaction. Proportionately fewer Australian-born adults usually visited a dentist twice or more often annually. Adults who spoke English at home had lower scores for self-care and diffidence, and higher scores for assurance and dental satisfaction. Proportionately more English-speaking adults had a usual source of dental care and were dentally insured. Capital city dwellers reported significantly higher scores for visiting and dental satisfaction, and significantly lower diffidence scores. Significantly more city dwellers visited twice yearly, perceived a need for a visit, usually attended for a check-up, had a usual dentist and were dentally insured.

10.1.2.3 Socioeconomic distribution

The hypothesis that dental behaviour follows a socioeconomic gradient was only partly supported. In support of the hypothesis, people with higher income visited more frequently, and a greater proportion visited for a check-up, had a usual dentist, and had dental insurance. More affluent people had higher scores for assurance and dental satisfaction, and lower scores for diffidence. However, financially disadvantaged adults practised better dental self-care than more advantaged people. Self-care, as opposed to utilisation, is less constrained by economic and other barriers to access. Thus, self-regulatory dental behaviour that is not dependent on personal economic resource or constrained by organisational barriers was not clearly linked to SEP in the expected direction. Dental visiting was lowest in the middle income category, reflecting access and financial barriers faced by the working poor without public subsidy.

Among educational groups, visiting and self-care was poorest for those with vocational, as opposed to secondary, eduction and a lower proportion of vocationally educated people had dental insurance. A comparison of occupational groups indicated that paraprofessionals and clerks had higher visiting and self-care scores than had managers and professional workers. Consistent with findings for education, fewer manual workers made check-up appointments, had a usual dentist, and dental insurance compared with white-collar workers.

10.1.2.4 Multivariate analysis

Multivariate analysis supported the hypothesis that dental behaviour has consequences for oral health that are independent of sociodemographic factors. In summarising the most important relationships, visiting was negatively associated with decayed teeth, social impact and self-reported oral health. Self-care was negatively associated with missing teeth, social impact and oral symptom experience, and was positively associated with poor self-rated oral health. Attending for a check-up was negatively associated with all five measures of oral morbidity. Diffidence (low self-efficacy) was positively associated with decayed teeth, missing teeth and social impact, and dental satisfaction was negatively associated with decayed teeth, social impact and oral symptom experience, and was positively associated with missing teeth. Behavioural factors had a greater effect on decayed teeth, social impact and oral symptom experience in the multivariate model than did sociodemographic factors.

10.1.3 Psychosocial factors

The psychosocial factors examined in Chapter 6 were personal control, social support and networks, perceived stress and life satisfaction. Factor analyses yielded two subscales for personal control (constraint and mastery) and two subscales for perceived stress (distress and coping). Mean scale and subscale scores were grouped into quintiles. The hypotheses tested in this chapter were that there is a socioeconomic gradient in psychosocial factors, and that psychosocial factors are independently associated with oral health.

In addition to these individual level factors, a measure of socioeconomic inequality within postcode areas was constructed. This variable evaluates the dispersion in the distribution of socioeconomic resources. It represents the notion of relative deprivation, and as such is a psychosocial factor. The relative deprivation hypothesis argues that individuals are adversely affected when they perceive themselves to be socially and economically deprived relative to others in their reference group. Because unequal societies are detrimental to all members (affluent and poor), in the context of this study people living in postcode areas with greater dispersion of socioeconomic values (SEIFA IRSD) were expected to have poorer oral health, irrespective of their individual status.

10.1.3.1 Demographic distribution

There was no difference between males and females for mastery or constraints (personal control), or for social support. However, compared with males, females reported a higher sum of social networks, higher distress, poorer coping and greater life satisfaction.

There were significant differences by age for all of the psychosocial factors. There was a positive monotonic gradient in constraint scores by age group and an inverse gradient in mastery scores across successive age groups. Social support was relatively stable across age groups but was considerably lower in early adulthood, and declined again in midlife. The sum of social networks increased with age. Distress peaked in midlife and then decreased sharply in older age. Coping was poorest in midlife and was best in older age. Life satisfaction was lowest in young adulthood and highest in older age, with a decline during midlife. Overall, adults in old age had a better psychosocial profile than other age groups, but clearly fared worst for personal control. Adults aged 40-49 years were the most vulnerable overall and adults aged 18-29 were also at elevated risk.

Being born overseas or speaking a LOTE was associated with greater psychosocial risk. Adults born overseas reported more constraint and less life satisfaction than Australian-born adults. Adults who spoke a LOTE reported less social support and poorer coping. All differences between employment status groups were significant. Compared with people in the workforce and retirees, adults who were not employed had lowest mastery, least social support, poorest coping and lowest life satisfaction. Their level of constraint was second to retirees, and their level of distress was second to part-time workers.

Differences based on the number of household occupants were significant for all factors except control. Adults who lived alone reported least social support, least distress and lowest life satisfaction. Adults who lived with one other person reported highest social support, fewest social networks, best coping and highest life satisfaction. Adults living in households of more than four persons reported most social networks, greatest distress and poorest coping.

Differences based on geographical location (capital city or other) were only significant for constraint and socioeconomic inequality. Adults resident in non-capital city areas reported higher constraint and there was a greater dispersion in socioeconomic values assigned to their postcode area.

10.1.3.2 Socioeconomic distribution

The hypothesis that psychosocial factors were distributed across a socioeconomic gradient was strongly supported and observed on all socioeconomic indicators. There was an inverse monotonic gradient in constraint with increasing income. As expected, mastery was positively related to income. The sum of social networks with which people had affiliations increased with income. Distress was highest among people with low (but not lowest) income. Coping and life satisfaction increased with increasing income.

Compared with adults with secondary or vocational education, adults with tertiary education reported lowest constraint, highest mastery, highest social support, most social networks, highest distress and highest coping, and lived in areas with less socioeconomic inequality.
Among occupational groups, manual workers had the poorest psychosocial profiles. Labourers and related workers reported greatest constraint, least mastery, fewest social networks and poorest coping, and lived in areas with greatest socioeconomic inequality. Plant or machine operators and drivers reported least life satisfaction.

Cardholders had greater constraint, less mastery, less social support, fewer social networks, greater distress and poorer coping, and lived in areas with greater socioeconomic inequality.

10.1.3.3 Behaviour and oral health

In bivariate analysis, the associations of six psychosocial factors with five oral health outcomes produced 30 observations. Twenty-eight were significant. There were positive monotonic gradients between constraint scores and all oral health outcomes except oral symptom experience where the gradient was positive but not monotonic. Similarly, the negative gradients for mastery were monotonic for all outcomes except oral symptoms. The negative gradients for social support were monotonic for all outcomes except missing teeth. The positive gradients for distress were monotonic for decayed teeth, missing teeth and social impact. For coping, the gradients were negative and monotonic for decayed teeth, missing teeth and self-rated oral health (percentage rating their oral health as average or poorer). The negative gradients for life satisfaction were monotonic for oral symptoms and self-rated oral health. In summary, individuals who were vulnerable to psychosocial risk factors experienced poorer oral health, while those individuals with positive psychosocial resources experienced better oral health.

The second hypothesis, that psychosocial factors are independently associated with oral health, was also supported. After controlling for demographic characteristics and socioeconomic indicators in hierarchical multiple regression analysis, several psychosocial factors emerged as significant predictors of oral health. The most important of these was distress. Distress was positively associated with decayed teeth, missing teeth, social impact and oral symptom experience. Constraint was positively associated with decayed teeth, social impact, and poor self-rated oral health. Socioeconomic inequality was positively associated with decayed teeth but for social impact, the sign reversed indicating a negative association in the presence of other factors. Social support was negatively associated with oral symptom experience, and coping was positively associated with missing teeth.

For social impact, demographic and socioeconomic factors explained 4.7% of the variance. With psychosocial factors entered in step 2, the percentage variance explained increased to 16.1%, indicating that these factors were much more important to the social impact of oral conditions.

10.1.4 Childhood environment

Four questions sought to tap the socioeconomic and psychosocial circumstances in childhood. These items obtained information on the occupational group of father and mother, parental cohabitation and the perceived quality of rearing. Middle childhood, the development stage extending from six to 12 years, was selected as the referent stage and adults were asked to recall circumstances at the age of ten years.

10.1.4.1 Demographic distribution

Perceptions of childhood conditions and parental occupation were not distributed evenly across population subgroups. Adults in older age tended to report better psychosocial conditions than younger adults. For example, a greater proportion of people aged 70+ reported that their parents had cohabited and perceived that their rearing had been positive.

There were no differences in perceived rearing style based on the country of birth, language spoken at home or geographical location of residence. However, a significantly higher proportion of females and adults in midlife aged 40-59 years perceived their rearing to have been negative and unsupportive. Significantly fewer retirees perceived a negative upbringing.

Consistent with labour-force trends toward a more skilled workforce, the proportions of adults in younger age groups reporting parental occupations in more highly skilled occupations was greater. A greater proportion of capital city dwellers reported parental occupation in more highly skilled groups.

10.1.4.2 Socioeconomic distribution

The relationship between socioeconomic circumstances in childhood and in adulthood was significant. Differences in perceived rearing style were only significant for current occupational groups. A stronger relationship was found between socioeconomic indicators in childhood and socioeconomic indicators in adulthood. Both paternal and maternal occupation were associated with current income, educational attainment, occupational group, occupational prestige, concession status and area IRSD scores. Parental cohabitation and a father and or mother in a more highly skilled occupation were associated with higher current household income.

10.1.4.3 Childhood environment and oral health

Adults whose parents cohabited when they were aged 10 had significantly better oral health. Specifically they reported less decay, fewer missing teeth, lower social impact and fewer oral symptoms than adults who lived with one parent. Although a smaller proportion rated their oral health poorly, differences failed to reach statistical significance.

Because parental cohabitation at the age of ten years preceded these outcomes reported in adulthood, temporal sequence is established although a causal effect cannot be inferred.

People who perceived the quality of their rearing to be positive and supportive had significantly better oral health. They reported lower social impact scores and experienced fewer oral symptoms, and a smaller proportion rated their oral health poorly. Compared with those whose father was a white-collar worker, people whose father was a manual worker, performed domestic duties or was unemployed had worse oral health on all five measures. Similarly, people whose mother's occupational status was manual worker, domestic duties or unemployed had worse oral health on all five measures.

10.1.4.4 Childhood environment and dental behaviour

There is evidence to show that health behaviours established in childhood tend to be stable over the life course and have long-term effects on health. An investigation of the relationships between childhood circumstances and dental behaviour in adulthood revealed significant associations between childhood factors and dental behaviour in adulthood. Adults who lived with two parents, and adults with positive nurturing had significantly higher scores for dental visiting and self-care. Adults whose father was a manual worker had lower visiting and self-care scores than white-collar workers.

Concepts of self and self-worth develop in childhood and are powerfully influenced by environmental factors. Self-efficacy (an appraisal of one's own competency in performing a behaviour) is built around self-evaluation and exerts a powerful effect on levels of motivation. Results showed that adults with high levels of health self-efficacy scored higher for dental behaviour. Adults with positive, supportive rearing reported a significantly higher sense of assurance and significantly lower diffidence to perform health-relevant behaviour. There were significant differences in health self-efficacy based on parental occupation. Adults whose father was a manual worker had considerably higher diffidence scores and considerably lower assurance scores. Adults who described their mother's occupation as 'unemployed' had considerably higher diffidence scores and considerably lower assurance scores.

Rearing style and parental occupation were significantly associated with dental satisfaction. Positive rearing was associated with significantly higher dental satisfaction and paternal and maternal unemployment was associated with lowest satisfaction scores.

10.1.4.5 Childhood environment and psychosocial profile

Adults raised with supportive rearing reported significantly less constraint and distress, and better coping, social support and life satisfaction. Adults who lived with both parents reported significantly better coping. Adults whose paternal occupation status was domestic duties or unemployed had greatest constraint, least mastery, poorest coping and least social support.

Maternal occupational status as unemployed was associated with highest constraint, lowest mastery, lowest coping and lowest social support. Having a mother with an occupational status of unemployed or a manual worker was associated with highest constraint, lowest mastery, greatest distress, poorest coping, least social support and lowest life satisfaction.

10.1.4.6 Multivariate analysis

Childhood factors continued to contribute to multivariate models after controlling for present SEP and demographic factors. Paternal and maternal occupational status in lower white-collar, manual work, domestic work or unemployed – relative to upper white-collar occupation – was positively associated with oral symptom experience. Paternal occupational status as manual worker or unemployed was also positively associated with missing teeth. While socioeconomic indicators were not significantly associated with social impact scores, supportive positive rearing was inversely related to impact scores.

10.1.5 Workplace environment

A growing body of evidence suggests that aspects of the work environment can impact workers' health status. Chapter 8 examined the extent to which psychosocial work conditions were associated with oral health.

Analyses were limited to those in paid work, and labour-force participation in the sample was similar to Australian estimates, with 64.6% in paid work and part-time workers comprising 28.1% of the work force. Work hours, job security, risk of skill obsolescence and psychological demand were examined, and multiple item indices measured job control and social interaction at work. While considerable attention has been directed toward the occupational determinants of employee health, comparatively little study has addressed the effects on health of spillover, ie the competing demands between work and family responsibility.

10.1.5.1 Demographic distribution

Compared with females, males worked longer hours, and had greater decision-making authority, personal freedom, skill discretion and social interaction with co-workers both at work and outside work. A smaller proportion of males perceived their job to be psychologically demanding and expected their job skills would become obsolete. Age-related patterns were observed. Job security, decision-making authority and personal freedom increased with age. Hours worked, risk of skill obsolescence, psychological demand and work competing with home life was greatest in midlife. Adults who spoke a LOTE had less job security, work-home and home-work interference, and a greater sense of psychological demand.

10.1.5.2 Socioeconomic distribution

Adults with low income worked fewer hours, had less job security and had greater risk of skill obsolescence. They also reported less decision-making authority, personal freedom, skill discretion and social interaction inside and out of the workplace. Those with a tertiary education worked longer hours than other adults and had greater work-home interference, but this was off-set by better working conditions of security, skill updates, control and social interaction. Manual workers had least job security and workplace autonomy and clerks reported greatest risk of skill obsolescence.

10.1.5.3 Workplace environment and oral health

In bivariate analyses, the associations of 11 work-related variables with five oral health outcomes produced 55 observations. Significant differences were observed for 25 observations. Three work-related factors (personal freedom and both work-home interference subscales) were associated with decayed teeth. Higher work-home interference and lower freedom were positively associated with decayed teeth. Two factors positively associated with missing teeth were higher home-work conflict and higher psychological demand. Five variables were associated with oral symptom experience and seven variables were associated with poor self-rated oral health. Nine of the 11 independent variables were associated with social impact. Higher social impact scores were associated with fewer hours worked, any risk to job security, risk of skill obsolescence, low decision-making authority and personal freedom, psychologically demanding work, low social interaction at work and high work-home and home-work interference.

10.1.5.4 Multivariate analysis

Of the psychosocial variables, work-home interference was the single most important factor to oral health. Both work-home subscales were positively related to decayed teeth, social impact and oral symptom experience. Home interference with work was positively related to missing teeth. Among other significant variables, psychological demand was positively associated with missing teeth and social impact, but negatively related to symptom experience. Job security was negatively associated with social impact.

10.1.6 Psychosocial factors and dental behaviour

Central to this research was the role of psychosocial factors in mediating the SEP-oral health relationship through shaping dental behaviour. This area of research has received considerable attention in the mental health literature and has identified depressive symptomatology as a mediator of stress in socioeconomic socially disadvantaged groups, with links to subjective well-being and health-related behaviour.[3 4]

The bivariate associations between psychosocial factors and dental visiting and self-care behaviours were examined in Chapter 9. The associations of six psychosocial factors with two dental behaviours produced 12 observations. All were significant at the $p<0.001$ level, and revealed a series of monotonic gradients. There were inverse monotonic gradients between constraint and visiting and between distress and both behaviours. There were positive monotonic gradients between social support and both behaviours and between coping and both behaviours. There were positive monotonic gradients between mastery and self-care and between life satisfaction and visiting. The association between life satisfaction and self-care was positive but not monotonic, and the association between constraint and self-care was inverse but not monotonic.

10.2 General discussion

10.2.1 The socioeconomic gradient

Socioeconomic inequality in oral health is often conceived as a problem affecting the poorest individuals in the community. In Australia, the separation of financially disadvantaged persons from the mainstream occurs logically with the division of people eligible for government concession versus other adults. Approximately 5.6 million individuals (including children) access Centrelink * services or payments each year. Eligible adult recipients include retirees, sole parents, those looking for work, and people with disabilities, illnesses or injuries. Other groups include carers, widows, primary producers, students, indigenous Australians and people from diverse cultural backgrounds. Clearly, disadvantaged adults are not a homogeneous group, yet in comparison to their more financially advantaged counterparts, they share a common concern of poorer oral health. Adults who were eligible for a concession had more untreated disease and fewer remaining teeth. Within a 12-month period, they experienced a wider range of common oral complaints and the burden of their oral conditions more profoundly affected their quality of life. Not unexpectedly, they rated their oral health less favourably than did more advantaged individuals.

However, this simple dichotomy gives a distorted view of the distribution of oral health by inferring the presence of an economic threshold. In this view, inequality in oral health is solely a function of absolute material standard of living or structural barriers to accessing dental care. This perception obscures marginalised or emerging vulnerable groups who are also disadvantaged. One such group was those with household income in the $20,000 to $50,000 range, who perceived more stress than other Australians. These 'working poor' were not those with lowest income or education attainment, but were characterised as having vocational education and manual occupations. By focusing exclusively on this artificial split in the population based on concession eligibility, policy reform and health promotion efforts are unlikely to confront the social structures that give rise to differential exposure to risk factors, and are likely not to reach unrecognised vulnerable groups.

* Centrelink is a statutory authority within the Commonwealth government that delivers a range of benefits on behalf of various government agencies to the community.

Contrary to a *socioeconomic gap* in oral health, findings revealed a stepwise gradient in oral health distributed across the socioeconomic hierarchy, and hence replicated those findings of general health research. The implication is that absolute socioeconomic resource or the materialist explanation is insufficient in explaining socioeconomic variation in oral health.

Rather, the poor oral health of disadvantaged individuals is due to a combination of economic and social disadvantages together with a public dental care system that through institutional scarcity fails to adequately meet the dental health needs of eligible individuals.[5] While any one of these factors alone might reduce opportunities for good oral health, frequently forms of disadvantage cluster together compounding the difficulties faced by these individuals through multiple exposures. Moreover, this inter-relatedness conflates pathways, obscuring each factor's distinct influence, so that the specific causal mechanisms by which disadvantage might affect oral health is difficult to determine.

10.2.2 Social determinants of oral health

Over the past two decades, growing evidence has demonstrated that health is highly sensitive to social conditions. Attributes such as stressful living conditions, supportive social relationships, childhood environment, and relative disadvantage have emerged as key determinants of health. More recently, psychosocial factors have been suggested as pathways along which social inequalities are channelled into unequal health outcomes, either directly through stress-related physiological responses or indirectly via risk-taking behaviour.

10.2.2.1 Behavioural factors

The approach was to start downstream at health outcomes, then move towards progressively more distal determinants, and demonstrate connections between these factors. Having confirmed a socioeconomic gradient in oral health, attention was directed toward dental behaviour and beliefs understood to be the most proximal determinants of oral health. These behaviours, it was contended, are a consequence of factors operating further upstream such as derived material and psychosocial conditions in childhood and relative material disadvantage in adulthood. Such disadvantage shapes behaviour through reduced control over circumstances, limited opportunity for social participation and compounding stress. Selected dental behaviour variables evaluated attitude to visiting, the utilisation of services and dental self-care. Clearly, these factors do not capture all aspects of dental behaviour. Other factors not addressed were diet and nutrition, injury prevention, and exposure to fluoride products, sun, alcohol and tobacco.

In order to explore the proximal predictors of dental behaviour, individuals' perceived competence to alter their health (health self-efficacy beliefs) and their satisfaction with dental care were examined. These proximal factors are only two of a wide range of predictors of utilisation behaviour.

Freeman[6] observed that individuals seek dental care for reasons that appear quite unrelated to oral health, and Kay [7] named social environment, dental anxiety and esthetic concerns as three other predictors of dental attendance.

There was strong evidence of a relationship between care-seeking, self-care and oral health. Inconsistent self-care and episodic visiting emerged as major risk factors that were not only associated with past and present dental disease, but also with recent symptom experience, diminished oral health-related quality of life and poor subjective appraisals of oral health. Associations were graded and generally monotonic, implying a dose-response effect. Asymptomatic visiting and perseverance with self-care regimes were associated with favourable oral health benefits, as demonstrated with similar dose-response gradients. These associations persisted after controlling for a host of factors understood to influence oral health.

However, the presence of significant behavioural gradients running parallel to the gradient in oral morbidity is not sufficient to imply a causal relationship. While it is likely that care-seeking and self-care do confer oral health benefits, it is the factors that drive these behaviours that are the socially produced risk and protective mechanisms, or 'social determinants'. Countering the view that dental behaviour produces oral health is the weak evidence supporting the protective effect of dental self-care. Indeed, the oral health literature makes a good case that variation in oral health has relatively little to do with self-care behaviour (apart from exposure to fluoride). Moreover, this research found no evidence in multivariate analysis that enabling factors for visiting such as dental insurance and having a usual dentist were predictors of oral health as would be expected if visiting per se improved oral health. Further, associations between SEP and dental behaviour were inconsistent, reducing the explanatory credibility of dental behaviour as a mechanism for generating socioeconomic variation in oral health.

A more useful question with wider applicability for reducing inequalities in population health is, 'What factors induce protective and risk behaviours?' The exploratory process began with a theoretical underpinning in Bandura's cognitive learning theory that underscored the salience to health behaviour of self-efficacy beliefs. Unlike the inconsistency in the SEP-behaviour relationship, there were clear monotonic gradients between socioeconomic indicators and diffidence scores. The fact that socioeconomic gradients for diffidence were stronger than for assurance implied that the deleterious effect of diffidence on oral health is greater than the protective effect of assurance beliefs. Another factor thought to influence behaviour was dental satisfaction, and it was argued that individuals who are highly satisfied with past care are more likely to adopt regular attendance patterns and heed professional home-care advice.

10.2.2.2 Psychosocial factors

At this point, the socioeconomic gradient in oral health was confirmed and a behavioural gradient in oral health had also been established. The explanatory challenge was to clarify the mechanisms by which social circumstance shapes dental behaviour. Materialist explanations contend that the concentration of risk behaviour in disadvantaged groups is more a consequence of poverty rather than fecklessness, but do not explain how this occurs. Therefore a second challenge was to determine the extent to which psychosocial factors further explain social variation in oral health beyond that already accounted for by the materialist explanation.

It is argued that neither materialist nor behavioural differences adequately explain socioeconomic variation in oral health for two reasons. Firstly, the materialist explanation fails to account for how socioeconomic resource per se translates into differences in health. Secondly, there was only tenuous evidence that dental behaviour was patterned by socioeconomic resource. To further expand these combined explanations, attention was shifted to more distal psychosocial processes that were linked to socioeconomic resource while at the same time being linked to patterns in dental behaviour. The selected psychosocial variables were thought to be both risk factors for oral health (constraint, distress) and protective factors (mastery, coping, support). Social support and sense of life satisfaction were measured along a continuum incorporating both risk and protective levels of these resources. These were found to be strongly associated with SEP, such that adults on the highest household income level had least constraint and greatest levels of mastery, coping, social support and life satisfaction.

Psychosocial risk factors (constraint and distress) were strongly associated with episodic dental visiting and weak adherence to self-care, while protective factors (mastery, coping, social support and life satisfaction) were positively associated with these behaviours. Thus, confirmation was established of conceptually plausible links connecting socioeconomic resource to dental behaviour and oral health via a psychosocial-behavioural pathway.

It is generally the case that the lower the material standard of living, the poorer the level of oral health. Beyond this relationship, there is growing evidence that the relative distribution of socioeconomic resource matters in its own right for population health. In developed countries such as Australia, the experience of relative disadvantage means that people are less able to purchase and consume a lifestyle similar to that of others around them. Social comparisons leading to a sense of being economically deprived relative to one's peers may have an indirect psychological effect on health though psychosocial processes. In this study, people who lived in postcode areas that comprised census collection districts with wider dispersion of area disadvantage scores reported greater diffidence, constraint and distress. They also reported poorer coping ability and less assurance, social support and life satisfaction than adults living in areas with greater equality. In terms of their oral health, socioeconomic inequality in postcode areas was positively related to decayed teeth and poor self-rated oral health.

10.2.2.3 Childhood factors

Confirmation of connections between SEP, psychosocial resource, behaviour and oral health strengthened the plausibility of the conceptual framework, but provided only intuitive arguments about the direction and temporal sequence of these relationships. Support for the argument that socioeconomic conditions and psychosocial resource precede oral health status in adulthood emerged from an examination of factors in childhood. The observed associations indicated that the groundwork for adult oral health is laid in childhood. Further, associations were consistent with a strong literature showing that risk factors in childhood set in train psychosocial consequences for compromised health in later life. Proponents of the life course explanation for health inequalities argue that contemporary socioeconomic and psychosocial risk factors alone are not sufficient to understand current health status. Rather, health in adulthood reflects the embodiment of accumulated material and psychosocial circumstances throughout life. Yet not all adults exposed to poor socioeconomic or psychosocial conditions in childhood experience poor health in adulthood. Some research has shown that the timing of exposure to economic deprivation is important. For example, family economic conditions in early and middle childhood have been shown to be more important to subsequent health than economic conditions in adolescence. [8] There is also an extensive body of literature that shows that children who receive responsive, positive care giving have more favourable developmental outcomes and are less at risk for subsequent health problems.

In a broad and comprehensive review of this literature, Repetti and colleagues [9] identified two family characteristics that triggered a cascade of accumulating risk for long-term effects on physical and mental health. These characteristics were overt family conflict and deficient nurturing characterised by neglectful parenting and cold, unsupportive family relationships. Their framework illustrating the pathways linking family environment to adult health outcomes is presented in Figure 10.1. The framework contends that family environment may produce vulnerability and exacerbate genetically determined vulnerability. The pathways elucidated in the framework of Repetti and colleagues are consistent with the conceptual framework advanced in this research. However, while strong associations in bivariate analyses were found between childhood conditions and a host of economic, social and behavioural factors in adulthood, there associations generally did not persist in multivariate analyses in the presence of adulthood socioeconomic indicators.

A similar absence of a direct childhood effect was noted in a Whitehall II study that found that socioeconomic status in adulthood was a more important predictor of cardio-respiratory diseases and mental illness than was social position in childhood. [10] The conclusion in that study was that the social circumstances early in life are more important in their influence on the more proximate determinants of health in adulthood than they are on the actual health outcomes themselves. Thus, it may equally be the case that the impact of childhood on adult oral health is indirect, affecting the proximal determinants of oral health such as psychosocial resource and behavioural consequences.

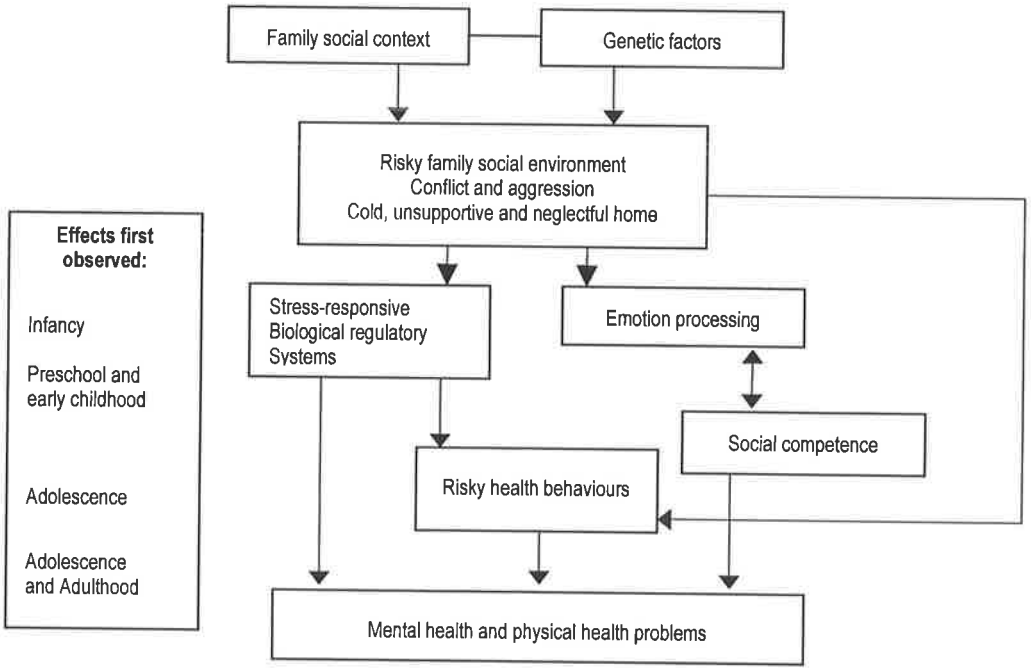

Figure 10.1: Pathways linking the effect of family environment in childhood on health in adulthood
Taken from Repetti RL, Taylor SE, Seeman TE. Risky families: family social environments and the mental and physical health of offspring. Psychol Bull. 2002 Mar;128(2):330-66.

10.2.2.4 Workplace factors

The workplace represents a microcosm of the broader social environment. As such, it provides a concrete setting in which to study the relationships between social position and oral health. In the workplace setting, the social hierarchy otherwise represented by income or education is measured by occupational grading, which may be crudely reduced to white-collar versus manual occupations. Moreover, the generalised experiences of personal control, social support and perceived stress are substituted for more specific constructs of workplace autonomy, co-worker interaction and job security. Thus, the workplace provides specific and tangible risk factors that may be targeted in policy response and health promotion intervention.

Although the labour force in Australia is diverse, several features distinguish it from those in other developed countries. Notable is the marked trend towards lengthening working hours. Recent labour market statistics indicate that approximately three in every ten workers work extended hours, and the Australian Council of Trade Unions [11] claim that Australia has more people working extended hours than all other OECD nations except North Korea. In a review of the impact of extended working hours, Dawson and colleagues[12] cite Bretherton and colleagues[13] who identified managers, employers, the self-employed and blue-collar workers as those among whom extended hours were most prevalent. Compared to the former groups, blue-collar workers are less likely to work longer hours voluntarily for personal satisfaction or profit, and are more likely to do so because of financial need or employer expectation.

For manual workers in this research, working longer than 40 hours a week had the greatest effect in explaining variation in decayed teeth, and the second-greatest effect after low income in explaining variation in the social impact of oral conditions.

Among the multiple indicators of work-related stress related to oral health was the concept of work-home interference, which measured the stress of reconciling the commitments of work with those outside the workplace. This issue may be a particular concern in this country, as Australia and the US remain the only OECD countries not to provide paid maternity leave to workers. At the same time there has been a trend of increasing female participation in the paid workforce. ABS statistics show the employment rate for females aged 15 to 64 years increased from 29% in 1954 to 47% in 1980 and to 63% in 2000.[14 15] While this research showed that the experience of work-home interference was no different for females than males, it was an important explanatory variable for decayed teeth, missing teeth, social impact and oral symptom experience.

10.2.3 Explaining socioeconomic inequality in oral health

Socioeconomic position was operationalised with indicators typically used in health research – household income, educational attainment, occupational group, occupational prestige, concession status and area disadvantage aggregated to the postcode level. Correlations between these were weak to moderate, ranging from 0.144 for occupational group and concession status to 0.332 for income and education, with a single exception of occupational group and occupational prestige (r=0.798). It is possible that these indicators impact on oral health through different mechanisms; income may influence outcomes directly through purchasing power, whereas education may influence health behaviours and occupational group may operate through work-related psychosocial stresses. At issue, however, is not the effect of income, education, or occupation per se, but rather the notion of social relativities.

In spite of the evidence for inequality in oral health, the critical issue remains over how socioeconomic resource is translated into differential oral health outcomes. The contemporary literature tends to discount conventional wisdom; inequality is more than the effect of absolute material resource, universal access to care does not eliminate health inequalities, and risk behaviours account for only about a quarter of the gradient in health. While the oral health literature reports correlations between psychosocial factors and oral health, it falls short of clarifying how such factors might link social inequalities to unequal oral health outcomes. The substantive aim of this study was to identify an explanatory mechanism through which social inequalities in socioeconomic resource produce inequalities in adult oral health. The general health literature proposes two general mechanisms: latency effects that underscore the impacts of early life, and a pathway effect that highlights multiple exposures to adverse life events across the life course.

Overall, associations lend support to the pathway effect, inasmuch as the socioeconomic and psychosocial circumstances of childhood propel the individual onto a specific trajectory that has oral health consequences for adult oral health. Along these trajectories individuals are differentially exposed to risk and protective factors and to opportunities that either enhance or diminish life chances. Individuals who were raised in disadvantaged circumstances perceived less control over their circumstances, and were less able to access social networks and supports for practical assistance or encouragement in positive health behaviours. Consequently, their adaptive coping ability was less effective, leaving them vulnerable to stress and dissatisfied with life in general. In the workplace, these adults were more likely to face adverse psychosocial conditions, resulting in less flexibility and control. This may translate into less freedom to attend health appointments. Disadvantaged individuals are less likely to perceive that their action might result in better oral health and are less likely to follow professional advice, maintain dental self-care and seek routine dental services on a regular basis. Interestingly, disadvantaged adults were more likely to report social interaction with colleagues outside the workplace. In addition, they face structural barriers to accessing dental care, and when dental services are provided, they are less likely to be of a conservative nature. Although not investigated, it is likely that intervening experience (such as further education or divorce) may deflect individuals onto a different trajectory, thus altering the nature and duration of exposure to risk and protective factors.

In light of the importance attached to psychosocial factors for oral health, a greater effect in multivariate models might have been expected. Mechanic[16] has explained the relative unimportance in multivariate analyses of social and psychosocial factors influencing the decision to see a physician. He has argued that it is a measurement issue. Psychosocial factors involved in decision-making are part of a dynamic process involving response and feedback from the environment. These complex relationships cannot be adequately measured through health survey items, as can more concrete factors such as age and income.

10.2.4 Self-assessed oral health

The measurement of oral health in this research expanded the utility of self-assessed outcome measures in seeking to obtain indicators that reflected contemporary definitions of oral health. A variety of measures was examined so that the effect of socioeconomic and predictor variables could be compared across a range of different outcomes. The final selection included both objective and subjective indicators that permitted both closed (number of teeth) and open responses, which allowed for broader interpretation (global self-rated item) and assessed multidimensional aspects of oral health such as biological or physical, and perceptual or psychological. The first two measures evaluated pathological processes. These were objective counts of decayed teeth, and teeth missing due to 'decay, pain, or other dental disease.' The former is a measure of untreated disease, while the latter, missing teeth, represents the notion of mortality and the failure of disease treatment.

Several earlier studies have noted the validity of self-assessed tooth counts, yet little was known about the accuracy of self-assessed counts of decayed, missing and filled teeth. The validation study confirmed that the great majority of adults self-reported DMFT estimates accurately within the range of two teeth. Moreover, these counts were sufficiently valid to demonstrate clear and consistent socioeconomic gradients. Apart from the advantages of cost-efficiency and convenience, self-assessed parameters have potential for greater application in population surveillance to monitor trends in inequality over time in response to health promotion and intervention initiatives.

A little over half of the respondents reported that they had no decayed teeth at the time of the survey. Clearly a sizeable minority (45.0%) either was unsure or believed they had untreated dental disease. A similar proportion (45.5%) reported having lost one or more permanent teeth due to dental disease. Yet more than three-quarters of respondents (77.5%) thought that their oral health was good, very good or excellent. This seemingly paradoxical relationship makes it clear that oral health is not simply reducible to the absence of biological problems; it also has a substantial component that reflects the impact of biological problems on individuals' functional capacity and quality of life.

Increasingly it has become clear that the impact of a condition on function and well-being is critical to understanding the effect of the condition and offers insight into the wide variability in individual responses to similar conditions. Over the past 15 years, a rapid acceleration in the development of alternative indicators has ensued. Such measures are particularly suited to oral health conditions that are typically chronic. The third outcome measure selected for this research – social impact evaluated with the Oral Health Impact Profile – represents such an instrument. A summary score captured a multidimensional expression of burden that encompassed physical, psychological, and social domains that reflect an individual's subjective evaluation and reaction to their oral conditions. The fourth measure, oral symptom experience was obtained by summing affirmative experiences of four common oral complaints over the preceding 12 months. Assessed were broken or chipped natural tooth, gums that hurt or bleed, sores on the tongue or inside the mouth, and bad taste or breath. Together these symptoms reflect a composite image of general oral maintenance and wellbeing, incorporating trauma prevention, oral hygiene and periodontal health.

The final measure was a global subjective rating of dental health with responses provided along a six-point ordinal scale, dichotomised in multivariate analysis as 'good', 'very good' and 'excellent' versus 'average', 'poor' and 'very poor'. Arguably, what people use as referents when rating their oral health is not important, as ultimately it is the distribution of responses in the population of interest that matters. However, the issue has been explored in the academic community for both general and oral health. From general health research it was found that most people alluded to physical aspects such as the presence or absence of health problems, and to a lesser extent to behavioural aspects, when rating their general health.[17]

10.2.5 Issues pertaining to demography

While the socioeconomic distribution of oral health was the primary focus, a secondary focus was the demographic distribution of oral health outcomes and potential explanatory factors. Selected demographic characteristics were sex, age, country of birth, language spoken at home, employment status, number of householders and geographical location. Traditionally such information is obtained in health surveys to control for confounding, but in this study, these characteristics were assessed to identify vulnerable population subgroups. Three such groups were identified: adults from non-English speaking backgrounds; persons neither employed nor retired; and adults living outside capital cities.

10.2.5.1 Sex/gender

The conventional understanding of sex/gender differences in health is something of a paradox; while females have longer life expectancy than males, they experience greater chronic illness throughout life. Consistent with the latter, females reported higher levels of adverse impact from their oral conditions on daily living than did males. Yet while this association emerged in multivariate analysis, in bivariate analysis sex/gender differences were apparent only for self-rated oral health, and then only for the ordinal scale and not the binary variable. The absence of a sex differential in oral health was unexpected in light of the abundant literature on sex differences for general and mental health, particularly as outcomes were self-assessed and open to subjective interpretation.

To further investigate possible explanations for this apparent contradiction, the separate behavioural and psychosocial profiles for males and females were compared. Findings revealed that patterns in health behaviour and beliefs may be protective of oral health for females. Compared with males, females used dental services more regularly and were less likely to seek asymptomatic care. Apart from preventive care-seeking, they were more diligent in their own dental care behaviour. In addition, females had stronger health self-efficacy beliefs (assurance) and expressed greater dental satisfaction with their last course of dental care. While stress vulnerability appeared to be higher in females than males, this did not detract from their global wellbeing as indicated by higher levels of life satisfaction among females. Somewhat inconsistent with the wider literature, there were no differences between males and females in levels of personal control, social support or work-home interference. Yet when the work environment was considered, sex differences were evident in the respective experiences of control and support. Compared with females, males were more highly rewarded by conditions of the work environment. They worked longer hours than females but had greater autonomy in decision-making authority, personal freedom and skill discretion. They also experienced more social interaction in the workplace and engaged in more social interaction with colleagues outside of work.

Although males were equally concerned as females by the dual demands of work and home commitments, their higher scores for coping suggests that were better able to manage the stress resulting from this conflict. Taken together, the profile for females concludes a greater readiness to perceive and appraise situations as stressful, counter-balanced by a sense of competence to successfully manage their oral health and greater utilisation of services and attention to dental self-care.

10.2.5.2 Age

An examination of Australia's population pyramid reveals a clear central bulge representing the post-war 'baby boom' birth cohort, whose numbers were bolstered by waves of post-war immigration. This pre-fluoride cohort now in midlife reported poorer oral health than both younger adults and older adults aged 70-80 years, raising a number of questions. What are the foundations of successful oral ageing? By identifying the antecedents of oral health at midlife, a better understanding emerges of the early risk factors for oral morbidity later in life. How likely is it that the comparatively poor oral health of this cohort will improve as they move towards old age? And, why do adults in midlife have comparatively poorer oral health?

While the compression of morbidity hypothesis adequately accounts for the good oral health of early old age relative to later old age, there is no comparable explanation to account for the relatively high levels of morbidity in midlife. An interesting observation that may shed light on the issue is the coincidental peak in socioeconomic differentials in middle age. This association has been reported elsewhere. Marmot and colleagues [18] for example, cited Goldblatt [19] and Marmot and Shipley [20] to observe that "Midlife is the period of life, after the first year, at which socioeconomic differences in mortality are most manifest" (p403). As socioeconomic differences were attenuated among older adults, so to were differences in oral health.

While adults in midlife had relatively high levels of oral morbidity, adults aged 18-29 years fared comparatively better and this was reflected in their favourable global ratings of oral health status. In addition to fewer missing teeth, young adults reported less untreated decay and lower social impact than other adults except the 70+ years age group. It is possible that behavioural and psychosocial determinants exert greater or lesser salience at different points in the life course. Very little is known about the differential impact of social determinants on developmental oral health. Salient determinants in young adulthood may not be as salient in midlife. Underscoring this possibility was the observation that highest and lowest scores on psychosocial and behavioural items were consistently polarised to the youngest and the oldest age groups. In terms of their psychosocial profile, one trend was positive; young adults have the highest perception of mastery and the lowest perception of constraint. Yet in almost every other respect, however, this cohort has a risk profile that leaves them vulnerable to poor social integration and multiple health threats.

Compared with older age groups, adults aged 18-29 years reported lowest social support, fewest social networks, greatest distress, least coping ability and poorest life satisfaction. In the workplace they reported less control over decision-making, limited skill discretion, less personal freedom and greatest home-work interference. While young adults perceived a sense of high control on the general social support items, in the workplace this perception was unsupported.

10.2.5.3 Ethnicity

The exploration of social variation in oral health and explanatory variables included a comparison based on country of birth (Australia or overseas) and language spoken at home (English or other). The reduction of ethnicity to bi-dimensional categories of the dominant culture versus all others was clearly not adequate to account for the complex relationships between cultural factors and oral health. The exploration of differences between ethnic groups was beyond the scope of this study, yet despite this limitation an important finding emerged. Persons born overseas and those who spoke a LOTE at home are both first-generation migrants to Australia, yet their relative experiences of oral health were dissimilar. The poorer oral health of people who speak a LOTE is likely to involve more than material disadvantage and include barriers to dental care, as well as ethnic identity, social isolation and relative deprivation.

10.2.5.4 Employment status

No distinction was made between unemployed persons (persons actively seeking work) and those not employed (non-working adults of working age who were not seeking work). It is likely that non-employed persons share common risk factors for health as unemployed persons, such as economic barriers to purchasing goods and services, opportunity barriers to social integration and skill barriers to re-entry into the labour market. In Australia, economic restructuring of the labour market has brought about a significant increase in the number of hidden unemployed,[21] and these individuals are not included in official unemployment rates. In comparison to unemployed adults, the health of non-employed individuals is relatively unexplored.

10.2.6 Future research

This research has looked at the social distribution of oral health and its social determinants, based on the understanding that individuals are influenced by their social context and that this influence is ultimately reflected in their oral health. While this approach has advanced the understanding of how social environment is tied to oral health, there remain important omissions. Among these is the challenge to identify and explain the independent effect of social context itself. If it is understood that health is produced is a social context, then exploration of social determinants needs to incorporate contextual attributes that are not reducible to effects of individual people but rather are embedded in collective factors in society.

For instance, it is possible that the personal income of an individual and the income distribution of their community have independent and interdependent effects on the health of individuals.

There has recently been increased recognition of multi-level analytic techniques that analyse outcomes simultaneously in relation to determinants measured at these different levels. The challenge for future research is to determine whether the socioeconomic variation in oral health is shaped by compositional factors alone, or in concert with contextual variables, and exert an independent effect.

10.3 Limitations

The potential limitations in this study pertain to non-response bias, measurement issues and causal interference.

10.3.1 Non response bias

A limitation of voluntary surveys is the risk of bias from non-response that may compromise the quality of the data obtained and limit the ability to generalise findings to the target population. In this research the length and complexity of the mailed survey posed a threat that involved a trade-off between the comprehensiveness of the dataset obtained and the likely response rate. To maximise participation and minimise the potential effect of non-response bias, the survey administration followed the methods of Dillman for telephone and mail surveys. The CATI was completed by 56.6% of sampled households, and the mailed survey was completed by 64.6% of interviewees selected for follow-up.

To examine non-response differentials to the mail survey, chi-square tests were used to compare respondents and non-respondents to the mailed survey on sociodemographic characteristics obtained in the CATI. These analyses revealed systematic non-response concentrated in the lower portion of the socioeconomic distribution, ranging from 43.2% of individuals with household income <$12,000 to 29.1% of individuals with income of $50,000+. Consistent with the income gradient, non-response was greater among adults with no post-secondary education, those eligible for government concession and edentulous adults. Non-response was also greater among males than females and among those who spoke a LOTE at home rather than English. There was an inverse age gradient in non-response ranging from 29.1% among adults aged 60-69 years to 45.1% of adults 18-29 years. Significantly fewer capital city dwellers responded, but there were no differences by country of birth.

Data were weighted to account for the sampling design and to conform to ABS population estimates of the age and sex distribution of adults aged 18+ years in each of the sampling sites. These statistical adjustments overcame the problem of under representation based on geography, age and sex, and also increased the representation of LOTE speakers from 7.5% to 10.7%, as these people predominantly resided in capital cities. The under-representation of socioeconomically disadvantaged persons would be a problem if the objective was to collect epidemiological data to make precise estimates of disease prevalence or service utilisation. This, however, was not the case in this research, where the objective was to examine relationships between potential risk and protective factors for oral health. Such associations are generally unaffected by non-response bias.

10.3.2 Measurement issues

10.3.2.1 Dependent variables

A consistent finding in the dental literature is that dentate adults self-assess their remaining or missing teeth with a high level of accuracy in telephone and mail surveys. [22 23 24 25] These counts provide valuable data in large population studies and can be obtained quickly with little cost. The clinical validation study indicated that estimates of teeth missing because of pathology were accurate within the range of ± 2 teeth in 74.7% of cases across both arches. Self-assessments were conservative, under estimating the mean number of missing teeth by 1.76 teeth. This error might be explained by the objective assessment including teeth missing for reasons other than pathology. Self-assessed numbers of decayed teeth across both arches were accurate within the range of ± 2 teeth in 85.0% of cases. Again, self-assessed estimates were conservative, under estimating the mean number of decay teeth by 0.4 teeth. The logical questions arising from the validation exercise are how important is the element of subjectivity in self-assessed caries and how might extraneous variables such as negative affectivity be controlled? The answers to these questions depend on the purpose for which tooth counts are collected. If self-assessment is intended as an alternative method of clinical examination for reporting precise parameter estimates of epidemiological incidence or prevalence, such subjectivity introduces serious bias. If, however, subjective caries experience is the intended outcome, then self-assessment is a legitimate outcome and the factors that influence perception of disease might well be classified as explanatory rather than confounding.

The intended purpose in this research for collecting self-assessed disease estimates was to obtain a quasi-clinical measure that might supplement other, more subjective measures of oral health such as the global self-rating item. In correlational analysis, 'decayed teeth' was moderately correlated with social impact (rho=0.378) and the global self-rating item (rho=-0.334), suggesting that while 'decayed teeth' represents a distinct aspect of oral health, a relationship does exist. Intuitively, one might expect this to be the case; that untreated caries might coexist with other oral conditions that impact adversely on quality of life and lead to a poorer self-rating of oral health.

Missing teeth is another traditional clinical measure that reflects the cumulative effects of past oral disease and dental treatment practices. In this research, the use of missing teeth as an outcome measure has important limitations. Being cumulative and non-reversible, its relationship with age implies that oral health declines across the life course, which is a conclusion that was not supported by other subjective measures. The strength of the linear relationship with age meant that in multivariate analysis after controlling for age, very few other explanatory variables reached statistical significance in explaining missing teeth. Secondly, the clinical rationale for tooth extraction altered considerably over the second half of the twentieth century, with a trend towards greater tooth retention. Thus, while high missing teeth in young adulthood is indicative of inadequate exposure to preventive and conservative care and implies socioeconomic disadvantage, the same inferences cannot reliably be made for older adults with few remaining teeth.

Another limitation is the potential for self-reporting bias. Because both dependent and explanatory variables were self-reported, adults who perceived fewer competencies to manage their own health, for instance, may also be more likely to report that problems with their teeth, mouth or dentures affected their quality of life. In reviewing the literature on organisational stress, Zapf and colleagues[26] described this bias in terms of a common third variable whereby underlying factors such as negative affect can lead to a tendency to report in one direction, potentially altering the correlation between perceived stress and subjective health status. Arguably, this bias is a problem when using the global single item question for rating health status. Responses to this item reflect an integration of multiple dimensions of health that are not defined by the researcher, and are consequently prone to personality traits of the respondent such as hardiness or negative affect. By contrast, the development of the OHIP was guided by the theoretical underpinning of the World Health Organization's 1980 International Classification of Impairments, Disabilities and Handicaps that was subsequently adapted for oral health by Locker.[27] OHIP items evaluate the impact of dental problems on an ascending hierarchy of dimensions, ranging from impairment through to functional limitation and increasingly more debilitating impacts of disability and handicap. Because OHIP items address specific impacts such as the sense of taste, pain, interruption to meals and social irritability, their clearly defined boundaries minimise the potential impact of subjective interpretation.

10.3.2.2 Independent variables

Empirical research and theoretical models guided the selection of instruments to measure the social determinants of interest. The selected instruments, in the main, had been widely used in the public domain, and their psychometric attributes, including aspects of validity and reliability, were published in the oral health or social science literature.

The single exception was the four-item battery referred to as the social support scale. These items were developed for inclusion in this research from the theoretical literature on social support, but had not been pre-tested.

The items lacked sensitivity, as indicated by the mean scores that ranged from a low of 3.36 for appraisal support to 3.50 for informational support, from a possible range of zero to four. This lack of variation precluded the construction of quintile bands, so that graded relationships might be observed in bivariate analysis.

10.3.3 Causal inference

The research design and all empirical analyses were based on cross-sectional data. The limitation of such data relates to the inability for drawing causal inference about the effects of social environment on oral health, as data cannot establish the direction of causation. For example, the observed association between dental care and oral health may be bi-directional.

By convention, the process of judging whether an observed association is a causal relationship is guided by a set of nine guidelines described in 1965 by Bradford Hill.[28] Initially developed for infectious diseases due to a single agent, these criteria have been applied in chronic disease epidemiology where etiology is not multi-causal. However, in social epidemiology where societal or environmental circumstances that influence the general context of human behaviour are thought to drive health inequalities, their application is challenged, and when health is subjectively assessed, their appropriateness is further diminished. Having observed these caveats, some cautious comments about causality are made by drawing on the broader body of research that has addressed relative inequality in health.

Foremost among Bradford Hill's criteria is whether exposure precedes the effect, ie a temporal relationship. This issue is fundamental to the prospective cohort design, and Whitehall II, for example, showed that low levels of job control predicted coronary heart disease.[29] Other Whitehall II research found that employees faced with an unforseen threat of job insecurity, redundancy or job change recorded significant increases in poor self-rated general health and mean number of symptoms, and relative increases in blood pressure, body mass index, poor sleep, and minor psychiatric morbidity.[30]

- *Strength of the association*

In a systematic review of prospective cohort studies to 1997 in which psychosocial factors were implicated with coronary disease, strong evidence was found that psychosocial factors were independent etiological and prognostic factors for coronary heart disease. In particular, depression, anxiety and social support had strong associations with myocardial infarction and coronary heart disease as measured by odds ratios and relative risk after adjusting for a host of demographic, medical, behavioural, physiological, and other psychosocial factors.[31]

- *Dose-response relationship*

The relationships between socioeconomic position and oral health are monotonic, indicating that socioeconomic conditions have a dose-response relationship with oral health.

- *Consistency of the relationship*

An expansive body of research has developed from numerous studies conducted by different investigators and undertaken using a variety of methods to build a solid evidence base demonstrating the consistency of the relationship. Importantly, these findings have been replicated among different ethnic populations, in different continents and in countries experiencing profound different sociopolitical change.

- *Biologic plausibility and experimental evidence*

As Wilkinson [32] noted of studies of non-human primates, the investigators' ability to manipulate the experimental social environments strengthens implied causal inferences by minimising the possibility of reverse causality. Brunner has reviewed the increasing body of evidence that confirms direct connections between exposure to psychosocial risk and pathological biological functioning in humans and animals.[33]

Many of the advances in establishing causal links between social environment and disease have arisen from coronary heart disease research, a disease with dissimilar etiology to the oral health outcomes evaluated in this study. Yet, as Sheiham and Watt observed, oral health conditions share common risk factors with several important chronic diseases, including cardiovascular diseases, cancers and injuries. [34] In light of the association observed in this research, it is not unrealistic to expect that social factors linked to cardiovascular disease are underlying, if not immediate, determinants of oral health.

10.4 Significance and implications

Of significance is the confirmation that factors considered to be social determinants of general and mental health are also associated with oral health. This observation strengthens the case that oral health, rather than being a separate entity, is a fundamental component of general health and as such has salience to mainstream population health. The findings have potential to contribute to the development of oral health promotion activities and, in the broader academic environment, to add meaningfully to the evidence base necessary for the effective development and implementation of policy to reduce inequalities in population health. Lower position on the social hierarchy confers more oral disease, and is associated with more oral symptoms, poorer subjective oral health and greater missing teeth. Also disproportionately concentrated in lower socioeconomic groups are a number of psychosocial risk factors that appear to contribute to the development of these inequalities. Individuals who experienced economic hardship in daily living also lacked control over their lives, were more likely to have weak social ties, experienced more daily stress and were less satisfied with life generally. These conditions impacted upon people's motivation for committing to oral health goals and proactively seeking regular dental care. While the oral health consequences of exposure to a single risk factor posed only a minimal negative impact, people with low SEP tended to be exposed to multiple risks that increased the probability of oral health problems.

The broader significance is that not only do socioeconomic and psychosocial risk factors for oral health cluster together, but that individuals who are vulnerable to poor oral health are likewise vulnerable to a host of other health problems that share these common social determinants.

The conceptual framework shows that oral health is determined proximately by people's dental self-care and use of dental services, but is ultimately determined by the factors further upstream that influence their dental health-related behaviour. The underlying determinants of oral health are therefore factors such as the psychosocial consequences of inequality in the social, economic, living and working environments and the psychosocial resources that accrue from exposure to these conditions. The explanatory links delineated in the conceptual framework were supported by the research findings and represent a step forward in understanding the determinants and pathways that link social circumstances to adult oral health in the Australian population.

There are inter-related implications arising from this study: policy implications for dental care and coverage, social justice implications and the implications for health promotion. Results showed that the utilisation of dental services was positively associated with each measure of oral health. On the one hand, the reduction of access barriers to dental services would enable more people to obtain timely dental care and attain better oral health. From an oral health perspective, the benefits are clear. Yet, from a health inequalities point of view, the gain from a reorganised public dental health program is less transparent. At issue is whether differential access to dental care is the principal cause of the oral health gradient across the social hierarchy in Australia. A counter argument is that health inequalities are not due primarily to a lack of health care – in fact, estimates indicate that health care accounts for about one fifth of the variation in health outcomes. However, the literature supporting this contention is based on general health outcomes and mostly derived from studies overseas.

Inequity in oral health refers to inequalities that are unjust and potentially avoidable. Oral health inequalities are an expression of social inequalities in the broader society. It is entirely appropriate that the responsibility for population oral health be shifted back to society and away from the sole responsibility of the individual. The issue of social justice is related to inequity issues and has salience in defining oral health goals and targets. In setting goals and targets, emphasis on reducing social inequalities in population oral health is equally important as attention paid to improving overall levels of population oral health.

10.5 Conclusions

The persisting inequalities in population health have provoked much debate within academic forums over the past quarter of a century. In particular, two assertions have been foremost in the debate; namely that population health differentials have tended to increase rather than decrease, and that social factors ranging from familial factors to global issues are a primary cause of this widening gap. Since the publication of the influential Black Report in 1980, the explanations for these inequalities have shown increasing sophistication. This development has moved the inquiry forward from debate over the authenticity of documented health inequalities to discussion that is more erudite on the importance to health of relative inequality and the psychological impact of social comparison.

This research explored the distribution of adult oral health in the Australian population and found systematic inequalities in outcomes distributed along a monotonic gradient closely aligned to the social hierarchy. Adults ranked higher in socioeconomic position had identifiably better oral health status than those adults occupying positions immediately below them, and this relationship spanned the entire hierarchy irrespective of the indicator employed to quantify socioeconomic position.

Further investigation revealed the presence of a second gradient that paralleled the socioeconomic gradient and comprised social and psychosocial resources to facilitate adaptive functioning and promote health. Adults with greater material resource as determined by socioeconomic indicators enjoyed a wider range of social ties and better access to emotional, instrumental, appraisal and informational support. Because of this support base, or perhaps independently of it, socioeconomically advantaged adults perceived themselves better able to direct their lives, to exert control, achieve goals, solve problems and deflect the stressfulness of daily life. The more advantaged adults were, the higher they rated their satisfaction with life. Importantly, each of these factors was independently associated with oral health outcomes.

The presence of this second gradient and its close affiliation with the first suggested that some relationship between the two could decode reasons for the social gradient in adult oral health. The purchasing power of income and the knowledge power of education are intuitively sufficient to explain gross differences in oral health, such as rates of missing teeth; clearly, the acquisition of advanced conservative dental treatment is procurable through income alone. Yet, this materialist explanation would seem inadequate to account for finer differences in oral health such as the hierarchical-linked variation in the social impact of oral conditions found closely linked to psychosocial resource.

Unexpectedly, only weak evidence supported the possibility of a third analogous gradient, a behavioural gradient, running parallel to the socioeconomic and psychosocial gradients. In the absence of a strong relationship, the credibility of a behavioural explanation for the socioeconomic distribution of adult population oral health substantially diminished. Yet while only tenuous links were found connecting dental behaviour to socioeconomic resource, the concomitant co-variance between dental behaviour and oral health outcomes was considerable, as was the association between psychosocial resource and dental behaviour. Clear monotonic gradients between levels of psychosocial resource and adherence to recommended behavioural practices were reflected in monotonic gradients between dental behaviours and oral health status.

Although unexpected, the absence of a strong behavioural explanation for the socioeconomic gradient in oral health did not weaken the development of a coherent conceptual framework to explain oral health inequalities. In fact, it enabled the refinement of a materialist-psychosocial explanation in which behavioural determinants were socially determined, but not instrumental in instigating hierarchical differences in oral health outcomes. Thus behavioural factors emerged as proximate determinants of oral health, and psychosocial and material factors were considered to affect a more distal impact on oral health, providing some sense of chronology in their influence. The resultant explanatory framework was not then limited to a mono-causal socioeconomic explanation, but encompassed a broader array of material factors, social environment and workplace conditions and took into account the impact of these factors on psychosocial response, dental behaviour and ultimately on oral health.

Central to developing an explanatory mechanism for inequality in oral health through a conjoint material and psychosocial pathway is the notion of social comparison. Much of the research on social comparisons underscores the importance of the direction of the comparison being made. Adults occupying higher positions on the social hierarchy have the greatest scope for downward comparisons whereby they appraise their own standing as being better relative to similar individuals around them. Conversely, adults in the most deprived circumstances inevitably make upward comparisons perceiving their position unfavourably to that of more advantaged people around them, and the interpretation of this comparison gives rise to potentially health-damaging psychological distress and diminished satisfaction with life.

Individuals occupying high positions on the social hierarchy had an abundant supply of positive resources (income, education, prestige), while individuals at the opposing end of the hierarchy held fewer of these beneficial resources for good oral health.

The distribution of psychosocial resources was somewhat different, and this difference had a critical implication for poor oral health. It was not simply the case that people at the low end of the psychosocial resource hierarchy held fewer beneficial resources, such as supportive ties, adaptive coping ability and personal control.

Rather than having null or minimal resources, people situated in this disadvantaged position experienced insidious exposures to social isolation, chronic distress and personal subjugation. Furthermore, the hazardous effect on oral health of exposure to these aversive attributes was greater than were the beneficial effects to oral health of social ties, adaptive coping and personal control.

In drawing these inter-related facets together, what emerged was a picture of compounding disadvantage that raises questions of social justice. The individuals who were most disadvantaged in terms of socioeconomic resource were the same individuals most vulnerable to psychosocial risk factors. Hence, disadvantage was not arbitrarily distributed over the population as a whole but instead was concentrated in specific vulnerable groups. The burden of low economic resource was intensified by the additional burdens of social and psychological deficits, and these coincided with structural and organisation barriers to timely preventive dental care services. While the literature discounts the importance of the 'inverse care law' as a factor in the generation of health inequalities, it is certainly the case in Australia that the provision of public-funded dental care to eligible adults is harshly rationed through institutionalised scarcity.

Population differences in oral health are jointly influenced by the social environmental conditions of adulthood and the prevailing circumstances and influences of the family environment during childhood. Adults who experienced social and psychosocial deprivation in middle childhood were at greater risk of impaired oral health later in adult life. It is likely that different social factors have different salience at different developmental stages across the life course. Young adults, for instance, had the poorest social support and greater distress, tempered by higher perceived control over life circumstances. Very little is known about what causes these risk and protective factors to switch on and off for similar-aged adults.

Understanding how disadvantage in its various forms becomes manifest in unequal health outcomes directly through a psycho-physiological pathway, and/or indirectly by lowering the individual's capacity to resist health damaging behaviour is a topic that needs further investigation. Certainly, the evidence in this study for an association between psychosocial risk and poor adherence to recommended dental behaviours supported the indirect pathway.

In recent years, there has been an important reorientation in the dental literature away from a reductionist view of oral health that is solely concerned with specific oral diseases and their clinical management. The broader orientation recognises the individual's own perspective by evaluating oral health-related quality of life and subjective oral wellbeing. Such measures are highly sensitive indicators of socioeconomic gradients in adult population oral health and underscore the relevance to oral health of social environments in which people are raised, live, work and interact.

Despite this expanded view, oral epidemiology has, in the main, continued to emphasise traditional behavioural risk factors to the relative exclusion of broader social determinants, yet oral health and wellbeing reflect much broader issues than illness behaviour.

To counter this direction, this research shifted the focus upstream to factors that promote or impede healthy behaviour on the one hand, and that connect with socioeconomic indicators on the other hand. Through fitting together these relationships, a conceptual framework emerged that provided information on pertinent areas of the causal processes that lie behind the generation of inequalities health in population oral health.

Finally, it is argued that the key to socioeconomic inequalities in adult oral health lies in the systematic variation in underlying social factors across socioeconomic groups. The framework makes clear how socioeconomic inequalities in health depend both on the impact that the various underlying determinants of health have on health outcomes, *and* on the distribution of these underlying health determinants across socioeconomic groups. Health may be especially sensitive to one particular underlying determinant, such as access to health services. But if this underlying determinant is not especially unequally distributed across socioeconomic groups, it cannot be an important underlying cause of socioeconomic inequalities in health.

Social determinants of health are societal conditions that differentially influence social relations and ultimately impact the distribution of health in society. These conditions do not occur independently of population oral health. This study underscores the importance of recognising that people maintain good oral health or develop oral morbidity in the context of where they live their lives. Because these conditions are subject to only limited control by individuals, their health consequences are a public health concern and strategies for oral health promotion need not only to target individuals, but also the conditions and contexts in which they live and work.

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11. Appendices

Appendix A: 1999 National Dental Telephone Interview Survey

Schedule #1

This appendix provides the questions and response categories used in the 1999 National Dental Telephone Interview Survey. Unless otherwise specified responses were '*Yes*', '*No*', and '*Don't know*'. Response categories used are indicated by italicised text. This appendix does not include: the skip sequences used; inbuilt range and error checking; the numerical coding of responses; additional onscreen notes for interviewers; and lead in statements to questions or question blocks.

1. Do you have any of your own natural teeth?
2. Have you been without natural teeth for more than one year?
3. How many years would that be?
   Literal response
4. Do you think that you need to make a dental visit now?
5. Would that visit be for a check-up or for dental treatment?
   Check-up
   Treatment
   Both
   Don't know
6. Do you think you need to have a scale and clean at that check-up?
7. What treatment do you think you need to have done? Do you need:
   Scaling and cleaning of teeth?
   Filling(s)?
   Extraction(s)?
   Denture(s) made or repaired?
   Gum treatment?
   Dental crown or bridge?
   Other treatment?
8. How soon do you think you need this visit?
   In less than a week
   From one week to less than a month
   From one month to less than three months
   From three months to less than six months
   Six months or more
   Don't know
9. Do you think that you will make this visit within that time?
10. How long ago did you see a dental professional about your teeth, dentures, or gums?
    Less than 12 months
    One to less than 2 years
    Two to less than 5 years
    Five to less than ten years
    Ten years or more
    Never attended
    Don't know
11. How long ago was that in months?
    Less than 3 months
    3 to less than 6 months
    6 to less than 12 months
    Don't know
12. How many dental visits did you make in the last 2 weeks?
    Literal response
13. How many dental visits did you make in the last 12 months?
    Literal response
14. Did you last see the dental professional because you had a dental problem?
15. Was that dental visit necessary for the relief of pain?
16. How many times did you have a scale and clean during the last 12 months?
    Literal response
17. How many fillings did you have during the last 12 months?
    Literal response
18. How many teeth were extracted during the last 12 months?
    Literal response

19. What were the problems with that tooth or teeth?
    Wisdom teeth
    Impacted
    Decayed
    Cracked or fractured
    The filling had broken down
    Abscessed or infected
    Loose
    Orthodontic extractions
    In the wrong position
    Don't know
    (All offered reasons are recorded)

20. Did you think that there was any alternative treatment available other than extraction?

21. Were any of the following the reasons for having the tooth/teeth extracted?
    The cost of keeping the tooth or teeth?
    The extensive time required for treatment?
    Failure of previous treatment?
    Feeling that the tooth would be extracted sooner or later?
    Wanted to stop the pain?
    Any other reason? → What was that reason? *(Literal response)*

22. Have you had the extracted tooth/teeth replaced by a denture or a bridge?

23. Was there any [other] treatment done during the last 12 months?

24. What was that treatment?
    Professional fluoride application
    New dentures prepared or fitted
    Other oral surgery (besides tooth extraction)
    Gum treatment (periodontal treatment)
    Adjustment, reline or rebase of denture(s)
    Orthodontics
    Crowns or bridge
    Other treatment
    (All offered reasons are recorded)

25. Was your last dental visit made at a:
    Private dental practice (including specialist)
    Government dental clinic (including dental hospital)
    School dental service
    Dental technician
    Other site
    Don't know

26. Are you covered by any Government Health Concession cards?

27. So you are NOT covered by any Social Security such as an aged pension, Veterans Affairs, unemployment, sole parent or invalid pension?
    Yes—have a card or pension
    No card or pension
    Don't know

28. Which Health Card(s) are you covered by?
    Health Care Card
    Commonwealth Seniors Card
    Department of Veterans Affairs treatment card
    Other card
    Don't know
    (All offered reasons are recorded)

29. Did the Government or an insurance fund pay any part of the expenses for your last dental visit?
    Paid all own expenses
    Insurance paid some - patient paid some
    Insurance paid all - patient paid none
    Government paid some - patient (or insurance) paid some
    Government paid all - patient paid none
    Other payment arrangement
    Don't know

30. Were you covered by Social Security or a government concession card at the time of that [last] visit? [to a private dental practice]
    Not eligible at time
    Eligible at time
    Don't know

31. Did you last go to a private practice because you prefer to see a private dentist?

32. Was it because:
    The treatment wasn't available at the public clinic?
    You had to wait too long at the public clinic?
    You didn't know you were eligible for public care?
    There was no public clinic to attend?
    It was difficult to get to the public clinic?

33. Why do you prefer to see a private dentist?
    The quality of care
    Don't have to wait
    Treatment not available at the public clinic
    No public clinic to attend
    Continuity of care
    Other
    Don't know/refusal
    (All offered reasons are recorded)

34. Were all of your visits made at a *{lastsite}* during the last 12 months?

35. For your last dental visit, was there a waiting time between your contacting the dental clinic or hospital and being given an appointment?

36. How long did you have to wait before being given an appointment?
    Literal response in months and weeks

37. For your last dental visit, how long did you have to wait between the time you made an appointment and the time of visiting the dental professional?
    Literal response in weeks and days

38. Is there a public dental service in your local area?

39. Is there a waiting period for dental care at that public dental service?

40. How much influence did that waiting period have on your not having dental care in the last 2 years?
    None
    Hardly any
    A little
    A lot of influence
    Don't know

41. There are 16 teeth, including wisdom teeth in the upper jaw.
    Could you tell me EITHER:
    the number of MISSING teeth in your upper jaw, OR
    the number of REMAINING teeth in your upper jaw?
    Literal response

42. There are also 16 teeth, including wisdom teeth in the lower jaw.
    Could you tell me EITHER:
    the number of MISSING teeth in your lower jaw, OR
    the number of REMAINING teeth in your lower jaw?
    Literal response

43. Do you have a denture or false teeth for your upper jaw?

44. Do you have a denture or false teeth for your lower jaw?

45. Which is your usual reason for visiting a dental professional, for check-ups or when you have a dental problem?
    Check-ups
    Dental problem
    Don't know

46. Would your dental visits usually be (necessary) for the relief of pain?

47. How often on average would you seek care from a dental professional?
    Two or more times a year
    Once a year
    Once in two years
    Less often than that
    Don't know

48. Average number of years between visits?
    Literal response

49. During the last 12 months how often have you had toothache? Was it:
    Very often
    Often
    Sometimes
    Hardly ever
    Never during the last 12 months
    Don't know

50. How often have you felt uncomfortable about the appearance of your teeth, mouth or dentures during the last 12 months?
    Very often
    Often
    Sometimes
    Hardly ever
    Never during the last 12 months
    Don't know

51. How often have you had to avoid eating some foods because of problems with your teeth, mouth or dentures during the last 12 months?
    Very often
    Often
    Sometimes
    Hardly ever
    Never during the last 12 months
    Don't know

52. During the last 12 months did your NATURAL teeth or gums cause you any pain or discomfort?

53. During the last 12 months have you had:
    A broken or chipped NATURAL tooth?
    Gums that hurt or bleed?
    Sores on the tongue or the inside of the mouth?
    A bad taste in the mouth or bad breath?

54. During the last 12 months, have you avoided or delayed visiting a dental professional because of the cost?

55. During the last 12 months, has the cost prevented you from having any dental treatment which was recommended or which you wanted?

56. During the last 12 months, has the waiting list at government dental services prevented you from having any dental treatment which was recommended or which you wanted?

57. In the last 12 months, how much of a financial burden have dental visits been for you? Would you say:
    None
    Hardly any
    A little
    A large burden
    Don't know

58. At most times of the year, how much difficulty would you have paying a $100 dental bill? Would you say:
    None
    Hardly any
    A little
    A lot of difficulty
    Don't know

59. Do you have private insurance cover for dental expenses?

60. Was that dental insurance cover taken up ...
    More than 2 years ago
    in 1998
    in 1999
    Don't know

61. Has dental insurance caused you to make dental visits ...
    More often
    Less often
    No change
    Don't know

62. Has dental insurance caused you to accept recommended dental treatment ...
    More often
    Less often
    No change
    Don't know

63. Are you aware of the tax rebate for private health insurance, which also applies to dental insurance?

64. Was the tax rebate a factor in deciding to take up dental insurance cover?

65. Was the tax rebate a factor in deciding to maintain dental insurance cover?

66. Is the insurance cover single or family cover?
    Single
    Family
    Don't know

67. Do you have an appointment set for a checkup in the next 18 months?

68. Do you expect to receive an appointment or reminder notice for a visit within the next 18 months?

69. Is there a dentist you usually go to for dental care?

70. How long have you gone to that dentist for dental care?
    12 months or less
    One to less than 2 years
    Two to less than 5 years
    Five to less than ten years
    Ten years or more
    Don't know

71. How would you rate your own GENERAL health? Would you say that it is:
    Excellent
    Very good
    Good
    Average
    Poor
    Very poor
    Don't know

72. And how would you rate your DENTAL health? Would you say that it is:
    Excellent
    Very good
    Good
    Average
    Poor
    Very poor
    Don't know

73. You are:
    Male
    Female
    Refusal

74. Could you tell me your age please?
    Literal response

75. In which country were you born?
    Australia
    New Zealand
    Other Oceania
    UK and Ireland
    Other Europe (include old USSR)
    Middle East / N Africa
    SE Asia
    NE Asia
    Southern Asia
    North America
    South or Central America
    Africa (excl. N Africa)
    Don't know / Refusal
    OR Literal response

76. Are you of Aboriginal or Torres Strait Islander origin?

77. Do you speak a language other than English at home?

78. What language do you mainly speak at home?
    English
    Italian
    Greek
    Chinese
    Arabic/Lebanese
    German
    Vietnamese
    Spanish
    Polish
    Don't know / Refusal
    OR Literal response

79. Do you attend school either full time or part time?
    Full time
    Part time
    Not at school
    Don't know

80. How old were you when you left school (full time)?
    Literal response

81. Have you undertaken a trade course or any other educational studies since leaving school?

82. What is the highest level of education you have attained since leaving school?
    Completed secondary
    Some University, CAE or Teacher's College (still studying or ceased study)
    Completed a University, CAE or Teacher's College Course
    Part completed a vocational course eg nursing, a trade or apprenticeship
    Completed a vocational course eg nursing, a trade or apprenticeship
    Other
    Don't know / Refusal

83. What is the highest level of schooling you have had?
    Primary school
    Some secondary school
    Completed secondary school

84. Are you employed full-time or part-time in a job, business or on a farm?
    Full-time
    Part-time
    Retired
    No—not employed
    Don't know / Refusal

85. Could you please indicate the category of your total household income?

Per year	*Per fortnight*	*Per week*
Up to $12,000	*Up to $460*	*Up to $230*
From 12 to $20,000	*$461 to $770*	*$231 to $385*
From 20 to $30,000	*$771 to $1154*	*$386 to $577*
From 30 to $40,000	*$1155 to $1538*	*$578 to $769*
From 40 to $50,000	*$1539 to $1923*	*$770 to $961*
More than $50,000	*More than $1923*	*More than $961*
Don't know		
Refusal		

86. How many people aged 5 years or more live in the household?
    Literal response

Appendix B: Dental Health and Lifestyle Factors questionnaire and associated letters

B1 Cover letter 1

Date
<<Title>> << First Name>> <<Last Name>>
<<Address 1>>
<<Address 2>>
<<State>> <<Postal Code>>

Dear <<Title>> Last Name>>

Recently you were chosen at random for inclusion in a major study of dental health in Australia – The National Dental Telephone Interview Survey. The purpose of the telephone interview was to obtain information about the frequency of dental problems and the types and sources of dental care received.

As mentioned at the end of the interview, we are also seeking information on your level of satisfaction with the dental care you last received. In addition, we are looking at dental health from a broader perspective. We are interested to know more about your dental health from your point of view and some detail on you social circumstances and opinions about health in general. We expect that these responses will contribute to a greater understanding of people's values and needs, so that all groups within the community can be best assisted when planning dental health services.

We would like you to complete the enclosed questionnaire that will take about 15 minutes of your time. Participation is voluntary and all information supplied will be maintained in strict confidence.

The study is being conducted at Adelaide University and the Australian Institute of Health and Welfare's Dental Statistics and Research Unit in the Dental School at Adelaide University. If you have any queries please telephone 1800 882 690 (toll free) if you are calling outside Adelaide. Adelaide residents can telephone Ms Anne Sanders on 8303 3292 or Mrs Lorna Lucas on 8303 4051 at Adelaide University. Your assistance will make a valuable contribution towards improved dental health in the community.

Yours sincerely

A John Spencer
Professor of Social and Preventive Dentistry
Director, AIHW Dental Statistics and Research Unit

B2 Reminder card

AIHW

DENTAL HEALTH
& LIFESTYLE FACTORS
QUESTIONNAIRE

To.....

A short time ago you were interviewed by telephone as part of a study which will allow a better understanding of the frequency of dental problems, and the types and sources of dental care received. At the end of the interview it was indicated that a questionnaire on your views on dental health and lifestyle factors would be sent to you. This was done about two weeks ago. If you have already returned the questionnaire, please accept our thanks and ignore this notice. However, if you haven't done so, please fill in and post the questionnaire today. It is important that we obtain a complete picture of satisfaction with dental care and your participation in the study will ensure that the findings present an accurate account of the community's needs.

If by some chance you did not receive the questionnaire, or it was misplaced, please contact Ms Anne Sanders or Mrs Lorna Lucas. For callers outside the Adelaide metropolitan area phone 1800 882 690 (toll free), or Adelaide residents phone 8303 4051.

Yours sincerely

A John Spencer
Professor of Social and Preventive Dentistry
Director, AIHW Dental Statistics and Research Unit

B3 Cover letter 2

Date
<<Title>> << First Name>> <<Last Name>>
<<Address 1>>
<<Address 2>>
<<State>> <<Postal Code>>

Dear <<Title>> Last Name>>

Several weeks ago we posted you a questionnaire about issues related to dental health and lifestyle factors. As of today, we have not received your completed questionnaire. We realise that you ay not have time to complete it. However, we would genuinely appreciate hearing from you.

The nationwide study is being conducted by Adelaide University and the Australian Institute of Health and Welfare. The response to the questionnaire has been excellent, but the study's usefulness depends on our receiving a questionnaire from each respondent. Our past experience has shown that people who take longer to return their questionnaire have different opinions. While some sections of the questionnaire may not be relevant, please complete as many as are relevant to your circumstances.

Thank you again for your valuable contribution to this important research area. We will be happy to sent you a summary of the results should you request it. In the event that your questionnaire has been misplaced, please phone Ms Anne Sanders or Mrs Lorna Lucas on 1800 882 690 (toll free) for callers outside Adelaide, or 8303 4051 for Adelaide residents.

Yours sincerely

A John Spencer
Professor of Social and Preventive Dentistry
Director, AIHW Dental Statistics and Research Unit

B4 Questionnaire

Dental Health
& Lifestyle Factors

Questionnaire 1999

AIHW Dental Statistics and Research Unit
The University of Adelaide
SOUTH AUSTRALIA 5005

Telephone: 1800 882 690 (toll free)
OR 8303 4051 or 8303 3292 for Adelaide residents

Dental Health
And Lifestyle Factors
1999

WE need your help. Would you be kind enough to participate in an important study about dental health? We are trying to find out how satisfied you have been with your dental treatment. In addition, we are interested in the influence of people's different lifestyles and circumstances on their dental health. We hope that you can take part as we think our results improve our understanding of oral health in the community could influence ways in which people receive oral health care.

HOW TO ANSWER THE QUESTIONS ...

SECTION

In Section One, please consider each statement on dental health.
Some of the following statements are worded positively and others negatively.
Please read each statement carefully, then ***circle one number only*** **to indicate your level of agreement/disagreement with EACH statement.**

EXAMPLE

	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
The dental clinic I visited had modern equipment.	1	2	3	4	(5)
The dental clinic I visited was not clean and tidy.	1	(2)	3	4	5

If you strongly disagree, circle 1.
If you disagree, circle 2.
If you neither disagree nor agree circle 3.
If you agree, circle 4.
If you strongly agree, circle 5.

There are no right or wrong answers; we are simply seeking your opinion.

The first statements deal with different aspects of satisfaction with the service provided at your **last dental visit** or **series of dental visits**.
If you saw more than one dental professional, please respond in terms of the dental professional with whom you spent most time.

Note: The term *dental clinic* includes government public clinics and private practice surgeries.

	Strongly Disagree				Strongly Agree
The distance to the dental clinic made it difficult to attend my last visit.	1	2	3	4	5
Travel to the dental clinic I visited was convenient for me.	1	2	3	4	5
I found it difficult to arrange with the dental clinic a date and time for my dental visit.	1	2	3	4	5
I was able to make the dental visit as promptly as I felt was necessary.	1	2	3	4	5
The dental clinic waiting room was attractive.	1	2	3	4	5
I was not kept waiting long when I was at the dental clinic.	1	2	3	4	5
The dental surgery had everything needed to provide my dental care.	1	2	3	4	5
The dental surgery was modern.	1	2	3	4	5
The dental clinic staff were friendly to me.	1	2	3	4	5
The dental professional I saw was impersonal or indifferent towards me.	1	2	3	4	5
I saw the dental professional I wanted to see.	1	2	3	4	5
I saw the same dental professional each time I visited.	1	2	3	4	5
The dental professional I saw explained well what treatment was needed.	1	2	3	4	5
The dental professional explained whether there were any patient costs and how much before beginning treatment.	1	2	3	4	5
	Strongly Disagree			Strongly Agree	

	Strongly Disagree				Strongly Agree
The dental professional I saw could have been more thorough in examining me.	1	2	3	4	5
The dental professional I saw answered my questions.	1	2	3	4	5
I would like to have had more explanation of my dental treatment options.	1	2	3	4	5
The dental professional I visited avoided expensive treatment options.	1	2	3	4	5
I was satisfied with the dental care I received.	1	2	3	4	5
I received more dental care than I was convinced I needed.	1	2	3	4	5
There were other dental problems I had that were not treated.	1	2	3	4	5
The dental care I received was more painful than I had expected.	1	2	3	4	5
The dental professional explained what was being done during the treatment.	1	2	3	4	5
The dental care I received fixed my dental problems.	1	2	3	4	5
The dental care I received did not improve my dental health.	1	2	3	4	5
It took longer than I expected before my dental problems showed improvement.	1	2	3	4	5
My dental care cost me more than I could reasonably afford.	1	2	3	4	5
I am confident that I received good dental care at my last visit.	1	2	3	4	5
There are things about the dental care I received that could have been better.	1	2	3	4	5
My dental professional gave me good advice about how to look after my teeth and gums.	1	2	3	4	5
I feel protected financially against possible dental expenses.	1	2	3	4	5
	Strongly Disagree				Strongly Agree

This section is about professional and home dental care.

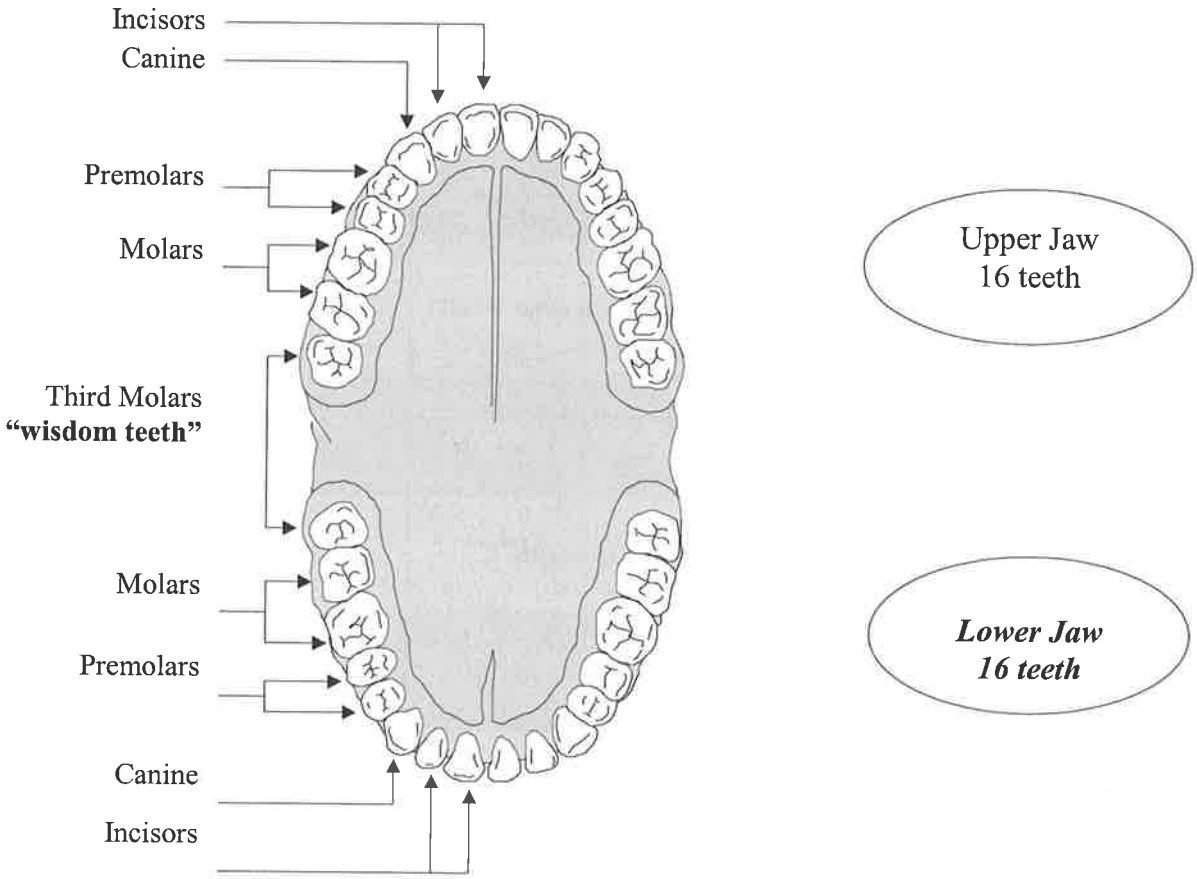
Please read each statement then **circle one number only to indicate your level of agreement with EACH statement.**

	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
It is good practice to have regular dental checks-ups.	1	2	3	4	5
I avoid seeking dental care even when I think I have a dental problem.	1	2	3	4	5
I generally make dental appointments for check-ups even when I believe there is no problem.	1	2	3	4	5
I brush my teeth at least once every day.	1	2	3	4	5
I succeed in any effort I make to have good dental health.	1	2	3	4	5
I carefully follow any instructions my dental professional gives me about home-care.	1	2	3	4	5
When I have a dental problem, it is not a high priority.	1	2	3	4	5
If I had toothache, I would deal with it myself for at least a week.	1	2	3	4	5
I floss my teeth every day.	1	2	3	4	5
I control snacking between meals.	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree

Please take a moment to consider this diagram of a complete set of **32** teeth.

It shows the mouth comprising two jaws referred to as the **upper** and **lower** jaw.

Each jaw has 16 teeth.



We are interested in your *number of teeth* and the reason for any *missing* teeth.
Teeth may be missing for a number of reasons.

i. Teeth may never develop or may **fail to erupt** (come through). This is common with "*wisdom teeth*".

ii. Teeth can be **extracted** because of **crowding**. These are usually premolars during adolescence or impacted wisdom teeth in early adulthood (refer diagram);

iii. Teeth can be **extracted** because of severe **decay**, pain, or other oral disease;

iv. Teeth can be knocked out in an **injury**.

While such mouths have less than 32 teeth, there may not be obvious spaces to show that teeth are missing.

If you have less than 32 natural teeth present, please consider possible reasons for teeth to be missing.

① **NUMBER OF TEETH PRESENT**	Count the number of **natural adult teeth** you have in each jaw. *Write these numbers in the two boxes provided for C1.*
ℑ **NUMBER OF TEETH MISSING AND REASONS FOR TEETH MISSING**	Calculate the number of **missing teeth** in each jaw by subtracting your number of natural teeth (C1) from 16. Select the **reasons for missing** teeth from these 4 options: never erupted; extracted (crowding); extracted (decay/disease); or lost through injury. *Write these numbers in the eight boxes provided for C2.*
③ **NUMBER OF TEETH WITH FILLINGS**	Count the teeth you have with one or more **fillings** in each jaw. *Write these numbers in the two boxes provided for C3.*
℘ **NUMBER OF TEETH WITH UNTREATED DECAY**	Count the teeth you have that you think might have new areas of **unfilled decay** in each jaw. *Write these numbers in the two boxes provided for C4.*

We are interested in *your best estimate* for each of these questions.

Please answer the following questions by placing a number in the boxes below.

		Upper Jaw	Lower Jaw
C1	How many **natural teeth** do you have in each jaw? (minimum 0 and maximum 16 teeth) →	☐	☐
	If you have less than 16 teeth in either jaw, go to C2.	+	+
C2	How many **teeth are missing** for each of the following reasons? **Never erupted** *Ie. never came through into the mouth*	☐	☐
		+	+
	Extracted because of **crowding** *eg premolars and impacted wisdom teeth*	☐	☐
		+	+
	Extracted because of **decay, pain** or other **dental disease**	☐	☐
		+	+
	Lost through injury	☐	☐
		=	=
	Please note: the number in the boxes should sum to **16** in each column →	**(16)**	**(16)**

		Upper Jaw	Lower Jaw
C3	How many **teeth with one or more fillings** can you count in each jaw? (minimum 0 and maximum 16 teeth) "Fillings" includes crowns, silver fillings and white fillings	☐	☐
C4	How many teeth with **untreated (unfilled) decay** do you think you have in each jaw?	☐	☐

Each of the following questions begins by asking how your **teeth, mouth or dentures** have affected your daily living during the PAST YEAR.
We would like you to complete these questions even if you have good dental health.

Please circle one response only that best fits your case for EACH statement.

HOW OFTEN during the PAST YEAR have your TEETH, MOUTH OR DENTURES ...					
... made *pronouncing any words* difficult?	Very Often	Fairly Often	Occasion-ally	Hardly Ever	Never
... affected your sense of *taste*?	Very Often	Fairly Often	Occasion-ally	Hardly Ever	Never
... caused *pain* in your mouth?	Very Often	Fairly Often	Occasion-ally	Hardly Ever	Never
... caused *discomfort when eating* some foods?	Very Often	Fairly Often	Occasion-ally	Hardly Ever	Never
... caused you to feel *self conscious*?	Very Often	Fairly Often	Occasion-ally	Hardly Ever	Never
... caused you to feel *tense*?	Very Often	Fairly Often	Occasion-ally	Hardly Ever	Never
... meant that your *diet has been unsatisfactory*?	Very Often	Fairly Often	Occasion-ally	Hardly Ever	Never
... caused an *interruption to your meals*?	Very Often	Fairly Often	Occasion-ally	Hardly Ever	Never
... made it *difficult for you to relax*?	Very Often	Fairly Often	Occasion-ally	Hardly Ever	Never
... caused you to feel *embarrassed*?	Very Often	Fairly Often	Occasion-ally	Hardly Ever	Never
... caused you to feel a little *irritable* with other people?	Very Often	Fairly Often	Occasion-ally	Hardly Ever	Never
... made it *difficult for you to do your usual jobs*?	Very Often	Fairly Often	Occasion-ally	Hardly Ever	Never
... caused you to feel that *life in general was less satisfying*?	Very Often	Fairly Often	Occasion-ally	Hardly Ever	Never
... meant that you have been *unable to lead a normal life*?	Very Often	Fairly Often	Occasion-ally	Hardly Ever	Never

SECTION 2

This section moves away from dental health. From this point the questionnaire asks about lifestyle circumstances. Some of it is based on your *opinions* and some is based on your *experiences*. We are interested in relating patterns of these characteristics to dental health. Most of the blocks of statements are published scales that have been widely used in other studies and have been carefully designed. Please attempt to answer each question.

Please consider each statement and circle one number only, to indicate your level of agreement with EACH statement.

	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
I can do just about anything I really set my mind to.	1	2	3	4	5
Other people determine most of what I can and cannot do.	1	2	3	4	5
When I really want to do something *I usually find a way* to succeed at it.	1	2	3	4	5
Whether or not I am able to get what I want is in my own hands.	1	2	3	4	5
There is *little I can do to change* many of the important things in my life.	1	2	3	4	5
I often feel helpless in dealing with the problems of life.	1	2	3	4	5
There are many things that *interfere with what I want to do.*	1	2	3	4	5
I have *little control* over the things that happen to me.	1	2	3	4	5
There is really *no way I can solve all the problems* I have.	1	2	3	4	5
I sometimes feel I am *being pushed around* in my life.	1	2	3	4	5
What happens to me in the future mostly *depends on me.*	1	2	3	4	5
What happens in my life is *often beyond my control.*	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree

Each of the following statements is about managing your general health.

Please circle one number only to indicate your level of agreement with EACH statement.

	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
I take responsibility in caring for my health.	1	2	3	4	5
No matter how hard I try my health doesn't turn out the way I would like.	1	2	3	4	5
It is difficult for me to find effective solutions to the health problems that come my way.	1	2	3	4	5
I succeed in the projects I undertake to improve my health.	1	2	3	4	5
I'm generally able to achieve my goals with respect to my health.	1	2	3	4	5
I find my efforts to change things I don't like about my health don't work.	1	2	3	4	5
Generally, my plans for my health don't work out well.	1	2	3	4	5
I am able to do things for my health as well as most other people.	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree

The next statements refer to support you receive from other people.

Please circle one number to indicate your level of agreement with EACH statement.

There are PEOPLE IN MY LIFE who …	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
… pay attention to my feelings and problems.	1	2	3	4	5
… express appreciation of my work.	1	2	3	4	5
… I can get help from with certain activities if needed.	1	2	3	4	5
… I can get advice from on how to handle things if needed.	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree

We are interested in people's involvement in organisations, committees, clubs or associations.

Please tick any box(es) which describe(s) any active membership you have where you meet with other people on regular basis.

☐ Sporting club ☐ Social group ☐ Religious group ☐ Community service club ☐ Hobby club

☐ Support group ☐ Parent group ☐ Charitable organisation ☐ Professional association ☐ Fund-raising group

☐ Cultural association ☐ Other *(please specify)* .....

The following questions are about *stress* you may have experienced over the past year.
We would like you to complete these questions even if stress has not been a concern for you.
Please circle one response only to EACH question.

HOW OFTEN during the PAST YEAR have you felt? ...					
... upset because of something that happened unexpectedly?	Not At All	Rarely	Some-times	Fairly Often	Very Often
... unable to control the important things in your life?	Not At All	Rarely	Some-times	Fairly Often	Very Often
... felt either nervous or stressed?	Not At All	Rarely	Some-times	Fairly Often	Very Often
... dealt successfully with irritating life hassles?	Not At All	Rarely	Some-times	Fairly Often	Very Often
... effectively coped with important changes in your life?	Not At All	Rarely	Some-times	Fairly Often	Very Often
... confident about your ability to handle your personal problems?	Not At All	Rarely	Some-times	Fairly Often	Very Often
... felt things were going your way?	Not At All	Rarely	Some-times	Fairly Often	Very Often
... unable to cope with all the things that you had to do?	Not At All	Rarely	Some-times	Fairly Often	Very Often
... felt able to control irritations in your life?	Not At All	Rarely	Some-times	Fairly Often	Very Often
... felt you were on top of things?	Not At All	Rarely	Some-times	Fairly Often	Very Often
... angered because of things that happened outside of your control?	Not At All	Rarely	Some-times	Fairly Often	Very Often
... found yourself thinking about things that you have to accomplish?	Not At All	Rarely	Some-times	Fairly Often	Very Often
... felt able to control the way you spend your time?	Not At All	Rarely	Some-times	Fairly Often	Very Often
...felt difficulties were piling up so high that you could not overcome them?	Not At All	Rarely	Some-times	Fairly Often	Very Often

The next five statements seek views on levels of life satisfaction.

Please circle one number only, to indicate your level of agreement with EACH statement.

	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
In most ways my life is close to my ideal.	1	2	3	4	5
The conditions of my life are excellent.	1	2	3	4	5
I am satisfied with my life.	1	2	3	4	5
So far I have acquired the important things I want in life.	1	2	3	4	5
If I could live my life over, I would change almost nothing.	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree

This block of questions is about your childhood.

Please **print your answer** or ☑ **tick the response** that mostly closely answers each question.

Name the town/suburb, State and postcode for the area in which you lived at the age of 10 years.	If you were **not born in Australia**, please go to J2. ..... (town/suburb) .... (State) ..... (postcode)		
When you were aged 10 did your parents live together or separately?	☐ TOGETHER	☐ SEPARATELY	☐ UNSURE
How would you describe the parenting style of the person chiefly responsible for rearing you?	☐ generally positive and supportive	☐ generally negative and unsupportive	☐ other *(please specify)* .....

When you were aged 10, what was the **occupation category** of your **father** (or male carer living in your household)?	☐ manager or administrator	☐ clerk	☐ domestic duties
	☐ professional	☐ salesperson or personal service worker	☐ unemployed
	☐ para-professional	☐ plant or machine operator, or driver	☐ other *(please specify)* .....
	☐ tradesperson	☐ labourer	
When you were aged 10, what was the **occupation category** of your **mother** (or female carer living in your household)?	☐ manager or administrator	☐ clerk	☐ domestic duties
	☐ professional	☐ salesperson or personal service worker	☐ unemployed
	☐ para-professional	☐ plant or machine operator, or driver	☐ other *(please specify)* .....
	☐ tradesperson	☐ labourer	

If you are not in the paid workforce or not self-employed, the following statements will not be relevant to your current life circumstances. There are no further questions. Thank you for considering these issues and giving us your opinions and your assistance in responding is greatly valued. Please return your completed questionnaire in the reply-paid envelope provided.

If you have only recently stopped work, or if you are taking extended leave, please continue with the questionnaire. We welcome your responses. The remaining questions and statements apply to persons in the paid workforce or self-employed.

If you are *presently employed* in the workforce, **please print your answer to the first question, then circle the best response for questions K3 to K5.**

Please state your usual occupation. Write description, eg "accounts clerk".	.....
Please write a brief description of your usual type of work. Examples are "in charge of invoicing", "supervisor in large firm", "self employed"	....

How many hours per week do you spend on work related to your paid employment?	Less than 10 hours	Between 10 and 20 hours	Between 20-30 hours	Between 30-40 hours	More than 40 hours

Do you expect that your job will be secure for the next five years?	Yes	Probably	Unlikely	No
Do you expect that your present job skills will be obsolete within ten years?	Yes	Probably	Unlikely	No

This block of questions is asking about the control you have over your work conditions.

Please circle the one response that best fits your case for EACH statement.

Are you able to influence the planning of your work?	Rarely or Not at All	Some-times	Often
Are you able to influence the pace at which you are required to work?	Rarely or Not at All	Some-times	Often
Are you able to influence how your time is used in your work?	Rarely or Not at All	Some-times	Often
Are you able to plan when you take work breaks?	Rarely or Not at All	Some-times	Often
Are you able to plan when you take your holidays?	Rarely or Not at All	Some-times	Often
Are you able to work flexible working hours?	Rarely or Not at All	Some-times	Often
Are you free to receive a phone call during working hours?	Rarely or Not at All	Some-times	Often
Are you free to receive a private visitor at work?	Rarely or Not at All	Some-times	Often
Does your work have varied skill levels?	Rarely or Not at All	Some-times	Often
Does your work have varied work procedures?	Rarely or Not at All	Some-times	Often
Are there possibilities for on-going education as part of your work?	Rarely or Not at All	Some-times	Often

These questions ask about the demands of your work, and about support from those with whom you work. **Please circle YES or NO, to indicate your level of agreement with EACH statement.**

Does your job require you to work at a hard, fast pace?	Yes	No
Is your job psychologically demanding?	Yes	No
Are you able to talk to co-workers during your work?	Yes	No
Are you able to leave your job to talk with co-workers?	Yes	No
Are you able to interact with co-workers as part of your work?	Yes	No
Do you meet with co-workers outside of the work place?	Yes	No
Have you met with a co-worker within the last six months outside of the work place?	Yes	No

These statements are about work and home. The first four ask *how work affects life home* or recreational time, and the next four ask *how home* or other *activities affect work.*

Please circle one number only to indicate your level of agreement with EACH statement.

	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree
After work, I am too tired for leisure activities, family time or household chores.	1	2	3	4	5
I have so much work to do that it takes away from my personal interests.	1	2	3	4	5
My family/friends dislike how often I am preoccupied with work while I am at home.	1	2	3	4	5
Work takes up time that I'd like to spend with family or friends.	1	2	3	4	5
I'm often too tired at work because of the things I have to do at home.	1	2	3	4	5
My personal demands are so great that they interfere with my work.	1	2	3	4	5
My superiors and peers dislike how often I am preoccupied with my personal life while at work.	1	2	3	4	5
My personal life takes up time that I'd like to spend at work.	1	2	3	4	5
	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree

Thank you for completing this questionnaire. Your assistance is greatly appreciated.
The following lines are for any comment about the questionnaire or the subject matter in general that you may wish to make.

That concludes the final section. Your assistance in completing this questionnaire is greatly appreciated and your contribution is valued.

To avoid the necessity of any response being made *invalid*, could you please check to ensure:

* that each item has been answered;
* that only one response to each item has been clearly given;
* that no item has a circle placed in between two possible response options.

Thank you for taking this care.

If you have queries or need clarification to complete this questionnaire, please telephone Ms Anne Sanders at The University of Adelaide on either of the following numbers:

☏ 1800 882 690 (toll free)
or Adelaide residents may call 8303 4051 or 8303 3292.

✉ Please return this questionnaire in the enclosed reply-paid envelope addressed to:

AIHW Dental Statistics and Research Unit
Dental School
The University of Adelaide
SOUTH AUSTRALIA 5005

Appendix C: Validation study

C1 Primary approach letter: metropolitan

Date

<<Title>> << First Name>> <<Last Name>>
<<Address 1>>
<<Address 2>>
<<State>> <<Postal Code>>

Dear <<Title>> Last Name>>

Thank you for completing the mail survey titled 'Dental Health and Lifestyle Factors'. In the final stage of the project we are inviting research participants to attend an appointment for a dental inspection. These inspections will be conducted at the Colgate Australian Clinical Dental Research Centre located in the Adelaide Dental Hospital, Frome Road.

Please consider this offer over the next week or two, as someone from the Adelaide University will phone you with further information and will offer to arrange an appointment time that is convenient for you to attend. There is no cost for this inspection. Other than your time, there will be no inconvenience to you or discomfort. No X-rays will be taken, no drugs administered, and no dental treatment will be performed.

Your teeth will be inspected by research staff from Social and Preventive Dentistry in the Dental School at Adelaide University. At the conclusion of the inspection you will be given a written report of findings. All details will be kept strictly confidential.

Appointment time will be offered during the following sessions:

- Tuesday from 9.00am to 5.00pm
- Thursday from 9.00am to 12.00 noon
- Friday from 1.30pm to 4.30pm

In addition, some limited evening appointments will be available on Monday and Wednesdays, and some week-end appointments will also be offered within the Adelaide Dental Hospital.

Having made the appointment, you are free to reschedule the visit, or withdraw from the study altogether if you choose. If you seek further information, please telephone 8303 3292 to speak with Ms Anne Sanders.

Yours sincerely

Ms Anne Sanders

C2 Primary approach letter: non-metropolitan

Date

<<Title>> << First Name>> <<Last Name>>
<<Address 1>>
<<Address 2>>
<<State>> <<Postal Code>>

Dear <<Title>> Last Name>>

Thank you for completing the mail survey titled 'Dental Health and Lifestyle Factors'. In the final stage of the project we are inviting research participants to attend an appointment for a dental inspection. These inspections will be conducted over July and August at several South Australian Dental Service clinics around the State.

Please consider whether you will be able to attend a 30-minute appointment at one of the clinics listed below. If you live near one of these regional centres, someone from Adelaide University will telephone you over the next few weeks to arrange an appointment. Also are listed are some tentative dates. Appointment times will available during working hours and evenings.

Adelaide Dental Hospital, Frome Road, Adelaide (all days including weekends)

Whyalla (July 9–10)
Port Augusta (July 11–12)
Port Pirie (July 13–14)
Clare (July 15)
Eudunda (July 15)
Berri (July 16–17)
Mt Gambier (July 19)
Naracoorte (July 20)
Murray Bridge (July 24)
Gawler (July 28)
Angaston (August 4)
Birdwood (August 7)
Victor Harbor (August 12)
Willunga (August 18)

We realise that some people live in areas that are not accessible to these clinics. However, if you are travelling to Adelaide between June and September this year, we would be interested to arrange an appointment for you at the Adelaide Dental Hospital. Please phone (08) 8303 3292 or 1800 882 690 (toll free) to speak with Anne Sanders if you would like to arrange an appointment for a dental inspection in Adelaide, or if you seek further information.

There is no cost for this inspection. Other than your time, there will be no inconvenience to you or discomfort. No X-rays will be taken, no drugs administered, and no dental treatment will be performed. Your teeth will be inspected by research staff from Social and Preventive Dentistry in the Dental School at Adelaide University. At the conclusion of the inspection you will be given a written report of findings. All details will be kept strictly confidential.

Yours sincerely

Ms Anne Sanders

C3 Dental inspection confirmation letter: metropolitan (modified for non-metropolitan clinics)

Appointment Notice

Attention

Your appointment has been arranged at the following time on this date.

|.....

After hours dental inspections will be conducted in the Primary Care Unit of the South Australian Dental Service. This unit is located in the Adelaide Dental Hospital marked with the orange coloured **X** on the enclosed map. Pedestrian traffic lights are adjacent the building on Frome Road.

Please enter the Adelaide Dental Hospital through the main doors on Frome Road. The Primary Care Unit is situated on the ground floor immediately on your right hand side. Please announce your arrival at the reception desk.

Appointments will be concluded within 30 minutes.

Research participants attending an after hours appointment have the advantage of being able to park directly outside of the building. Limited parking is available between the Dental Hospital and the IMVS building alongside. Thank you for your continued support.

Anne Sanders.

(phone) 8303 3292.

C4 Amendment to self-assessed DMF teeth status

The purpose of the following questions is to update the self-reported dental status of the research participant since completing the Dental Health and Lifestyle Factors questionnaire late last year.

QUESTIONS	RESPONSES		
Have you attended a dental appointment since you completed the written dental health questionnaire? If NO or UNSURE, please proceed to question 10.	YES ☐	NO ☐	UNSURE ☐
Have you had teeth EXTRACTED since completing the questionnaire? If NO, or UNSURE, please proceed to question 6.	YES ☐	NO ☐	UNSURE ☐
How many teeth were extracted from your upper and from your lower jaw?	UPPER JAW ☐	LOWER JAW ☐	TEETH EXT'D SINCE QU'RE ☐
Of the *(number)* teeth extracted from your *(upper/lower)* jaw, how many had been FILLED?	TEETH IN UPPER JAW HAD FILLING ☐	TEETH IN LOWER JAW HAD FILLING ☐	
Of the *(number)* teeth extracted from your *(upper/lower)* jaw, how many had been DECAYED?	TEETH IN UPPER JAW HAD DECAY ☐	TEETH IN LOWER JAW HAD DECAY ☐	
Have you had teeth FILLED since completing the questionnaire? If NO or UNSURE, please proceed to question 10.	YES ☐	NO ☐	UNSURE ☐
How many teeth have been filled in your upper jaw and in your lower jaw since completing the questionnaire?	UPPER JAW ☐	LOWER JAW ☐	TEETH FILLED SINCE QU'RE ☐
Of the *(number)* teeth filled in your *(upper/lower)* jaw, how many had been previously filled?	TEETH IN UPPER JAW HAD FILLING ☐	TEETH IN LOWER JAW HAD FILLING ☐	
In the *(number)* teeth filled in your *(upper/lower)* jaw, how many did you know had decay?	TEETH IN UPPER JAW HAD DECAY ☐	TEETH IN LOWER JAW HAD DECAY ☐	
Have any teeth that were previously healthy and unfilled, DECAYED since completing the questionnaire? If NO or UNSURE, there are no further questions.	YES ☐	NO ☐	UNSURE ☐
How many previously healthy, unfilled teeth now have DECAY in your upper jaw and in your lower jaw?	UPPER JAW ☐	LOWER JAW ☐	TEETH DECAYED SINCE QU'RE ☐

C5 Recording sheet for dental inspection (part a)

SUBJECT DETAILS

IDENTIFICATION

SEX: M | F

SURNAME

UR/RU: U | R

AGE

POSTCODE

MEDICAL CONTRAINDICATIONS FOR CPI

- NIL
- RHEUMATIC FEVER, HEART DISEASE
- ARTIFICIAL JOINT/VALVE PROS
- TRANSPLANTED TISSUE
- BLEEDING DISORDER

INSPECTION DETAILS

RESEARCHER

RECORDER

SIGNED CONSENT OBTAINED

DATE: 0 0 0

CLINIC NAME

INSPECTION STATUS: COMP | FTA | REAP

REPEAT

ORAL MUCOSA *

- NO LESION
- TUMOUR
- LEUKOPLAKIA
- LICHEN PLANUS
- ULCERATION
- ANUG
- ABSCESS
- CHELITIS
- CANDIDIASIS

Other, please specify .....

** (Tick one or more)*

DENTURE STATUS

NO DENTURE

NOT WORN

UPPER DENTURE: P | F

LOWER DENTURE: P | F

SUBJECT ASSESSMENT *

U1	U2	U3	U4	U5	U6
L1	L2	L3	L4	L5	L6

1 = satisfactory 2 = fit 3 = function
4 = comfort 5 = material 6 = esthetics

** (Tick the ONE most relevant category)*

CRITERIA FOR UNSATISTACTORY (WORN) DENTURE

RETENTION: U | L

Displacement of the denture from the alveolar mucosal ridge when the subject opens wide but without strain

STABILITY: U | L

≥ 3mm displacement when rotating denture in horizontal plane or if displacement occurs when pressure applied to premolars

OCCLUSION: U | L

Lack of contact during tapping; or displacement upon closing

MATERIAL **

UC	UP	UL
LC	LP	LL

(C) Calculus or staining extensive ≥ ⅓ of surface
(P) Porosity or crazing > ⅓ of surface
(L) Lining deficient or temporary

DEFECT

US	UL	UM
LS	LL	LM

(S) Small. 1-2 teeth missing/fractured, < 1cm^2 of material lost, cracks are < 2cm, or flanges extension inadequate
(L) Large. ≥ 3 teeth missing /fractured, > 1cm^2 of material lost, cracks ≥ 2cm, or no flanges
(M) Multiple. > 1 large defect or total denture fracture

*** (Tick the ONE most relevant)*

C6 Recording sheet for dental inspection (part b)

TOOTH PRESENCE																
CROWN STATUS																
ROOT STATUS																
CPI STATUS 17, 16, 11, 26, 27																
	18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
	48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
CPI STATUS 37, 36, 31, 46, 47																
ROOT STATUS																
CROWN STATUS																
TOOTH PRESENCE																

PLAQUE SCORE					
16 buc	11 lab	26 buc	36 buc	31 lab	46 buc
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3

C7 Coding guide for recording dental inspections

TOOTH PRESENCE	CODE	TOOTH STATUS	CROWN	ROOT	COMMUNITY PERIODONTAL INDEX (CPI)	CODE
Present	P	No Exposed cementum	-	NE	Healthy	0
Crown coverage	C	Sound	S	S	Bleeding observed after probing	1
Unerupted or agenesis	U	Recurrent	R	R	Calculus, but all of the black band on the probe is visible	2
Extracted. Removable Denture in place	RD	Filled	F	F	Pocket 4-5 mm (gingival margin within the black band)	3
Extracted. Replaced with Fixed Bridge	FB	Filled Unsatisfactory, temporary filling	FU	FU	Pocket ≥ 6 mm (black band on the probe not visible)	4
Extracted. Replaced with Implant	RI	Decayed	D	D	Excluded Sextant (less than two teeth present)	X
Extracted. No space (< ½ unit space remaining)	NS	Filled, primary decay on separate site	FD	FD		
Extracted due to Caries	XC	Fissure Sealant	FS			
Extracted due to Other	XO	Trauma	T			
Retained Root Sound (≤ ¼ crown remains)	RS					
Retained Root Carious (≤ ¼ crown remains)	RC					

C8 Findings from dental inspection

Findings from the Dental Inspection

RESEARCH PARTICIPANT _____

Today, a research person from the study titled Social Determinants of Oral Health completed a dental inspection without radiographs for the above named research participant in which the following conditions were noted:

- ☐ Dental caries
- ☐ Periodontal pocketing (4mm or more)
- ☐ Calculus/gingivitis
- ☐ Inflamed/abnormal oral mucosa
- ☐ Instability/defects of dentures
- ☐ Other _____
- ☐ None of the above conditions

Any conditions noted in this dental inspection, and the possible need for treatment should be discussed with a dentist. I have advised the person that, in my opinion, they should seek dental advice/care:

☐ Immediately ☐ In the near future ☐ At regular recall

RESEARCHER: _____

SIGNATURE: _____ DATE: _____