

Predicting social distancing compliance using the Theory of Planned Behaviour

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Abstract

Pandemics are associated with high rates of morbidity, mortality, and economic disruption. Indeed, the ongoing COVID-19 pandemic has been the most fatal of three twenty-first century coronavirus outbreaks. In the absence of a vaccine or medicinal treatment, non-pharmaceutical interventions, such as social distancing, have been recommended to reduce person-to-person transmission. It is anticipated, however, that 80% compliance with regulations would be required to control the outbreak in Australia, with 90% compliance rate likely to control transmission sooner. Although previous research has investigated factors associated with intentions to comply with government enforced pandemic restrictions (such as social distancing), limited research has examined actual behaviour during a pandemic. Using an online questionnaire which included a series of vignettes, this study aimed to identify factors related to compliance with social distancing restrictions. In line with the predictions of the Theory of Planned Behaviour (Ajzen, 1991), our results show that intention to adhere with restrictions and perceived behavioural control significantly predicted participants' self-reported behaviour. Further, participants' attitudes towards social distancing regulations significantly predicted their intentions to adhere with social distancing, although subjective norm and perceived behavioural control were not predictors of intention. Greater understanding of the restrictions also significantly predicted intentions to adhere with the restrictions. Our results suggest that greater understanding of the social distancing restrictions, more favourable attitudes towards the restrictions, and perceived ability to follow the restrictions may encourage greater compliance with social distancing; a behaviour that could reduce morbidity and mortality rates during the current and future pandemics.

Keywords: COVID-19, social distancing, Theory of Planned Behaviour

Declaration

“This thesis contains no material which has been accepted for the award of any other degree of diploma in any University, and, to the best of my knowledge, this thesis contains no material previously published except where due reference is made. I give permission for the digital version of this thesis to be made available on the web, via the University of Adelaide’s digital thesis repository, the Library Search and through web search engines, unless permission has been granted by the School to restrict access for a period of time.”

September 2020

Contribution Statement

The conceptualisation of the research questions and the research design and methodology was a collaborative effort between myself and my co-supervisors, Dr. Jaime Auton and Dr. Daniel Sturman. I conducted the literature search, completed the ethics application, and devised the vignettes included in the final questionnaire. I was responsible for all participant recruitment, where my supervisors provided all participation incentives. I performed preliminary regression analyses using SPSS, and my supervisor Dr. Daniel Sturman completed the final path analyses using AMOS. I wrote up all aspects of the thesis, of which the final draft was reviewed by only one of my supervisors.

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I would also like to thank those who took the time to participate in the current study and allowed me to complete the research study reported here.

Predicting Social Distancing Compliance using the Theory of Planned Behaviour

Pandemics pose a global threat to human health and are associated with high rates of morbidity, mortality, and economic disruption (Lahariya, Sharma, & Pradhan, 2006; World Health Organization, 2005). There have already been three outbreaks of coronaviruses in the 21st century; SARS in 2002, MERS in 2012, and COVID-19 in December 2019. Of these, COVID-19 has caused the greatest mortality due to its high infection rate (Ahmad, Iram, & Jabeen, 2020; Peeri et al., 2020; Wu et al., 2020). Michie, West, Rogers, Bonell, Rubin, and Amlôt (2020) described the COVID-19 pandemic as the greatest threat to mortality and physical and mental health since World War II. Additionally, there currently exist no pharmaceutical interventions, limiting the ability to control transmission (Ferguson et al., 2020).

In the absence of pharmaceutical interventions such as a vaccine or medicinal treatment, non-pharmaceutical measures such as case isolation, quarantine, and social distancing have been employed during previous pandemics to reduce person-to-person transmission (Bootsma & Ferguson, 2007; Wu et al., 2020). Social distancing refers to behaviours or policies that are intentionally adopted to reduce contact rates between people in the general population (Bootsma & Ferguson, 2007; Ferguson et al., 2020; Hatchett, Mecher, & Lipsitch, 2007). Examples of these strategies adopted during previous pandemics include isolation of confirmed and/or suspected cases, bans placed on mass gatherings, increased hygiene processes, and closure of schools, churches, and social venues (Bootsma & Ferguson, 2007; Ferguson et al., 2020; Hatchett et al., 2007). It has been shown that social distancing strategies successfully limit the spread of disease by reducing transmission of respiratory droplets from those confirmed or suspected to be infected. In addition to quarantine measures that reduce contact with people

confirmed or queried to be unwell, social distancing is an effective preventative measure for those presumed well (Wilder-Smith & Freedman, 2020).

The effectiveness of social distancing for reducing transmission and overall mortality has been demonstrated by historical analyses of past pandemics and mathematical simulations of hypothetical pandemic diseases (Bootsma & Ferguson, 2007; Ferguson et al., 2006; Hatchett et al., 2007; Markel et al., 2007). Historical analyses have shown that United States cities that implemented non-pharmaceutical interventions earlier during the 1918 influenza pandemic experienced fewer total cases and associated deaths than cities that did so later (Bootsma & Ferguson, 2007). These authors also estimated that maintenance of these measures could have reduced total mortality by an average of 40% across cities. Using similar methodology, Hatchett et al. (2007) also found that U.S. cities that implemented multiple interventions (such as school, church, and theatre closures) early in the 1918 outbreak experienced 50% lower peak death rates and fewer total deaths than cities that implemented measures later or not at all. Overall, school closures and public gathering bans delayed peak mortality, reduced peak mortality rates, and reduced the number of total deaths during the 1918 pandemic (Markel et al., 2007). Further, cities that maintained these interventions for longer periods experienced lower total mortality than cities that lifted restrictions earlier in the pandemic (Markel et al., 2007). These findings provide support for the effectiveness of social distancing and other non-pharmaceutical interventions for reducing transmission of pandemic diseases.

In addition to non-pharmaceutical interventions effectively controlling transmission of prior pandemic diseases, it has also been suggested that they might be beneficial for the COVID-19 pandemic. Simulation modelling based on census data from Great Britain has indicated that in the absence of any control measures, approximately 81% of the population would become

infected with COVID-19, and 510,000 deaths would occur (Ferguson et al., 2020). However, by isolating suspected cases, quarantining individuals residing with suspected cases, and social distancing those at the highest risk of serious disease, it is predicted that peak healthcare demand could be reduced by two-thirds and total deaths reduced by half (Ferguson et al., 2020).

Similar predictions regarding the efficacy of social distancing measures for reducing morbidity and mortality have been reported through modelling using census data from Australia (Chang, Harding, Zachreson, Cliff, & Prokopenko, 2020), Singapore (Koo et al., 2020), United States (Courtemanche, Garuccio, Pinkston, & Yelowitz, 2020), Canada (Tuite, Fisman, & Greer, 2020), and China (Wu et al., 2020). In Australia, it has been estimated that a minimum 80% compliance with social distancing is required to control the outbreak (Chang et al., 2020), and 90% compliance would control transmission in 13 to 14 weeks. Although these studies demonstrate the potential effectiveness of social distancing for reducing influenza transmission, the utility of this depends on individuals' adherence with these measures (Ferguson et al., 2020).

Although prior research has reported a high level of willingness to comply with restrictions during prior pandemics and the current COVID-19 outbreak (Cava, Fay, Beanlands, McCay, & Wignall, 2005; Wolff, Martarelli, Schuler, & Bieleke, 2020), social distancing and quarantine are often associated with negative experiences that may inhibit compliance with these interventions. These negative effects include a loss of freedom, lack of fresh air, lack of exercise, and separation from social support systems (Barari et al., 2020). One prior study found that 34% of quarantined individuals experienced high psychological distress, compared with 12% of the general Australian population (Brooks et al., 2020). Many of these unfavourable psychological effects are also further inflated by extended quarantine periods (Brooks et al., 2020).

Considering the factors that can influence individuals' adherence with social distancing restrictions, it is critical to identify factors that also promote compliance so that public health messaging can target these factors and maximise the effectiveness of interventions. Previous research has found single factors such as general attitudes to be poor predictors of behaviour, and models that integrate a range of factors and conditions are often more valid predictors of behaviour (Ajzen, 1991).

1.1 Theory of Planned Behaviour

The Theory of Planned Behaviour (Ajzen, 1991) has been used to examine a range of behaviours, including protective health behaviours and preventative practices during pandemics. The Theory of Planned Behaviour posits that intentions are the most proximal predictor of behaviour, and intentions mediate the effects of attitudes, subjective norm, and perceived behavioural control on behaviour (see Figure 1). Attitudes are defined as a person's favourable or unfavourable evaluation of the behaviour and its likely consequences. Subjective norm refers to the perceived social approval or disapproval of the behaviour. Perceived behavioural control is defined as an individuals' perception of the ease or difficulty of performing the behaviour considering their abilities, resources, and barriers. According to the Theory of Planned Behaviour, holding favourable attitudes (attitudes), believing that important others would value and encourage the behaviour (subjective norm), and perceiving greater capabilities and resources to perform the behaviour (perceived behavioural control) increase a person's intentions to perform the behaviour, and the likelihood they will engage in it.

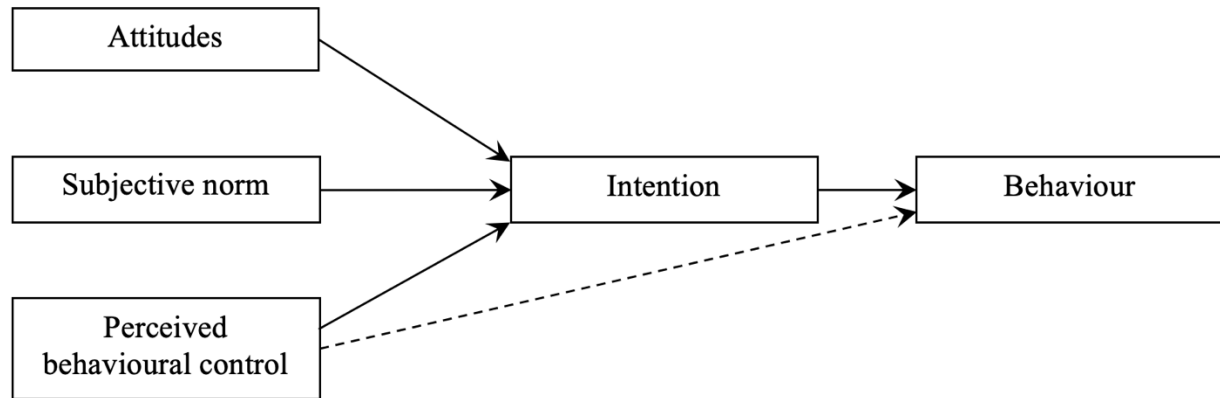


Figure 1. Theory of Planned Behaviour (Ajzen, 1991).

An example of a behaviour that the Theory of Planned Behaviour can be applied to is cigarette smoking. In the context of cigarette smoking, Godin, Valius, Lepage, and Desharnais (1992) used this framework to predict that believing that smoking is pleasant (attitudes) believing that other people would encourage cigarette smoking (subjective norm), and perceiving it to be relatively easy to smoke (perceived behavioural control) predict intentions to smoke in the next six months. In addition, intentions to smoke were suggested to predict individuals' actual smoking behaviour during the following six months.

In addition to smoking behaviour, the Theory of Planned Behaviour has been used to effectively predict other behaviours such as playing video games, voting in elections, and engaging in leisure activities (Ajzen, 1991). A previous meta-analysis has shown the Theory of Planned Behaviour to account for 39% of variance in intention and 27% of variance in behaviours (Armitage & Conner, 2001). The Theory of Planned Behaviour has also been used to predict health behaviours specifically (Godin & Kok, 1996). Within the 56 studies included in this meta-analysis, intentions were the most important predictors of behaviour. Attitude and perceived behavioural control also frequently predicted intention, and the predictive utility of subjective norm on intentions varied across health behaviours. In a separate meta-analysis

examining health behaviours, attitudes, subjective norms, and perceived behavioural control predicted intentions (Hagger & Chatzisarantis, 2009). The direct effect of perceived behavioural control on behaviour varied between behaviour types however (Hagger & Chatzisarantis, 2009). As the effectiveness of the Theory of Planned Behaviour variables have differed in their effects on intentions and behaviour, it is important to consider these factors in the context of social distancing specifically.

Previous research has used Theory of Planned Behaviour to predict compliance with social distancing and other preventative practices during previous outbreaks and the COVID-19 pandemic. One specific study examined people's stated intentions to self-isolate during a pandemic through telephone interviews with Chinese residents (Zhang, Wang, Zhu, & Wang, 2019). In this study, residents' agreement with the government's mandatory isolation rules (attitude), their willingness to disclose their infected status to others should they become infected (subjective norm), and their confidence they could protect themselves from the outbreak (perceived behavioural control) predicted their reported intentions to self-isolate. Specifically, attitude was found to have the strongest effect on intentions, followed by subjective norm. Behaviour was not assessed within this study however, so the effect of intentions on behaviour was not able to be examined.

1.1.1 Attitudes. The first predictor of intentions within the Theory of Planned Behaviour is attitudes. As proposed by the Theory of Planned Behaviour, Bass et al. (2010) found that attitudes strongly predicted adherence with health recommendations aimed to reduce the spread of influenza. Specifically, individuals who perceived a higher likelihood of contracting influenza and who perceived increased severity of influenza were more likely to adhere. This research was conducted based on a hypothetical influenza outbreak however, which may have limited to

validity of the research due to participants having a lack of personal experience with a severe outbreak.

Attitudes towards public health recommendations have also been examined during the SARS outbreak. It has been shown that people who feel confident in their government's ability to control the outbreak are more likely to adhere with recommended behaviours (Tang & Wong, 2003; Tang & Wong, 2005). Individuals from Singapore who believed that authorities provided honest information were also more likely to perform protective behaviours such as wearing a mask or increasing hygiene behaviour (Quah & Hin-Peng, 2004). Overall, attitudes toward government messaging regarding SARS preventative behaviours were found to be important for predicting adoption of the recommended practices.

The influence of attitudes on compliance with public health recommendations has also been examined in the context of the swine flu outbreak. Rubin, Amlot, Page, and Wessley (2009) examined people's behaviour through telephone surveys. They found that people who believed that the outbreak was severe, that authorities could be trusted, and that the recommended behaviours would reduce the risk of contracting swine flu were likely to adopt the behaviours. Conversely, believing that the outbreak had been exaggerated was associated with lower adoption of the behaviours. This suggests that individuals who believe social distancing is important and likely to be effective might be more likely to comply with them.

Similar research has also been conducted during the COVID-19 pandemic. Individuals from North America and Europe have cited distrust in messages provided by their government as a reason for non-adherence with social distancing regulations (Coroiu, Moran, Campbell, & Geller, 2020). Further, individuals from the United States who reported social distancing regulations to be beneficial were more likely to intend to comply with them, and were more

compliant during the seven days prior (Bogg & Milad, 2020). Rather than asking participants about their intentions in the context of specific behaviours, however, intentions were assessed using a single item which asked participants to rate their likelihood of adhering with the regulations in general. As such, they may have failed to account for circumstances in which they might violate restrictions. They may have also been misinformed of the regulations as they were not provided further details such as specific requirements or the duration of the restrictions. That data was collected by telephone interviews may have also lead to socially desirable responses.

1.1.2 Subjective norm. Ajzen's (1991) Theory of Planned Behaviour also proposes that individuals' subjective norms influence their intentions and behaviour. In support of this, individuals have been found to be more likely to adopt behaviours such as wearing a face mask during prior pandemics if they observe other people doing so (Jiang et al., 2009). People are also be more likely to wear a face mask if they perceive that their family and friends believe that it is effective in reducing transmission. Similarly, people have been found to be less compliant with quarantine during the COVID-19 pandemic when they observe other people violating quarantine requirements, and when they believe other people evaluate it as unimportant (Bogg & Milad, 2020; Webster et al., 2020). Zhang et al. (2019) has also found subjective norm to be associated with willingness to self-isolate during COVID-19, although subjective norm was not as important in predicting intentions as attitudes. These finding suggest that individuals might be more likely to adhere with social distancing restrictions if they believe other people consider it to be important. However, the measure of subjective norm in Zhang et al. was not specific to social distancing, but to participants' perceptions of stigma if they were to be diagnosed with the disease.

1.1.3 Perceived behavioural control. The third variable thought to influence intentions within the Theory of Planned Behaviour is perceived behavioural control. In addition, perceived behavioural control is also suggested to predict behaviour directly, particularly when control over the behaviour is perceived to be low (Ajzen, 1991). Prior research has identified factors which increase the difficulty of adhering with restrictions and may potentially reduce compliance. Participants of prior studies have noted concerns with social distancing when they are unable to work from home, as they feel they are required to violate social distancing restrictions avoid loss of their income (Blake, Blendon, & Viswanath, 2010; Bodas & Peleg, 2020; Rubin et al., 2009). Individuals who are employed have also been found to be less willing to comply with restrictions than individuals who are unemployed (Bass et al., 2010; Sadique et al., 2007). Promisingly though, people are generally willing to comply with health recommendations if their work and income are not impacted (Blendon et al., 2008). This suggests that individuals might be less likely to adhere with social distancing restrictions if they perceive their work requirements and potential financial implications as barriers to complying.

Another concern reported held by people regarding social distancing requirements is their ability to access essential groceries and medical supplies. It has been shown that these concerns can limit people's willingness to adhere with recommendations (DiGiovanni, Conley, Chiu, & Zaborski, 2004; Manuell, 2011; Webster et al., 2020). These perceived barriers to complying with social distancing restrictions provide support for perceived behavioural control as a predictor of intentions to social distance. This also contributes to evidence supporting the use of the Theory of Planned Behaviour to understand actual adherence with social distancing rules during a pandemic.

1.1.4 Understanding of COVID-19 restrictions. In addition to the factors described above, it is proposed that people's understanding of COVID-19 restrictions might predict their compliance with social distancing. Unlike health behaviours where the associated risks are widely known and accepted (such as cigarette smoking and exceeding the speed limit while driving), there exists greater variance in individuals' understanding of social distancing requirements during a pandemic. It is likely that these variations in understanding of restrictions is exacerbated by frequent changes to restrictions, such as when they are implemented a staged fashion. Knowledge and understanding have previously been examined in conjunction with Theory of Planned Behaviour variables to predict behaviours such as oral health practices (Dumitrescu, Wagle, Dogary, & Manolescu, 2011) and breastfeeding (Zhang, Zhu, Zhang, & Wan, 2018).

Understanding of social distancing restrictions is important to assess because attitudes, subjective norm, and perceived behavioural control alone may fail to account for individuals who are unaware of the restrictions and might violate them inadvertently. Previously, increased knowledge of COVID-19 has been associated with greater engagement in protective health behaviours including social distancing (Qazi et al., 2020; Xie, Liang, Dulebenets, & Mei, 2020). Similar results have been found in studies assessing knowledge of COVID-19 transmission, risk factors, symptoms, and required protocols if individuals exhibit symptoms of COVID-19 (Prasetyo, Castillo, Salonga, Sia, & Seneta, 2020). Although research has identified knowledge of COVID-19 including protocols for those who are queried to be infected, understanding of preventative social distancing restrictions has not been examined to date. Due to variations in understanding of social distancing restrictions during during a pandemic, this is proposed as a factor worthy of consideration when predicting intentions to adhere.

In addition to these factors thought to influence intentions, the Theory of Planned Behaviour has also previously included demographic variables as background factors to predict attitudes, subjective norms, and perceived behavioural control. Demographic factors have also been associated with compliance with social distancing during a pandemic. In relation to COVID-19, females have previously had greater knowledge (Zhong et al., 2020) and more favourable attitudes (Al-Hanawi et al., 2020) than males. Females have also been shown to be more compliant with preventative measures during previous pandemics (Bish & Michie, 2010; Leung et al., 2003; Tang & Wong, 2003), and during the COVID-19 pandemic (Al-Hanawi et al., 2020) than males.

Additionally, older people have demonstrated higher knowledge of COVID-19 in prior research than younger people (Zhong et al., 2020). Age has been shown to be associated with actual compliance with preventative measures also, with older people being more compliant than younger people during prior outbreaks (Leung et al., 2003) and COVID-19 (Al-Hanawi et al., 2020; Tomczyk, Rahn, & Schmidt, 2020).

A third background factor thought to influence attitudes, subjective norms, and perceived behavioural control is individuals' change in work hours due to COVID-19. It has been shown that fear of unemployment and loss of income is associated with poorer attitudes toward COVID-19 (Song, Wang, Li, Yang, & Li, 2020). Additionally, it is possible that social support for preventative practices might be higher within the work environment than in people's personal lives due to the implications on employees and the workplace should disease be transmitted at work. As such, changes to work hours during COVID-19 is thought to be a factor that might influence compliance with social distancing.

Although useful, existing research into adherence with social distancing has limitations. Much research examining social distancing during a pandemic and using the Theory of Planned Behaviour utilises self-report measures of data collection (Armitage & Conner, 2001). Within these self-report studies, participants' intentions are often asked directly using a single question. This method of assessing intentions fails to provide specific examples of scenarios that might lead to social distancing violations (e.g. Zhang et al., 2019), which might reduce the validity of these measures of intentions. The use of direct questioning might also elicit socially desirable responding due to the potential public health and legal consequences that might be associated with social distancing violations. Prior research has also not accounted for variations in individuals' understanding of restrictions, a factor thought to be important in predicting intentions. Previous research has also failed to assess actual behaviour, and as such, the effect of intentions on behaviour has not been accounted for.

1.2 The Current Study

1.2.1 Aims. The current study aims to use the Theory of Planned Behaviour as a framework to understand factors that influence social distancing compliance at the end of Stage 3 restrictions in Australia. The study utilises an online survey to assess adherence with social distancing and employs a series of vignettes to assess understanding of restrictions and intentions (see Appendix A). Vignettes are "short descriptions of situations or persons that are usually shown to respondents within surveys in order to determine their judgements about the scenarios" (Atzmuller & Steiner, 2010, p. 128). In addition to the vignettes, the present study utilises the Australian Government's restrictions for social distancing on 13th May 2020 (from <https://www.health.gov.au/>).

The use of vignettes provides a few advantages in comparison with direct questioning. First, it aims to reduce socially desirable responding, referring to the tendency of individuals to over-report socially acceptable attitudes and behaviours and under-report socially unacceptable ones (Nederhof, 1985). This is particularly important as socially desirable responding can be associated with self-report methods of research sensitive topics or factors which might incur serious health consequences. The use of vignettes aims to minimise this effect in the present study as the preferred response is more obscured compared with direct questioning (Dickel & Graeff, 2018; Walzenbach, 2019). An example of where this has been demonstrated is in research into attitudes toward pay. In one study, people reported that gender should not influence a person's pay when questioned directly (Auspurg, Hinz, Liebig, & Sauer, 2015). However, when presented with a vignette whereby the protagonist's gender was varied, male protagonists were assessed as being deserving of higher pay than female protagonists. This demonstrates the advantage of using vignettes to reduce social desirability in self-report surveys.

Vignette surveys also provide the advantage of standardising information for all respondents (Lunza, 1990; Wason, Polonsky, & Hyman, 2002) in comparison with direct questioning. Within the present study, the influence of COVID-19 and government-enforced social distancing restrictions on participants' lives may have varied between individuals or between their state of residence. It is also likely that individuals' understanding of restrictions might vary according to their exposure to reliable information, and this might impact on their intentions to adhere when asked directly. The use of vignettes and presentation of the Australian government's social distancing restrictions was aimed to standardise these factors in the present study and allowed participants' understanding of restrictions to be measured for analysis.

To further control for extraneous variables, participants' responses obtained after May 30th, 2020 were disregarded as social distancing restrictions were eased from June 1st, 2020 in some Australian states. This provided greater consistency of the restrictions applicable to participants' day to day lives across states and ensured that behaviours which participants reported that were considered violations of the restrictions were actually prohibited at the time they were performed.

The aims of this research are to identify predictors of social distancing behaviour using the variables of attitudes, subjective norms, perceived behavioural control, and understanding of social distancing restrictions. As prior research into background factors that predict compliance with social distancing has been limited, this study takes an exploratory approach regarding background factors and no specific hypotheses are proposed.

1.2.2. Hypotheses. In line with previous research into compliance with social distancing and other preventative measures during pandemics, the current study hypothesises that (see Figure 2):

- H_1 : Higher understanding of social distancing restrictions (understanding) will predict lower intentions to violate restrictions.
- H_2 : More favourable attitudes toward the social distancing restrictions (attitudes) will predict lower intentions to violate restrictions.
- H_3 : Increased adherence with social distancing restrictions among family and friends (subjective norm) will predict lower intentions to violate the restrictions.
- H_4 : Higher perceived ability to adhere with social distancing restrictions (perceived behavioural control) will predict lower intentions to violate the restrictions.

- H_5 : Higher perceived ability to adhere with social distancing restrictions (perceived behavioural control) will also predict fewer behavioural violations within the previous month.
- H_6 : Lower intentions to violate social distancing restrictions will predict fewer behavioural violations during the previous month.

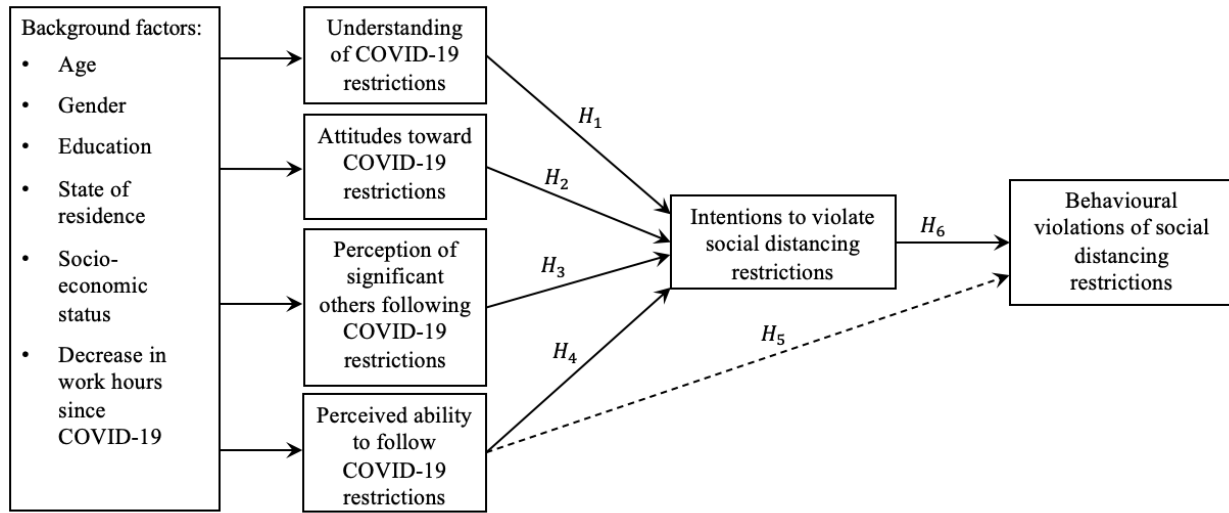


Figure 2. Hypotheses of the current study.

Method

2.1 Participants

Individuals were invited to participate in the present study either via email, social media advertisement, or through the University of Adelaide School of Psychology Research Participation System. University student participation was incentivized with course credit and community participants went into the draw to win one of five AU\$20.00 Westfield gift vouchers. University students comprised 12.7% of the sample and community participants comprised the remaining 87.3%.

A total of 110 Australian residents (87 female) participated in the study between 16th May 2020 and 31st May 2020. Participants were residents from South Australia (63.6%), New

South Wales (26.4%), Western Australia (3.6%), Queensland (2.7%), Victoria (2.7%), and the Australian Capital Territory (0.9%). One participant indicated residence outside of Australia and was removed prior to data analysis. Participants ranged in age from 18 to 63 years ($M = 32.5$, $SD = 12.7$). More than half of the sample reported to be employed on a full-time basis (58.2%), 23.6% were employed for part-time hours, 12.7% were unemployed, and 5.5% reported to be employed but not working at the time of survey completion. Of the final sample, 0.9% ($n = 1$) completed some high school, 21.8% ($n = 24$) completed high school, diploma, or equivalent, 7.3% ($n = 8$) completed some university, 5.5% ($n = 6$) completed trade or vocational training, 38.2% ($n = 42$) completed a Bachelor's degree, and 26.4% ($n = 29$) completed a postgraduate degree. Over half of the sample (54.5%) were married or in a de facto partnership, 39.0% were single, 2.7% were divorced, and 3.6% were separated.

Prior to analysis, data were excluded which indicated residence outside of Australia ($n = 1$), were obtained after May 30th, 2020 ($n = 48$), and which contained incomplete responses ($n = 20$). Responses obtained after May 30th, 2020 were disregarded as social distancing restrictions were eased from June 1st, 2020 in some Australian states. This was done to provide greater consistency of the restrictions applicable to participants' day to day lives across states and to ensure that behaviours which participants reported that were considered violations were actually prohibited at the time they were performed.

2.2 Materials

2.2.1 Demographic information. Participants were asked a series of demographic questions, including their age, gender, education, relationship status, work status, job title, state of residence, and postcode. The Socio-Economic Indexes for Areas (Australian Bureau of Statistics, 2011) was used to assign values to participants' postcodes which represented relative

socio-economic advantage and disadvantage. Higher scores indicated greater advantage and lower disadvantage within their residential postcode.

2.2.2 Social distancing vignettes. Social distancing vignettes were provided to participants which described 18 short scenarios. Thirteen vignettes described situations in which the protagonist violated social distancing restrictions, three described situations in which the protagonist did not violate social distancing restrictions, and two described ambiguous scenarios. It was important to include vignettes that described both violating and non-violating behaviours to assess participants' ability to distinguish between permitted and non-permitted behaviours. This provided a more accurate measure of understanding of restrictions compared with if only violating behaviours were included in the vignettes.

Prior to reading the vignettes, participants were presented with the Australian government's restrictions for social distancing at 13th May 2020 (<https://www.health.gov.au/> on May 13th, 2020; see Figure 3). These restrictions were current to all participants at the time they completed the survey, and participants were asked to respond to the vignettes assuming they were applicable to the protagonists. When completing the vignettes, participants were unable to return to the list of social distancing restrictions to replicate scenarios in their real lives in which they may not have access to the current restrictions when forming decisions about their intended actions.

In public

Social distancing in public means people:

- stay at home and only go out if it is absolutely essential
- keep 1.5 metres away from others
- avoid physical greetings such as handshaking, hugs and kisses
- use tap and go instead of cash
- travel at quiet times and avoid crowds
- avoid public gatherings and at-risk groups like older people
- practice good hygiene
- stay at home if you have any cold or flu symptoms. Seek medical advice and get tested for COVID-19



Australian Government
Department of Health

Households

All Australians are required to stay home unless it is absolutely necessary to go outside. Australians are permitted to leave home for the essentials, such as:

- shopping for food
- exercising — in a public space such as a park, limited to no more than 2 people
- going out for medical appointments or to the pharmacy
- providing care or support to another person in a place other than your home
- going to work if you cannot work from home.

Australians should work from home where they can.

Steps for social distancing in all homes include:

- keeping visitors to a minimum
- regularly disinfecting surfaces that are touched a lot, such as tables, kitchen benches, handrails and doorknobs
- increasing ventilation in the home by opening windows or adjusting air conditioning

If someone in your household is sick, you should:

- care for the sick person in a single room, if possible
- keep the number of carers to a minimum
- keep the door to the sick person's room closed. If possible, keep a window open
- wear a surgical mask when you are in the same room as the sick person. The sick person should also wear a mask when other people are in the same room
- protect at-risk family members by keeping them away from the sick person. At-risk people include those aged over 65 years or people with a chronic illness. If possible, find them somewhere else to live while the family member is sick

At work

If you can, work from home. If you cannot work from home and you are sick, you must not attend your workplace. You must stay at home and away from others.

Steps for social distancing in the workplace include:

- stop shaking hands to greet others
- consider cancelling non-essential meetings. If needed, hold meetings via video conferencing or phone call
- put off large meetings to a later date
- hold essential meetings outside in the open air if possible
- promote good hand, sneeze and cough hygiene
- provide alcohol-based hand rub for all staff
- eat lunch at your desk or outside rather than in the lunchroom
- regularly clean and disinfect surfaces that many people touch
- open windows or adjust air conditioning for more ventilation
- limit food handling and sharing of food in the workplace
- avoid non-essential travel
- promote strict hygiene among food preparation (canteen) staff and their close contacts

In schools

If your child is sick, they must not go to school or childcare. You must keep them at home and away from others.

To reduce the spread of viruses or germs in schools:

- wash hands with soap and water or use hand sanitiser when entering school, and at regular intervals
- stop activities that lead to mixing between classes and years
- avoid queuing
- cancel school assemblies
- have a regular handwashing schedule
- regularly clean and disinfect surfaces that many people touch
- conduct lessons outdoors where possible
- consider opening windows and adjusting conditioning for more ventilation
- promote strictest hygiene among food preparation (canteen) staff and their close contacts

Figure 3. Australian Government restrictions presented to participants.

An example of a vignette in which the protagonist violated social distancing restrictions is; ‘Mark works as a Claims Manager for an insurance company and could complete all of his work remotely. His Team Leader has advised he can work from home, but he feels that he will be unmotivated and unproductive working from home so instead attends his office to work.’ This violated the rule ‘Australians should work from home where they can.’ An example of a vignette in which the protagonist did not social distancing restrictions is; ‘Michelle works as a Physiotherapist in the city and is unable to work from home. Michelle believes that parking garages are overpriced, and it is more convenient to use public transport. Michelle decides to continue commuting to work via train as she considers that many people are likely working from home, and therefore the train will be quieter than usual, and she will be able to keep 1.5 metres distance from other passengers.’ This did not violate any restrictions as people were allowed to attend work for essential purposes and where they were unable to work from home. The social distancing restrictions presented to participants also did not prohibit travel via public transport.

In response to each vignette, participants were asked to indicate whether they believed the protagonist had violated the social distancing restrictions on a scale from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*). Ratings between one and three were considered correct for non-violating vignettes, and scores between four and six were considered correct for violating vignettes. The number of total correct identifications were summed for each participant to produce their ‘understanding of COVID-19 restrictions’ score. Responses to ambiguous vignettes were not included in this measure. Higher scores represented greater understanding of COVID-19 restrictions.

For each vignette, participants were also asked to rate on a scale from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*) whether they would perform the behaviour described in the

vignette if they were in the protagonist's position. As intentions to violate the restrictions are unable to be determined from ambiguous or non-violating vignettes, these were not included in the participants' intentions scores. Scores from the 13 violating vignettes only were summed to provide participants' 'intentions' scores. Higher scores indicated greater intentions to violate social distancing restrictions, where the minimum score possible was 13 and the maximum was 78.

2.2.3 Attitudes scale. Attitudes towards COVID-19 restrictions were assessed using eight items which examined participants' evaluations of the social distancing restrictions imposed by the Australian government. The first four items assessed participants to indicate their evaluations of the social distancing restrictions as necessary, important for their health, important for the health of their family members, and important for the health of people outside of their family. The remaining four items were derived from Georgiou, Delfabbro, and Balzan's (2020) 'government response scale.' An example item from this scale is; 'During the COVID-19 pandemic, the Australian Government's response has been the correct course of action.' Additional items asked participants to indicate their evaluations of the Australian government's response to COVID-19 as too strict, too lenient, and logical. Participants' agreement with these items was rated using a scale from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Ratings of the government's response as too strict were reverse coded, and the eight items were summed. Higher scores indicated more favourable attitudes.

2.2.4 Subjective norm scale. Subjective norm was assessed using two items. These were; 'My family and friends are following the social distancing rules' and 'I have felt social pressure to attend a gathering, event, or engage in an activity which I feel would not have been permitted by the social distancing rules at the time.' The first item was adapted from Prasetyo et

al. (2020) which asked participants to indicate to what extent people around them were adhering with the recommended behaviours. The second item was based on Ajzen (1991)'s definition of subjective norm as perceived social pressure to perform a behaviour. Participants rated their agreement with both items using a scale of 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Scores on the question 'I have felt social pressure to attend a gathering, event, or engage in an activity which I feel would not have been permitted by the social distancing rules at the time' were reverse coded, and the items were summed. Higher scores indicated stronger perceived social pressure to adhere with social distancing restrictions.

2.2.5 Perceived behavioural control scale. Perceived behavioural control was assessed using the item; 'I feel that I have the ability to follow the current social distancing restrictions.' This item was adapted from Elliot, Armitage, and Baughan (2007)'s measurement of perceived behavioural control in relation to driving faster than the speed limit. Participants rated their agreement on a scale from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). Higher scores indicated greater perceived ability to adhere with social distancing restrictions.

2.2.6 Behaviour scale. Behaviour was assessed using five items which asked participants to indicate the frequency they had performed behaviours within the previous month that were prohibited by the Australian government restrictions. These behaviours included; leaving their house for a non-permitted purpose, attending an event or gathering with more than ten people present, performing physical greetings with someone from outside of their household, exercising with more than one person from outside their household, and making cash payments. Responses to the five items were summed to produce a total behavioural score, whereby higher scores indicated more frequent behavioural violations. This measure was adapted from Briscese, Lacetera, Macis, and Tonin (2020) who asked participants to indicate how often they performed

six non-permitted behaviours. Participants were asked to indicate the frequency of their behaviours instead of using a Likert scale to rate the proportion of time that they adhered with restrictions, however. This was done to reduce participants' biases that might be associated with positive and negative anchors, and to minimise differences in participants' interpretations of these anchors.

2.3 Procedure

The present study received approval from University of Adelaide's Human Research Ethics Committee (reference 20/50). Individuals were invited to participate in the study via email, social media advertisements, or through the University of Adelaide School of Psychology Research Participation System. Participation was voluntary, anonymous, and all participants could withdraw at any time without consequence. On average, participation took 24 minutes and 36 seconds. Participants were first provided an information sheet outlining the study (see Appendix B) and were required to provide their consent before proceeding to the survey. All responses were collected between 16th May and 30th May 2020.

Participants completed all scales via an online survey that was administered using Qualtrics. After completing demographic questions, they completed the subjective norm scale, perceived behavioural control scale, attitude scale, and the vignettes assessing understanding and intentions. Behavioural questions were presented at the conclusion of the survey to minimize the potential influence of participants reporting their behaviour during the previous month on the vignettes. After submitting the survey, they were instructed to email the researcher should they wish to enter the AU\$20.00 Westfield gift voucher draw. They were informed that their responses would be unable to be linked to their email.

Results

3.1 Data reduction. Prior to analysis, data were excluded which indicated residence outside of Australia ($n = 1$), were obtained after May 30th, 2020 ($n = 48$), and which contained incomplete responses ($n = 20$). A total of 110 responses were analysed.

Descriptive statistics are presented in Table 1 below. Behaviour was correlated positively with intentions and negatively with perceived behavioural control. Intentions were also correlated negatively with understanding, attitudes, and subjective norms. Intentions were also negatively correlated with and perceived behavioural control, although this was non-significant.

Table 1

Means, Standard Deviations, and Correlation Co-efficients

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1 Behaviour	8.17	12.30	-	-	-	-	-	-
2 Intentions	39.41	10.94	0.49**	-	-	-	-	-
3 Understanding	10.48	2.68	-0.22*	-0.59**	-	-	-	-
4 Attitude	34.93	4.71	-0.29**	-0.55**	0.23*	-	-	-
5 Subjective norms	9.70	1.46	-0.27**	-0.22*	0.04	0.00	-	-
6 Perceived behavioural control	4.69	0.60	-0.24*	-0.12	0.04	0.18	0.38**	-

* $p < .05$, ** $p < .01$

3.2 Hypothesis testing. Path analyses were used to identify significant paths within the model (see Table 2 and Figure 4). Greater understanding of social distancing restrictions and more positive attitudes towards restrictions predicted lower intentions to violate them, providing support for Hypotheses 1 and 2. Perceived social endorsement and perceived ability to follow social distancing restrictions did not predict intentions to violate restrictions. As such, Hypotheses 3 and 4 were not supported. Stronger intentions to violate social distancing rules and lower perceived ability to follow COVID-19 restrictions both significantly predicted higher

behavioural violations during the previous month, which supported Hypotheses 5 and 6. The model was found to explain 52.2% of variance in intentions and 27.5% of variance in behaviour.

Table 2

Parameter Estimates

Relationship	Unstandardised Paths	Standard Error	<i>p</i>
Intention → Behaviour	0.53	0.10	< .001
Perceived behavioural control → Behaviour	-3.79	1.66	.023
Understanding → Intention	-1.99	0.27	< .001
Attitude → Intention	-0.96	0.15	< .001
Subjective norm → Intention	-0.47	0.50	.345
Perceived behavioural control → Intention	-0.08	1.20	.947
Age → Understanding	0.06	0.019	.001
Decrease in work hours → Attitude	-0.14	0.070	.047
Decrease in work hours → Subjective norm	-0.50	0.022	.029
Gender → Perceived behavioural control	-0.28	0.139	.043

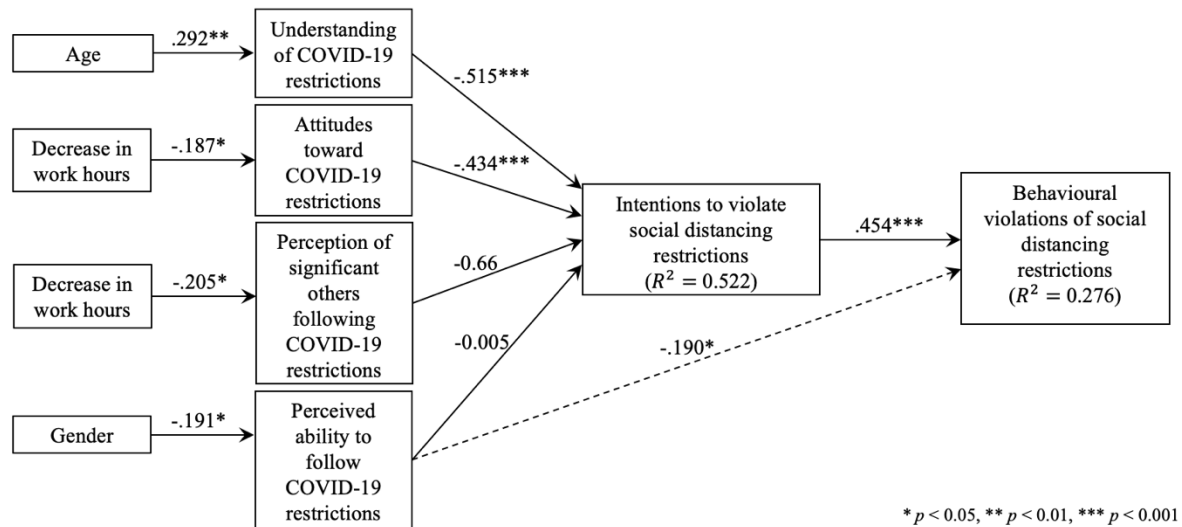


Figure 4. Path model used in the current study.

While not included in the hypotheses, backward regressions were performed to identify background factors that significantly predicted understanding, attitudes, subjective norms, and perceived behavioural control. These were also included in the final path model. Older age predicted greater understanding of social distancing restrictions ($\beta = 0.292, p = .001$). Greater

reductions in work hours due to COVID-19 predicted less favourable attitudes toward social distancing restrictions ($\beta = -0.187, p = .047$), and lower perceived social support for the restrictions ($\beta = -0.205, p = .029$). Gender also significantly predicted ability to adhere with the social distancing restrictions ($\beta = -0.191, p = .043$), with males perceiving a greater ability to comply than females. Additional background factors showed no significant effects.

Discussion

The aims of the present study were to evaluate whether understanding of social distancing restrictions, attitudes, subjective norms, and perceived behavioural control predict compliance with social distancing in an Australian sample. As hypothesised, having greater understanding of social distancing restrictions and holding favourable attitudes towards restrictions was predictive of lower intentions to violate restrictions. However, perceived support for social distancing (subjective norm) and perceived ability to adhere with restrictions (perceived behavioural control) did not predict intentions to violate restrictions. That positive attitudes predicted lower intentions to violate restrictions is congruent with prior research (Zhang et al., 2019). Unlike the present study however, Zhang et al. also found subjective norms and perceived behavioural control to significantly predict intentions, although attitude was a stronger predictor than subjective norm and perceived behavioural control. More positive attitudes and increased knowledge of COVID-19 including symptoms, transmission, risk factors, and preventative practices have also been previously associated with greater adoption of handwashing, social distancing, avoidance of public places, and wearing a face mask during a pandemic (Usman et al., 2020).

The present study also evaluated predictors of self-reported social distancing violations. As predicted, greater intentions to violate social distancing restrictions and lower perceived

ability to adhere with them significantly predicted more frequent violations. That more favourable intentions and higher perceived ability to adhere predicted compliance supports previous findings (Prasetyo et al., 2020). In this study, higher perceived control and stronger intentions to follow restrictions led to greater adherence with social distancing, as well as increased handwashing, use of hand sanitizer, working from home, and use of face masks. That intentions and behaviours were moderately correlated also replicates previous research using the Theory of Planned Behaviour (Armitage & Conner, 2001).

Within the present study, subjective norm did not predict intentions to adhere with social distancing restrictions. Subjective norm has previously been a weak predictor of intentions to perform health behaviours generally (Godin & Kok, 1996). More recently, subjective norm predicted compliance with social distancing specifically however (Zhang et al., 2019). Like the present study, Zhang et al. found subjective norm to have the strongest influence on intentions after attitudes. The use of multiple items assessing subjective norm has been suggested to moderate the effect of subjective norm on intention and has been shown to improve its predictive value compared with single items (Armitage & Conner, 2001). Additional items assessing subjective norm in the context of social distancing might lead to increased predictive utility in the future.

An additional difference in the present study compared with Zhang et al. (2019) is the influence of perceived behavioural control on intentions. Perceived behavioural control significantly predicted intentions to adhere with isolation requirements in Zhang et al., although this was not replicated in the present study. Although perceived behavioural control was not associated with intentions, it did predict reported behaviour during the previous month. It is possible that participants did not consider their control over their behaviour when considering the

vignettes as these were actions being performed by hypothetical person. However, participants may have considered their perceived control when deciding to perform their actions during the month prior to completing the survey, which led to the direct effect of perceived control on behaviour, but not on intentions.

In addition to the Theory of Planned Behaviour variables, the current study examined participants' understanding of the social distancing restrictions. Understanding of COVID-19 restrictions was important to consider in the current research because without understanding of the behaviours that are permitted and not permitted by restrictions, an individual's attitudes, subjective norms, and perceived control over the behaviour might fail to predict their intentions and behaviour. Further, an individual's intentions might be compromised when they do not understand the restrictions, and research not accounting for understanding might fail to consider for individuals who inadvertently violate social distancing restrictions. Understanding of social distancing restrictions might also be poorer when restrictions are frequently changed, or when they are implemented in stages such as during the COVID-19 pandemic in Australia.

The present study identified a positive relationship between understanding and attitudes, and greater understanding of restrictions predicted stronger intentions to adhere with them. Although previous research has examined knowledge of COVID-19 (Prasetyo et al., 2020; Zhong et al., 2020), limited work has assessed understanding of government restrictions aimed to control transmission. Prior research has found increased knowledge of COVID-19 (including symptoms, transmission, risk factors, and preventative measures) to be associated with more positive attitudes towards COVID-19 and the precautionary behaviours recommended to reduce transmission (Zhong et al., 2020). Increased knowledge of COVID-19 has also been associated with greater adoption of preventative behaviours (Zhong et al.). Understanding of COVID-19

including of the recommended protocols has also been shown to influence intentions indirectly through perceived vulnerability and perceived severity of COVID-19 (Prasetyo et al.). In one study using an Australian sample, increased knowledge of pandemic influenza was associated with higher reported willingness to comply with home quarantine, avoid public events, and postpone social gatherings (Eastwood et al., 2009). In this research, participants' reported willingness to comply was further increased following a short explanation regarding the hypothetical pandemic disease. This may be due to increased severity of COVID-19 and higher perceived severity, as identified by Prasetyo et al. This, with the findings of the present study provides support for increased education of the Australian public regarding the COVID-19 pandemic to promote compliance.

4.1 Theoretical and Practical Implications

In addition to understanding of restrictions predicting intentions, the current study also identified older age as being associated with greater understanding of restrictions. This contrasts findings by Zhong et al. (2020) that identified knowledge of COVID-19 (including symptoms, transmission, and preventative practices) as being higher in younger people. Reuben, Danladi, Saleh, and Ejembi (2020) have also found lower knowledge about COVID-19 in older adults which they attributed to having poorer access to the internet. Both Reuben et al. and the present study were completed via online surveys however, indicating that participants could access the internet. It is possible that although older adults have less knowledge about COVID-19 symptoms, transmission, and practices, however they were better at reading the restrictions presented in the current study and applying this knowledge to the vignettes. If internet access outside of the survey did vary in participants who completed the survey in Reuben et al., they also used a sample from Nigeria. A smaller proportion of people in Nigeria have access to the

internet than the Australian population, which might result in greater discrepancies between internet users and non-internet users in Nigeria than in Australia (Statistica, 2020c; Statistica, 2020d), which might explain these discrepancies.

The present study also found gender to predict perceived behavioural control such that males perceived a greater ability to adhere with social distancing restrictions than females. Although gender differences in Theory of Planned Behaviour variables have not been extensively examined in relation to social distancing, females have generally been found to be more compliant with social distancing than males (Bish & Michie, 2010; Pedersen & Favero, 2020). As perceived behavioural control predicted behavioural violations of social distancing restrictions directly, factors which increase females' perceived ability to comply with restrictions might be a worthwhile avenue for future research.

Decrease in work hours also significantly predicted attitudes in the current study. More hours decreased at work was associated with less favourable attitudes towards social distancing restrictions. This finding may reflect greater job insecurity, financial pressure, or more deviation from normal routines in people who experienced greater reductions in work hours. In turn, this may lead to less favourable attitudes. This would be consistent with Barari et al. (2020) who found that interruptions to normal routines, separation from social support systems, and boredom were associated with quarantine requirements. It has also been found that fear of the loss of income is associated with poorer attitudes toward preventative measures (Bodas & Peleg, 2020). These findings emphasise the importance of accommodating flexible work arrangements to keep individuals engaged in their work to promote compliance with social distancing.

Decrease in work hours also predicted subjective norms in the present study. Specifically, more work hours decreased was associated with lower perceived social pressure to

adhere with restrictions. One possible explanation for this is that individuals who experienced a greater decrease in work hours also experienced reduced social contacts within the workplace, a setting where compliant behaviour might be more greatly valued due to potential negative implications on the workplace if transmission occurred. The current study highlights the importance of work hours on social distancing compliance, with fewer reductions in hours being associated with more positive attitudes and greater perceived social support for adhering with restrictions. Implementation of measures to maintain people's normal work hours might be important for encouraging compliance.

The current research highlights the importance of individuals' understanding of social distancing restrictions and attitudes toward restrictions for promoting adherence with restrictions. As such, communication from authorities regarding social distancing restrictions should be clear and consistent, particularly when changes to the restrictions are being implemented. It is possible that contradictory information or changes to restrictions that are unclear might result in confusion among residents, and this might subsequently lead to inadvertent violations of the restrictions. Public health messaging in Australia might also be expanded to include examples of behaviours which are permitted and not permitted to reinforce any changes to restrictions that do occur. Government messaging should also emphasise the utility of adhering with restrictions for minimising significant health consequences, particularly for individuals at the highest risk of negative health implications (Rodriguez-Morales et al., 2020).

4.2 Strengths of the Present Study

A strength of the present study is the use of vignettes to assess intentions and participants' understanding of restrictions. Previous research has shown that people are poor at predicting their behaviour following exposure to racism (Kawakami, Dunn, Karmali, & Dovidio,

2009), when another person drops several items, and when they are presented with the opportunity to donate money to charity (Balcetis & Dunning, 2013). This poses challenges to the utility of self-report measures for examining intentions when using direct questioning. The use of vignettes aimed to improve on these limitations to more accurately assess intentions.

The use of indirect questions within vignettes also attempted to address the potential influence of socially desirable responding when assessing intentions to perform behaviours that violate restrictions. Social desirability refers for the tendency of individuals to over-report socially acceptable attitudes and behaviours and under-report socially unacceptable ones (Nederhof, 1985). Socially desirable responding is sometimes associated with self-report methods of collecting data and is increased when researching socially sensitive topics (Walzenbach, 2019). It is possible that participants of studies aimed to assess compliance with social distancing might engage in socially desirable responding due to the potential public health and legal consequences associated with violations. This is likely to be reduced through vignettes as the preferred response is more obscured compared with direct questioning (Dickel & Graeff, 2018; Walzenbach, 2019). One example of the use of vignettes for reducing social desirability bias is in the assessment of attitudes towards pay. In one study, participants reported that gender should not influence earnings when they were questioned directly (Auspurg, Hinz, Liebig, & Sauer, 2015). However, when presented with a vignette whereby the protagonist's gender was varied, participants reported that male protagonists should earn significantly more than their female counterparts. This demonstrates the advantage of vignette-style questions within self-report surveys when assessing sensitive topics or topics which participants might perceive there to be a desired response.

The method of collecting data via an online survey also aimed to reduce socially desirable responding when measuring behavioural violations over the previous month. Self-administered online questionnaires have also been shown to elicit fewer socially accepted responses than alternative methods of data collection such as personal interviews (Nederhof, 1985; Tourangeau & Smith, 1996). This was intended to increase the accuracy of the measure of behaviour.

The use of vignettes employed in the present study to assess intentions also allowed for participants' understanding of restrictions to be assessed. Further, presentation of the Australian government restrictions for social distancing aimed to control for variation in individuals' interpretations of restrictions or experiences with social distancing restrictions in their daily lives. Within studies that ask participants their intentions to adhere with restrictions generally, they are also unlikely to consider the range of contextual factors that might lead to violations. This was able to be measured within the present study, and enabled understanding of restrictions to be examined more accurately compared with if this was asked more generally.

Further, the current study measured self-reported behaviour, as much previous research has failed to assess behaviour (e.g. Zhang et al., 2019). Although intentions have been associated with behaviour (e.g. Prasetyo et al., 2020), the ability to adhere with restrictions is suggested to influence adherence directly, particularly for behaviours under low volitional control (Ajzen, 1991). Prior research has found that being unable to work from home (Bodas & Peleg, 2020) and perceiving barriers to accessing food supplies (Webster et al., 2020) to pose challenges to compliance. As such, it is possible that intentions do not predict behaviours entirely, and although individuals intend to comply with the restrictions, these factors influencing the ease of adherence with restrictions exert a strong influence on behaviour directly. This suggestion was

supported by the present study by the direct influence of perceived control on behaviour. Therefore, in addition to intentions to comply with restrictions, it is important to assess behaviour.

The present study also provides insight into predictors of social distancing within an Australian sample. Although prior research has examined predictors of COVID-19 preventative behaviours in China (Zhang et al., 2019) and the Philippines (Prasetyo et al., 2020), these results may not be applicable to Australian residents. One reason for this might be due to the reduced number of COVID-19 cases experienced by Australia compared with China and Philippines to date. Further, Australia has a larger proportion of people aged over 65 years compared with China and Philippines (Statistica, 2019; Statistica, 2020a; Statistica, 2020b), a cohort associated with a higher mortality rate following diagnosis with COVID-19 than younger people (Lithander et al., 2020). Therefore, it was important to research factors that predict compliance within Australia specifically. That data was collected from a population for whom social distancing restrictions were applicable is also likely to improve the validity of the study compared with if the research was conducted during a non-pandemic time period.

4.3 Limitations and Recommendations or Future Research

Although the present study has identified valuable findings, it is not without limitations. One limitation of the use of vignettes is the issue of external validity due to the artificiality of the scenarios compared with reality (Lunza, 1990). That the social distancing restrictions within the survey were relevant to all participants in the sample aims to improve on this limitation and increase validity of these responses however, as participants have experienced similar situations and restrictions to those that were presented. As such, participants were not required to imagine

how the restrictions influenced their routines as they have likely experienced them during the COVID-19 pandemic.

Future research into predictors of social distancing compliance should also include a more comprehensive measure of subjective norm. Additional items might examine individuals' perceptions of adherence with social distancing outside of their family and friend networks. This may also improve the predictive utility of the subjective norm construct on intentions (Armitage & Conner, 2001). Future studies might also consider the importance of these people's beliefs on their behaviour, as suggested by the Theory of Planned Behaviour. In addition, future research might also assess actual behavioural control, since discrepancies between perceived behavioural control and actual control over behaviour can limit the effectiveness of the Theory of Planned Behaviour when these differences are large (Ajzen, 1991).

The assessment of behaviour using self-report methods also poses a limitation to the current research. As discussed, this method of data collection can increase the risk of socially desirable responding when obtaining information which might have negative public health or legal consequences (Walzenbach, 2019). The use of indirect questions within vignettes attempts to address the potential influence of socially desirable responding on the assessment of intentions (Walzenbach, 2019), although behaviour in the present study was assessed using self-reports. In future, observations of behaviour might produce additional valuable findings regarding compliance with social distancing.

It is also possible that some participants may not have adequately read the restrictions presented to them in the online survey. Similarly, it is possible that some people may not read the restrictions applicable to them during the COVID-19 pandemic in their day to day lives. As such, in addition to measuring understanding of social distancing restrictions in specific contexts (such

as the vignettes), knowledge of the social distancing restrictions in the Australian population might be explored. This is important because understanding of restrictions during the COVID-19 pandemic is likely to be limited by poor knowledge of the restrictions, and this might inform additional strategies for promoting compliance in Australia.

Another important avenue for further research includes research into predictors of social distancing compliance at varying stages of social distancing restrictions, including during subsequent waves of a pandemic. This would be particularly beneficial as transmission is likely to increase after the easing of restrictions, and continued compliance during subsequent waves of the COVID-19 outbreak would further reduce overall morbidity and mortality (Hatchett et al., 2007). Further research might be undertaken during subsequent waves of the COVID-19 pandemic within Australian populations should they occur.

Conclusion

The current research used the Theory of Planned Behaviour as a framework to identify predictors of social distancing compliance in an Australian sample, and additionally assessed understanding of social distancing restrictions. Understanding of social distancing restrictions and attitudes were found to be important predictors of intentions to adhere with restrictions. These intentions, with perceived behavioural control were found to significantly predict behaviour during the COVID-19 pandemic. Future research should examine predictors of social distancing compliance during subsequent stages of social distancing restrictions in Australia.

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Appendix A: Vignettes used to assess Understanding of restrictions and Intentions to violate restrictions

Category	Vignette	Rule broken
Non-violation	Connor has two daughters, the eldest of whom is not feeling well. He chooses to work from home to keep her home from school, however he sends his second daughter to school as he will require minimal distractions while working.	None
Non-violation	Damien cares for his 78-year-old mother and has placed an online supermarket order, including butter, milk, and bread. He collects his order from the Service Desk at the front of the supermarket.	None
Non-violation	Michelle works as a Physiotherapist in the city and is unable to work from home. Michelle believes that parking garages are overpriced, and it is more convenient to use public transport. Michelle decides to continue commuting to work via train as she considers that many people are likely working from home, and therefore the train will be quieter than usual, and she will be able to keep 1.5 metres distance from other passengers.	None
Violation	Julie wishes to drop off a gift to her aunt who lives 15 kilometres from her. Julie travels to meet with her aunt at her home to deliver the gift but stays outdoors and does not enter her aunt's home.	'Stay at home and go out only if it is absolutely essential.'
Violation	John has recently become employed as a shop assistant at a menswear store. John's manager has asked all nine employees to attend a face-to-face meeting to negotiate the next week's roster, which he attends.	'Consider cancelling non-essential meetings. If needed, hold meetings via video conferencing or phone call.'
Violation	Jonathon needs to visit the pharmacy to fill a prescription. His brother needs to purchase more vitamins and his sister-in-law wants new cosmetic products, so he picks them up to visit the pharmacy together.	'Stay at home and go out only if it is absolutely essential.'
Violation	Emily plays on a netball squad and her coach has scheduled a squad workout in a park to maintain conditioning while the season has been delayed. Emily decides to attend as she is eager to secure her position in the team.	'Stay home unless it is absolutely necessary to go outside. Australians are permitted to leave home for exercising, limited to no more than 2 people.'

Violation	Jane has a close relationship with her grandmother, and when speaking with her by phone, Jane’s grandmother reports feeling very lonely. Jane decides to visit her grandmother to keep her company but sits at the other end of the table.	‘Stay at home and go out only if it is absolutely essential. Avoid at-risk groups like older people.’
Violation	Jenny works in an office of 12 people. Her colleague is eating lunch in the lunchroom and asks her to join her to debrief a difficult conversation she had with another colleague, which she agrees to.	‘Eat lunch at your desk or outside rather than in the lunchroom.’
Violation	Mark works as a Claims Manager for an insurance company and could complete all of his work remotely. His Team Leader has advised he can work from home, but he feels that he will be unmotivated and unproductive working from home so instead attends his office to work.	‘Australians should work from home where they can.’
Violation	Jeremy works as a Personal Trainer and runs exercise classes for up to six people. Due to the restrictions, Jeremy moves the class outdoors and provides hand sanitiser and disinfectant wipes to be used before touching any equipment.	‘Australians are permitted to leave home for exercising, limited to no more than 2 people.’
Violation	Lisa has a cousin who has recently given birth to her first child. Lisa decides to visit her cousin to offer her congratulations and cook dinner for the new parents.	‘Keep visitors to a minimum.’
Violation	Cooper receives a group message from three mates who enjoy outdoor sports. He is asked to go hiking with his mates, which he agrees to.	‘Australians are permitted to leave home for exercising, limited to no more than 2 people.’
Violation	Josie has a daughter who says she has a headache, but she has no other symptoms of illness. Josie sends her daughter to childcare as she needs to continue working as a Nurse.	‘If your child is sick, they must not go to school or childcare. You must keep them at home and away from others.’
Violation	Jordan has arranged to walk along the beach with her friend Jennifer, and Jennifer tells her about troubles with her relationship and becomes upset. Jordan provides her advice and comforts her with a hug as she does not like to see her friend upset.	‘Avoid physical greetings such as handshaking, hugs, and kisses.’
Violation	Bianca works in a clothing boutique and begins experiencing body aches around lunchtime which she thinks may be due to being on her feet the entire	‘Stay at home if you have any cold or flu symptoms. Seek

Ambiguous	day. Her boss offers for her to go home early, but she will need to work the following afternoon to cover the person who would replace her. Bianca decides she will continue working through the afternoon.	medical advice and get tested for COVID-19.'
Ambiguous	Jodie wishes to bake a cake for her daughter's birthday but realises mid-way through baking that she does not have enough flour. Despite knowing that the grocery store is typically busy at this time, Jodie drives to the store to collect more flour so that she can finish baking the cake.	'Stay at home and go out only if it is absolutely essential. Travel at quiet times and avoid crowds.'
Ambiguous	Roger is walking along the beach to exercise and sees the coffee van he usually purchases coffee from parked beside the road. The coffee van accepts cash payment but does not have EFTPOS facilities. Roger has the required change in his pocket and decides to purchase the coffee to continue supporting the small business.	'Use tap and go instead of cash'

Appendix B: Information and Consent Form

Project Title: Predictors of Social Distancing

Human Research Ethics Committee Approval Number: 20/50

Principal Investigator: Dr. Jaime Auton/Dr. Daniel Sturman

Student Researcher: Jemma Thacker

Student's Degree: Honours Degree of Bachelor of Psychological Science

Dear Participant,

You are invited to participate in the research project described below. Please read the below information before deciding whether to proceed to the survey. What is the project about? This study aims to examine demographic and psychological factors that might predict intention to engage in social distancing or 'keeping space between yourself and people outside of your home' (Centre for Disease Control and Prevention). The researchers hope to identify factors related to the intention to socially distance.

Who is undertaking the project?

This project is being conducted by Jemma Thacker under the supervision of Dr. Jaime Auton and Dr. Daniel Sturman. This research will form the basis for the Honours degree of Psychological Sciences degree at the University of Adelaide.

Why am I being invited to participate?

You are eligible to participate if you are 18 years of age or older and are fluent in English.

What am I being invited to do?

The study involves answering several demographic and multiple-choice questions. The survey will also include short vignettes which you will be required to read before responding to a number of short questions

How much time will my involvement in the project take?

Your participation in the research study should take approximately 30 minutes.

Are there any risks associated with participating in this project?

It is not anticipated that you will incur any risks or discomfort as a result of your participation in the study. If you find that you do experience distress at any time however, we encourage you to cease participation and seek support or counselling.

What are the potential benefits of the research project?

The conclusions and recommendations from the current study may assist in providing a greater understanding of individual factors related to the intention to socially distance. Conclusions from the research may assist in informing strategies for encouraging compliance with social distancing measures. Following completion of the survey, you will be eligible to go in the draw to win one of five \$20.00 Westfield gift cards. For students undertaking Psychology IA or IB, the

completion of this survey will constitute 0.5 credits, however you will not be eligible to win a Westfield gift card.

Can I withdraw from the project?

Your participation in this project will be entirely voluntary. If you agree to participate, you can withdraw from the study at any time by discontinuing the survey and closing your browser. Should you wish to withdraw after commencing the survey, your response will not be recorded, and you will not be disadvantaged in any way. Once the survey has been submitted, however, you will be unable to withdraw your responses as they will be stored anonymously.

What will happen to my information?

Your identifying information such as your name, date of birth, or residential address will not be collected, and your answers on the survey will be anonymous. All data gathered will be stored on password protected computers and servers for seven years and only the listed researchers will be able to access this information. The results and recommendations from this study will be used within the listed thesis and may be published in a peer-reviewed journal. You will not be able to be identified and only summary data will be reported. If you are interested in learning the main findings of the project, please contact the researchers via email. Data collected may also be used in future research, however your identifiable information will not be accessible.

Who do I contact if I have questions about the project?

Should you have any questions or concerns before, during, or after your participation, the researchers can be contacted via the below means:

Jemma Thacker: xxxx

Dr. Jaime Auton: xxxx

Dr. Daniel Sturman: xxxx

What if I have a complaint or any concerns?

The study has been approved by the Human Research Ethics Committee at the University of Adelaide (approval number 20/50). This research project will be conducted according to the NHMRC National Statement on Ethical Conduct in Human Research 2007 (Updated 2018). If you have questions or problems associated with the practical aspects of your participation in the project or wish to raise a concern or complaint, then you should consult the Principal Investigator. If you wish to speak with an independent person regarding your concerns the University's policy on research involving human participants, or your rights as a participant, to make a complaint, please contact Professor Paul Delfabbro, Chair of HREC subcommittee on paul.delfabbro@adelaide.edu.au. Any complaint or concern will be treated in confidence and fully investigated. You will be informed of the outcome.

If I want to participate, what do I do?

If you wish to participate, please proceed to the next page. Your responses will not be saved until the entire survey has been submitted *Consent:* I certify that I have read and understood all the information that has been provided to me, have had the opportunity to ask any questions about the study, and voluntarily agree to participate.

Agree and continue