Subjective Wellbeing in Healthy, Community-Dwelling, Older Adults: Measurement Operationalisations and Examination of Folate, Vitamin B12, Homocysteine and Omega-3 Polyunsaturated Fatty Acids as Potential Predictors

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Laura Catherine Edney

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5-HIAA	5-hydroxy-indoleacetic acid
5-MTHF	5-methyltetrahyrofolate
5, 10-MTHFR	5,10-methylenetetrahydrofolate reductase
A	Agreeableness
AA	arichidonic acid
ABS	Australian Bureau of Statistics
AD	Alzheimer's Disease
AIHW	Australian Institute of Health and Welfare
AL	Adaptation Level
ALA	α-linolenic acid
ANCOVA	Analysis of Covariance
ANOVA	Analysis of Variance
AVE	Average Variance Extracted
BAI	Beck Anxiety Inventory
BDI	Beck Depression Inventory
BLMS	Bond-Lader Mood Scales
BMI	Body Mass Index
BPAQ	Buss-Perry Aggression Questionnaire
BSI	Berocca Stress Index
C	Conscientiousness
CCVFFQ	Cancer Council of Victoria Food Frequency Questionnaire
CDI	Children's Depression Inventory (self-rated)
CDRS	Children's Depression Rating Scale (clinician rated)

CES-D	Centre for Epidemiological Studies Depression Scale
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CFS	Chalder Fatigue Scale
CGI	Clinical Global Impression Scale
CHD	Coronary Heart Disease
COS	Clinical Outcome Scale
CSIRO	Commonwealth Scientific Industrial Research Organisation
CSM	Complete State Model
CVD	Cardiovascular Disease
DASS	Depression Anxiety and Stress Scale
d.f.	Degrees of Freedom
DHA	docosahexaenoic acid
DHUS	Daily Hassles and Uplifts Scale
DPA	docosapentaenoic acid
DSM	Diagnostic and statistical manual of mental disorders
E	Extraversion
EAR	Estimated Average Requirement
E-DHA	ethyl- docosahexaenoic acid
E-EPA	ethyl- eicosapentaenoic acid
EM	Expectation-Maximisation
EPA	eicosapentaenoic acid
EPDS	Edinburgh Postnatal Depression Scale
FA	Folic Acid
FFQ	Food Frequency Questionnaire

GAFS	Global Assessment of Functioning Scale
GAS	Global Assessment Scale
GDP	Gross Domestic Product
GDS	Geriatric Depression Scale
GHQ	General Health Questionnaire
GNP	Gross National Product
GSIP	GoStop Impulsivity Paradigm
H	Coefficient H
HADS	Hospital Anxiety and Depression Scale
HAM-D	Hamilton Rating Scale for Depression
HARS	Hamilton Anxiety Rating Scale
Hcy	Homocysteine
HDRS	Hamilton Depression Rating Scale
HRSA	Hamilton Rating Scale for Anxiety
HSCL-D-20	Hopkins Symptom Checklist Depression Scale
IDS	Inventory for Depressive Symptomology
ISSFAL	International Society for the Study of Fatty Acids and Lipids
LA	linoleic acid
LC	Long Chain
LGCM	Latent Growth Curve Modelling
LS	Life Satisfaction
MADRS	Montgomery-Åsberg Depression Rating Scale
Mcg	Micrograms
MCI	Mild Cognitive Impairment
MDD	Major Depressive Disorder

Mg	Milligrams
MI	Modification Indices
MMSE	Mini–mental state examination
MMSQ	Multi-Modal Strain Questionnaire
MTHF	methyltetrahydrofolate
N	Neuroticism
n-3	Omega-3
n-6	Omega-6
NA	Negative Affect
NHMRC	National Health and Medical Research Council
nmol	NanoMole
NPI	Neuropsychiatric Inventory
O	Openness
OAS-M	Overt Aggression Scale, Modified
OCD	Obsessive-Compulsive Disorder
OCEANIC	Openness Conscientiousness Extraversion Agreeableness Neuroticism Index Condensed
PA	Positive Affect
PANAS	Positive and Negative Affect Schedule
PD	Parkinson's Disease
P-F Study	Aggression-estimating test
PFT	Picture-Frustration Test
PGE2	prostaglandin E2
PGWB	General Psychological Wellbeing
PHQ-9	Patient Health Questionnaire – 9

pmol	PicoMole
POMS	Profile of Mood States
PRIME-MD	Primary Care Evaluation of Mental Disorders
PSQ	Personal Strain Questionnaire
PSS	Perceived Stress Scale
PUFA	Polyunsaturated Fatty Acid
QoL	Quality of Life
RC	Reliability of the Construct
RCT	Randomised Control Trial
RDI	Recommended Dietary Intake
RMSEA	Root Mean Square Error of Approximation
SAHOS	South Australian Health Omnibus Survey
SAMe	S-adenosylmethionine
SC	Short Chain
SEIFA	Socio-Economic Indexes for Areas
SEM	Structural Equation Modelling
SES	Socio-Economic Status
SF-36v2	Short-Form 36-item Health Survey, version 2
SHI	Steen Happiness Index
SKIP	Single Key Impulsivity Paradigm
SLT	Schmid-Leiman Transformation
SMD	Standardised Mean Difference
SSRI	Selective Serotonin Reuptake Inhibitors
STAI	State-Trait Anxiety Inventory
STAXI	State-Trait Anger Expression Inventory

SWB	Subjective Wellbeing
SWLS	Satisfaction with Life Scale
TLI	Tucker Lewis Index
Trt	treatment group
µmol	micromoles
µg	micrograms
VAMS	Visual Analogue Mood Scale
VAS	Visual Analogue Scales
WD	withdrawn
WHO	World Health Organisation
WLSMV	Weighted Least Squares Mean- and Variance-Adjusted
WRMR	Weighted Root Mean Square Residual
WVS	World Views Survey
YBOCS	Yale-Brown Obsessive-Compulsive Scale
YMRS	Young Mania Rating Scale
YPAS	Yale Physical Activity Survey

Summary

Traditional psychological research is frequently preoccupied with disability and treatment; Positive Psychology seeks to complement this approach to help form whole model conceptualisations of mental health. This thesis sought to assess (1) the empirical measurement of one measure of positive functioning – Subjective Wellbeing, (2) whether certain nutritional components commonly associated with mental illness were also associated with positive mental health, and (3) whether we could alter the normative trajectory of positive mental health with a nutritional intervention. Nutrition offers a potentially preventative measure to ill-health and was therefore investigated as a departure from the traditional focus on treatment of disability. If nutrition can be identified as a risk factor for sub-optimal positive mental health then it offers a preventative measure that is modifiable, easy to implement at the population-level, relatively cheap, and available to all.

Subjective Wellbeing (SWB) is a well-defined measure of positive mental health that has been studied extensively. It is composed of three components: Positive Affect (PA), Negative Affect (NA), and Life Satisfaction (LS). Despite this consensus on what the construct is, there is little uniformity in its measurement. Paper 1 sought to review theory and empirical evidence on the definition and measurement of SWB, compare and contrast four common methods used to measure SWB, and provide an example of how these different methods may influence study results. Results favoured one method of measuring SWB and we demonstrated that each of the four methods had the potential to differentially impact any subsequent conclusions drawn regarding SWB and its relationship to an external variable of interest.

Papers 2 and 3 sought to assess the influence of aspects of nutrition on SWB, using the most appropriate method for measuring SWB as identified in Paper 1. In Paper 2 we examined the relationships between folate, vitamin B_{12}, homocysteine, and SWB. Folate and vitamin B_{12} are two B-vitamins that have been consistently implicated in mental illness, either directly, or via their influence on homocysteine levels. Folate, vitamin B_{12}, and their interaction significantly predicted levels of PA 18 months later but had no impact on levels of NA, or LS. Cross-sectionally, homocysteine was related to PA but this relationship was completely attenuated in longitudinal analyses suggesting that homocysteine is merely a marker for folate and vitamin B_{12} status. This is the first study to demonstrate a potential causal link between levels of folate and vitamin B_{12} to PA in a large, non-clinical population.

Paper 3 involved results from a double-blind placebo-controlled RCT to investigate whether omega-3 long-chain polyunsaturated fatty acid (*n*-3 LC PUFA) supplementation was able to predict any observed change in the trajectory of SWB over 18-months in older people. *n*-3 LC PUFAs have been implicated in several mood disorders; deficient levels have been found in psychiatric patients and several randomised controlled trials have observed an improvement in depression with *n*-3 LC PUFA supplement alone, or as an adjuvant treatment to existing therapies. Our results demonstrated little change in SWB across 18 months in either the treatment or placebo groups. Treatment group did not predict change in PA, NA or LS; however, initial levels of *n*-3 LC PUFAs (EPA+DHA) were associated with initial levels of PA, but were not associated with initial levels of NA or LS or with change in PA, NA or LS. Initial levels of *n*-3 PUFAs (EPA+DHA+DPA+ALA) did not predict initial levels of PA, NA, or LS; however, they were able to predict rate of change over 18 months in NA and LS. These

results were consistent when gender was controlled for. Results thus provided some evidence for a cross-sectional association between *n*-3 LC PUFAs with PA, and suggest a potential role of *n*-3 PUFAs in reducing rate of increase in NA and of decline in LS in otherwise healthy, older individuals.

Clarification of the theoretical and empirical differences between models of SWB used and the application of SWB to an area often dominated by investigation of disorder constitute the two main areas of original contribution provided by this thesis. Results of the three papers suggest that choice of measurement of SWB has an impact on conclusions drawn, that one model provides a superior measurement to the other three commonly reported in the literature, that folate and Vitamin B_{12} may play a role in Positive Affect independently of homocysteine, and that *n*-3 PUFAs are associated with change in NA and LS over 18 months.