An Explanation of Socioeconomic Differences in Physical and Mental Functioning in the Western Australian Population

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Introduction

The relationship between socioeconomic status and health has been substantially researched over past decades demonstrating a gradient effect of poorer health with reducing socioeconomic status (Adler, Boyce, Chesney, Cohen, Folkman, Kahn et al., 1994; Kunst, Bos, Lahelma, Bartley, Lissau, Regidor et al., 2005; Macintyre, 1997; Marmot, 1999; Martikainen, Lahelma, Marmot, Sekine, Nishi, & Kagamimori, 2004). In Australia, lower socioeconomic status has been clearly associated with higher rates of mortality, morbidity, risky health behaviours, poor self-assessed health and patterns of health service utilisation (Draper, Turrell, & Oldenburg, 2004; Turrell, Stanley, de Looper, & Oldenburg, 2006).

As an independent predictor of future morbidity and mortality, self-rated health is an important intermediary measure of health status. Self-rated health is typically measured as a single question 'How would you rate your health?' on a five-point ordinal scale ranging from excellent to poor. The measure is considered to summarise various aspects of physical health, mental health and social wellbeing as perceived by the individual (Segovia, 1989). Generally the measure correlates more highly with physical symptoms than with mental health symptoms (Fylkesnes, 1992; Krause & Jay, 1994; Singh-Manoux, Martikainen, Ferrie, Zins, Marmot, & Goldberg, 2006). While the majority of studies investigating the relationship between socioeconomic status and health have used the single self-rated health question, relatively few have examined self-rated physical and mental health symptoms separately. Studies of working and working-age populations using the SF-36 have shown a clear difference in the socioeconomic effect on physical and mental aspects of health (Cairney, 1998; Clarke, 2001; Hemingway, 1997; Martikainen, Stansfeld, Hemingway, & Marmot, 1999). To the best of knowledge, there are no population level studies that have made such a direct comparison. The Western Australian Health and Wellbeing Surveillance System (WAHWSS) provided the opportunity to make this comparison using the physical and mental component scores from the Medical Outcomes Study Short Form – 8 (MOS-SF8).

Historically, explanations for socioeconomic differences in health have been seen as competing but in the last decade, the need for an interdisciplinary approach and for the consideration of material, psychosocial and biological factors has been recognised. Current thinking also embraces a lifecourse and socio-ecological approach which recognises firstly, the impact of socioeconomic status across the lifespan and secondly, the importance of contextual factors (Adler, Boyce, Chesney

et al., 1994; George, 2005; Hertzman, 2001; House, 2002; Kawachi, 1999; Macintyre, 1997; Marmot, 1999)

The mechanisms by which socioeconomic factors influence health are complex. Part of the explanation is the relationship of socioeconomic status with behavioural and psychosocial factors. For example, education, occupation and work status have all been associated with smoking, alcohol consumption, physical activity and obesity (Adler, Boyce, Chesney et al., 1994; Lynch, Kaplan, & Salonen, 1997; Marmot, 2000; van Lenthe, Schrijvers, Droomers, Joung, Louwman, & Mackenbach, 2004). Theories as to how socioeconomic factors influence health through behavioural factors are commonly tied to a materialist explanation. For example, income may permit participation in certain healthy behaviours such as sport or more nutritional food choices; or some unhealthy behaviours such as smoking or binge drinking may be in response to adverse material conditions (Laaksonen, Roos, Rahkonen, Martikainen, & Lahelma, 2005). Socioeconomic status is also strongly associated with psychosocial factors such as environment related stress, personal coping resources and social support. Theories as to how socioeconomic factors influence health through psychosocial factors include 'differential exposure' and 'differential vulnerability', whereby those of lower socioeconomic status have either a greater exposure to stressors and/or increased vulnerability to stressors due to a lack of coping resources. The psychobiological mechanism by which psychosocial factors are thought to influence health is an impaired stress response and indirectly through health behaviours (Baum, 1999; Kristenson, 2004). Each process is interrelated and has a cumulative effect across the lifespan.

With a focus on the working population, some cross-sectional studies have considered the extent to which psychosocial work characteristics as well as behavioural factors explain the relationship between socioeconomic status and health. Generally about half of the social variation in self-rated health is explained and in studies utilising Whitehall II data, all of the occupational-grade variation in psychological wellbeing is explained (Borg & Kristensen, 2000; D'Souza, Strazdins, Lim, Broom, & Rodgers, 2003; Laaksonen, Roos, Rahkonen et al., 2005; Marmot, 1998; Schrijvers, van de Mheen, Stronks, & Mackenbach, 1998; Stansfeld, Head, Fuhrer, Wardle, & Cattell, 2003; Warren, Hoonakker, Carayon, & Brand, 2004). At the population level several cross-sectional studies have concurrently examined the effect of socioeconomic, behavioural and psychosocial factors on physical and mental health. These studies are most prominently from the Canadian National Population Health Survey, 1994-1995 (Bailis, Segall, Mahon, Chipperfield, & Dunn, 2001; Cairney, 1998; Cott, 1999; Denton, Prus, & Walters, 2004; Kosteniuk &

Dickinson, 2003) but also from the United States and Britain (Marmot, 1998; Sacker, Bartley, Firth, & Fitzpatrick, 2001). Despite the documented evidence of health inequalities in Australia, there is little understanding of how socioeconomic status and health are related in this country (Turrell & Mathers, 2000; Turrell, Stanley, de Looper et al., 2006).

Based on available evidence, two central hypotheses guided the research. Firstly, it was hypothesised that a different set of factors would be associated with physical and mental functioning. Secondly, it was hypothesised that the relationship between socioeconomic status and health in Western Australia would be related to psychosocial and behavioural factors. The objectives of this study were therefore to (1) Identify which socioeconomic factors are associated with physical and mental functioning. (2) Determine if there are different patterns of association for physical and mental functioning. (3) Identify which behavioural and psychosocial factors are independently related to physical and mental functioning. (4) Determine whether behavioural and psychosocial factors influence the effect of socioeconomic indicators on physical and mental functioning.

Methods

Study Population

This analysis used data from the 'WA Health and Wellbeing Surveillance System' collected from September 2003 to June 2004. A random sample stratified by age, gender and area was taken from the electronic white pages. The survey was conducted by Computer Assisted Telephone Interview (CATI) and a total of 5307 adults (aged 18 and over) throughout WA participated during these nine months. Aboriginal cases (n=128) were excluded from the sample as traditional socioeconomic indicators are not considered appropriate for the Aboriginal population. This resulted in a study sample of 5178. Survey weights were not applied as the weighting variables of age, gender and area were included in the regression analysis.

Variables

Outcome Variables

The Medical Outcomes Study (MOS) SF-8 is comprised of eight questions measuring different dimensions of health and is based on the eight scales of the MOS-SF-36. The physical and mental component scores (pcs and mcs) are created as a

composite measure with different weights applied for each scale. A low score on both scales implies a low level of functioning.

Independent Variables

Socioeconomic Status

The education variable measures the highest level of education achieved. Work status is a measure of current employment status. Those aged 65 and over were recoded to 'employed for wages or salary' or 'retired' depending on their response to a dichotomous employment question. The income variable measures the approximate gross current household income. The variable 'spending power' is considered a measure of spending or saving power and is an assessment by the individual of the amount of money the household spend/save on average each week. The marital status variable is a measure of current marital status.

Behavioural Variables

Smoking status measured current smoking status. Level of physical activity was a summary variable based on the national recommendation that each week a person must do at least 150 minutes of moderate activity over at least 5 days for health benefit. Although a different set of physical activity questions were asked of older adults, it was possible to calculate the level of moderate activity across all age groups. The classification of alcohol consumption was based on National Health and Medical Research Council (NHMRC) guidelines for levels of safe, risky and high-risk consumption (over 4 standard drinks per day for women and over 6 standard drinks per day for men). Measurement of fruit and vegetable consumption was based on the Western Australian Department of Health recommendations for daily consumption of 5 or more serves of vegetables and 2 or more serves of fruit. Body Mass Index (BMI) was calculated by dividing height (in kilograms) by weight (in metres) squared and then reported by the 2000 World Health Organisation groupings for being underweight, overweight, obese and of normal weight.

Psychosocial Variables

The psychosocial variables included a measure of perceived control based on four questions about control over health, personal life, finances and life in general. Scores on the five point response categories for each question were summed into one variable in which a high score indicates lack of control. Respondents were asked about stressful life events in the previous 12 months (eg moved house, death of someone close), and the number of these stressors were counted for each

respondent and categorised based on ANOVA results. The level of social support was a summary variable based on six individual questions (eg 'Is there someone you can relax with?' and 'Is there someone to help in a crisis?'). The responses to these questions were summed to form a scale and based on univariate analysis, the scale was reduced to a dichotomous variable of either 'none or very little support' (score 0-5) or 'some to a lot of support' (score 6-16). The burden of disability variable was based on two questions, asking first if there was someone (including the respondent) in the house with a disability, long term illness or pain that puts a burden on the respondent or the family as a whole. Secondly it was asked how much of a burden this was. The resulting variable ranged from those with no burden of disability in the household, through to those with someone presenting a large burden.

Statistical Analysis

Both physical and mental component scores were transformed by cubing to best correct for negative skewness. Some skewness was considered acceptable, as the general population tends to be healthy. Cross-tabulations, correlations and other measures of association were used to assess the relationship between variables. ANOVA and post hoc tests (Tukey B) were used to compare mean outcome scores by explanatory variables. Multiple linear regression techniques were used to identify variables significantly associated with physical and mental functioning (ANCOVA in GLM/SPSS v11.0). Missing values were eliminated by listwise deletion. (There were 805 missing cases for income, and these cases were more likely to be female, under 25 or over 74, to be retired, students or self-employed). Residual plots were used for testing model assumptions of normality, linearity and homoscedasticity. Mullticollinearity was assessed by the variance inflation factor (VIF).

There were four stages to the analysis. The first stage considered socioeconomic factors alone for physical and mental functioning (Model 1). In subsequent stages, behavioural variables were added to the base models (Model 2), then psychosocial variables (Model 3) and then both behavioural and psychosocial variables (Model 4). To enable comparison, all variables were retained in each stage regardless of significance.

Results

The population characteristics and univariate relationship between the independent and outcome variables are shown in Table 1. Also displayed are the homogeneous subsets obtained from posthoc analysis identifying significant between-group differences (denoted by different letter).

The results of testing for associations between variables can be seen in Table 2. Significant and high associations (r >0.30) that could cause a problem of multicollinearity in regression analysis are highlighted in bold text. The most 'problematic' variables were age and income. Tests showed that multicollinearity did not compromise the physical or mental functioning models with the largest variance inflation factor associated with age (VIF=3.31).

Contribution of Socioeconomic, Behavioural and Psychosocial Factors to Total Variance

The total variance explained by each model is shown in the bottom row of Table 3. Overall, the total variance of physical functioning explained by the demographic and socioeconomic factors was 13.7%. Behavioural effects alone added 3.3% more explanation to the base model compared to psychosocial factors alone that contributed 5.4% to the base model. With the factors combined, 7.8% was added and the full model of all factors explained 21.5% of variation in physical functioning.

In comparison, the total variance in mental functioning explained by the demographic and socioeconomic factors was less (8.6%). Behavioural factors alone contributed less than 1% to the base whereas psychosocial factors alone added a further 24.6%. With both sets of variables combined 24.5% of explanation was added to the base model with a third of variance in mental functioning explained.

Regression Models for Physical Functioning

Tables 3 displays the between-subject effects of all models and Table 4 displays the standardised regression coefficients of all main effects in the respective models. The coefficient represents the change in standard deviation of the outcome variable for a change of one standard deviation of the explanatory variables. Parameters for non-significant main effect variables are not displayed.

In the basic socioeconomic model (model 1), physical functioning declined with age and was influenced moderately by the socioeconomic factors of education, work status, income and spending power. Having an education of primary school or less

or a TAFE education was associated with reduced functioning compared to those with a tertiary degree. The retired and those who were unable to work had significantly reduced physical functioning compared to those who were employed for wages. Those with an income level of $20,000 or less had significantly reduced functioning compared to those on the highest income level. There was a strong negative impact on physical functioning for those with reduced spending power especially for those that spend more than they get or have just enough money to get through.

In Model 2, smoking status, exercise level, BMI and alcohol consumption were all significant factors, whereas fruit and vegetable consumption were not significant. Being a smoker, not exercising or exercising less than 150 minutes a week, being obese or being overweight all had a negative influence on physical health. The parameters for alcohol consumption were not significant. However, those who did not drink at all tended towards poorer physical health than those with a high-risk consumption ($p=0.06$). Introducing the behavioural variables (specifically exercise level) to Model 2 for physical functioning reduced education to non-significance and reduced the effect of spending power. The effect of work status on health (ie retired or unable to work) remained virtually unchanged.

In the physical functioning model with psychosocial variables added (Model 3), perceived control was significant as was burden of disability in the household. Physical functioning declined considerably with a decline in perceived control. Having someone with a disability in the house presenting a burden was associated with a decline in physical functioning. With the introduction of psychosocial variables (specifically perceived control) to the physical functioning model (Model 3), spending power was no longer significant in the model but marital status as a variable became significant, marked by the positive impact on physical functioning for the separated group. With all factors combined (Model 4), education was not significant and neither was spending power or income. All four behavioural variables remained significant but the parameters were slightly reduced. The single greatest influence in the model was from the summary measure of perceived control.

Regression Models for Mental Functioning

In the basic socioeconomic model (Model 1), mental functioning increased with age and females were at greater risk of a lower mental functioning score compared to males. Mental functioning was influenced by education, work status, spending power and marital status. Having an education of primary school or less or being unable to work or unemployed was associated with reduced mental functioning. A decrease in

spending power was associated with a linear decline in mental functioning. Being separated or divorced was associated with significantly poorer mental functioning compared to being married. In contrast, widowers had significantly better mental functioning.

In Model 2, level of exercise was the only significant behavioural factor. Not exercising at all or less than 150 minutes per week was associated with reduced mental functioning. The introduction of behavioural variables to the mental functioning model had a negligible effect on the socioeconomic variables.

All psychosocial variables (Model 3) contributed significantly to the explanation of mental functioning. The effect of perceived control was especially strong. Introducing the group of psychosocial variables had a considerable impact on the socioeconomic variables as the work status and spending power variables were no longer significant. Age was also no longer significant. The difference between males and females was reduced, the negative effect of being divorced and the positive state of being widowed was no longer significant. There was little difference to Model 3 when all factors were combined for Model 4 and as with the physical functioning model, the single greatest influence was from the perceived control variable.

Discussion

The results presented here provide evidence for a socioeconomic effect operating within the Western Australian population. The results for overall explanation are typical of population level studies of subjective health status which rarely report over 30% of variance explained. The SF-8 instrument is designed to be sensitive within the general population and therefore may be detecting everything from relatively minor illness through to chronic illness and major injury. This broad comprehension of health is comparable with that of the single self-rated health question. From an Australian perspective, replicating the results with more recent data, in other Australian states and with different study designs would assist with validation at the national level.

The key finding of this study, confirming the first general hypothesis, is the varying association of the socioeconomic, behavioural and psychosocial factors with physical and mental functioning. Firstly this is reflected in the relative importance of different groups of factors. Behavioural factors were more important for physical functioning whereas psychosocial factors were more highly associated with mental functioning. However, it should be noted that the overall explanation of variance by the behavioural variables was minimal for physical and especially mental functioning in

contrast to the impact of psychosocial factors. These findings on the relative importance of structural, behavioural and psychosocial factors are consistent with those from Canadian data (Denton, Prus, & Walters, 2004; Denton & Walters, 1999). Secondly, the differences were reflected in the significance of individual variables. Of the behavioural variables, smoking, physical activity and BMI were strongly associated with physical functioning whereas the only behavioural predictor of mental functioning was physical activity. Of the psychosocial variables, all measured factors were significantly and strongly associated with mental functioning whereas only perceived control and burden of disability were associated with physical functioning. Finally, there were also differences within variables indicated by the strength of the standardised coefficient as well as differences in the overall significance of parameters.

Secondly, the study has shown that behavioural and psychosocial factors substantially reduce the effect of socioeconomic status on health, suggesting a mediating effect. This does not discount but highlight the importance of social and economic factors as a change in social structure should, in theory, modify behavioural and psychosocial risk factors for health (House, 2002; Marmot & Wilkinson, 2001). Not all of the measures of socioeconomic status were insignificant in the final models. Some factors such as education and marital status appear to be associated with health via mechanisms other than the measured variables. This may be due to unmeasured psychosocial factors. For example, men with a primary education or less have been found to have comparatively high rates of hopelessness and cynical hostility (Lynch, Kaplan, & Salonen, 1997). An interesting confounding effect is noted for marital status whereby it becomes significantly associated with physical functioning once psychosocial factors (namely perceived control) are introduced into the model. In particular, the parameters for the separated group indicated that being separated is associated with better physical health than being married but only after allowing for a reduced feeling of perceived control.

A third important finding is the strength of results obtained for the measure of spending power. Traditionally, income is used as the main indicator of economic status but although a strong reverse gradient has been found between income and health, it is suggested that over a certain level, income is not related to health status, or that there are diminishing returns (Mackenbach, Martikainen, Looman, Dalstra, Kunst, & Lahelma, 2005; Marmot, 1999). At a bivariate level, similar results were found in this study. There was a strong association between income and physical functioning but at the level of $40,000 and above, the effect was minimal. This effect may be explained by the concepts of absolute and relative income or deprivation (ie

income compared with a peer reference group or neighbourhood). Specifically, the effect of absolute income on self-rated health has been found greatest between lower income groups and the effect of relative deprivation greatest among higher income groups (Ferrer, 2004; Yngwe, 2003). In this study, spending power had a particularly strong gradient of association with mental functioning indicating a psychosocial component. It may also be tapping into the concept of relative deprivation. Although income and spending power were correlated, the tendency to spend all or most of the household income each week was not restricted to lower income groups. These variables clearly measure two different dimensions and as such are not interchangeable. As low income is associated with poverty, it may be worth examining other variables that measure absolute deprivation such as the inability to purchase adequate food and clothing.

A limitation of cross-sectional studies is that all factors are measured at the same time and are self-reported, resulting in several possible confounding problems. For example, the results may be subject to the bias of self-reporting, for example reporting unfavourably on health and locus of control issues if someone is in poor physical health at the time of responding to the survey or is prone to neuroticism. Another issue may be overlapping measurements, a problem that has previously been noted in relation to perceived control and psychological wellbeing (Hertzman, 2001; Kosteniuk & Dickinson, 2003; Marmot, 1998). As such, the measure of perceived control may be endogenous with health and thus caution must be exercised in interpreting the overall strength of the variable. The predominance of perceived control in this study replicates the findings from a path analysis using Canadian data where the largest overall direct effects were observed for a composite measure of control (incorporating mastery and sense of coherence) (Kosteniuk & Dickinson, 2003). The issue of overlapping measurement is highlighted by another study using the same Canadian data which found the mastery index to be significant only for those with chronic illness and not in a healthy population (Cott, 1999).

A third limitation, and most commonly cited is that of ‘health selection’ or ‘social drift’ (Gallo, 1999; Macintyre, 1997). Health selection implies that poor health places an individual in a lower socioeconomic position, and reduces opportunity for advancement. Again, the summary measure of perceived control provides a good example as it is likely that poor health contributes to a decline in perceived control. Another example of health selection effect may be apparent with income as poor health can result in social drift towards a lower income group. Further analysis, not reported here showed a strong association between work status, income, age and chronic conditions. In other research, the relationship between income and health

has been explained by the clustering of long term disabilities in the lower income groups especially among men (Broom, 1984; Rahkonen, Arber, Lahelma, Martikainen, & Silventoinen, 2000; Stronks, 1997). Another example relates to the positive association of physical activity with health, a finding that is consistent with findings of other multivariate studies (Bailis, Segall, Mahon et al., 2001; Cairney, 1998; Cott, 1999; Denton & Walters, 1999). However, the relationship may not be straightforward as the results of a path analysis of women aged 20-59, showed that poor health reduced sport participation. To put perspective on the issue, longitudinal studies have shown the contribution of health selection to socioeconomic inequality is relatively small compared to causal effects (Blane, 1995; Power, Matthews, & Manor, 1996).

Multivariate studies that consider multiple measures of socioeconomic status have been criticised for not considering the relationships between indicators, especially the causal nature of education on subsequent occupation, employment and income (Singh-Manoux, 2002). Gender differences between these relationships have been stressed (Arber, 1997; Ballantyne, 1999; Lahlema, 2004; Rahkonen, Arber, Lahelma et al., 2000). The correlations between variables in this study show clearly that independence cannot be assumed although they are not so high to create a problem of multicollinearity. This highlights the multidimensional nature of socioeconomic status and is supported by others that suggest a single indicator of socioeconomic status is not appropriate (Adler, Boyce, Chesney et al., 1994; Kelleher, 2003; Lahlema, 2004)

Health behaviour interventions have been criticised for ignoring upstream factors and the social context for behaviours (Berkman, 2000; Grzywacz & Fuqua, 2000). This analysis reveals some at risk groups in the unemployed, those who are unable to work, and those who are separated, groups that are most likely to have adverse health behaviours, and be lacking in psychosocial resources. Although these represent quite small subgroups in the population, (2.3% unemployed, 3.0% unable to work, 3.7% separated) there could be a greater focus on providing targeted health messages to at-risk groups. There is also information offered to put a different spin on the tangible benefits of better health practices, such as an increase in spending power or savings. In addition, there may be a need for more psychological support, counselling or general community support for people at such vulnerable times in their lives. The idea of psychosocial intervention is not new but it is argued that there is little evidence on the success of existing interventions (Macleod & Davey Smith, 2003). Psychosocial intervention will be better directed by further research on the

mechanisms by which psychosocial factors such as perceived control influence health.

This study has focused on the total adult population in Western Australia. In light of recent trends in social epidemiology, an analysis by age groups or stages of the lifecourse such as young adulthood, midlife and the senior years may reveal a different pattern of relationships (Grundy & Holt, 2001; Grundy, 2003; Murrell & Meeks, 2002; Rahkonen, Arber, & Lahelma, 1995; Sweeting & West, 1995). In particular, an important area of future focus is the interplay of stressors and psychosocial resources at different stages of life (Pearlin & Skaff, 1996). Another trend in the field is the examination of contextual effects which to date, has focused on neighbourhood but arguably should also include psychosocial factors related to work and the family (House, 2002; Marmot, 1999). This is made apparent by the limitations of role or status descriptors such as marriage or employment (Barnett & Marshall, 1993; Barnett, Marshall, & Singer, 1992; Macintyre, 1992). While there is great potential for future research utilising the WA Health Surveillance System, the primary purpose of the system is in monitoring health trends for the state and thus limitations in the scope of data collection will always apply.

Acknowledgements

The authors would like to acknowledge the Western Australian Department of Health for providing access to the data used in this paper. All data in the analysis has been drawn from the WA Health and Wellbeing Surveillance System, which is owned and funded by the Department of Health Western Australia. The authors also thank Jianghong Li for feedback on the final draft of the paper.

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Table 1: Population Characteristics and Oneway Analysis of Variance by Outcome

		Physical Functioning (PCS)			Mental Functioning (MCS)		
	N=5178 %[a]	Mean [b]	p	Homogeneous Subsets [c]	Mean [b]	p	Homogeneous Subsets [c]
Gender							
Female	58.5	51.1	0.20	NA	52.2	0.00	NA
Male	41.5	51.4			53.2		
Age group							
18-24	9.7	53.2	0.00	A	51.5	0.00	A
25-44	29.8	53.0		A	51.9		A
45-64	37.6	51.2		B	52.9		B
65+	22.9	47.9		C	53.7		C
Area							
Metropolitan	33.5	51.3	0.00	A	52.8	0.50	A
Rural	42.5	50.8		A	52.5		A
Remote	22.4	52.0		B	52.7		A
Socioeconomic Factors							
Education							
Primary school or less	11.6	47.7	0.00	A	52.2	0.13	A
Some high school	28.4	50.9		B	52.6		A
Completed high school	15.2	52.0		C	52.3		A
Tafe Certificate	25.9	51.5		BC	52.9		A
Tertiary	17.9	52.9		D	52.7		A
Work status							
Employed for wages or salary	46.5	52.9	0.00	A	52.7	0.00	AB
Self employed	12.7	52.7		A	53.0		AB
Unemployed	2.3	50.9		B	49.3		C
Home Duties	7.6	51.8		AB	51.6		B
Retired	25.4	47.9		C	53.5		A
Student	2.5	52.9		A	51.5		B
Unable to work/other	3.0	39.7		D	47.7		C
Household Income							
Under $20,000	20.4	47.5	0.00	A	51.9	0.01	A
$20,001-$40,000	19.8	50.9		B	52.6		AB
$40,001-$60,000	16.2	52.7		C	52.6		AB
$60,001-$80,000	11.1	52.8		C	53.2		B
$80,000-$100,000	7.5	53.1		C	52.9		AB
Over $100,000	9.5	52.9		C	52.9		AB
Spending Power							
Spend more than get	3.9	48.7	0.00	A	47.8	0.00	A
Just enough to next payday	15.5	49.3		A	50.5		B
Some left over but just spent	6.9	50.9		B	52.1		C
Save a bit every now and then	25.4	51.2		B	52.9		CD
Save a bit regularly	31.7	52.0		BC	53.5		DE
Save a lot	11.5	52.7		C	54.0		E
Private health insurance							
No	40.4	50.3	0.00	NA	52.1	0.00	NA
Yes	59.2	51.9			53.0		
Marital Status							
Never married	17.1	52.6	0.00	A	52.1	0.00	AB
Defacto	9.7	52.4		A	52.4		AB
Married	52.0	51.3		AB	53.0		A
Separated	3.7	51.8		A	49.0		C
Divorced	8.0	50.3		B	51.6		B
Widowed	9.3	47.2		C	54.1		D
Behavioural Factors							
Smoking Status							
Smoker	20.2	50.8	0.00	A	51.2	0.00	A
Ex smoker	31.2	50.8		A	53.0		B
Never smoked at all or regularly	48.6	51.7		B	53.0		B
Physical Activity							
None	15.4	48.3	0.00	A	51.6	0.00	A
Up to 150 mins	25.4	50.4		B	52.4		B
150 mins or more	53.7	52.9		C	53.0		C

Alcohol consumption							
Doesn't drink	25.3	49.2	0.00	A	52.2	0.00	A
Low risk consumption on a drinking	53.0	51.7		B	53.1		B
Risky consumption on a drinking d	13.9	52.6		C	52.1		A
Hish risk consumption on a drinkin	7.3	52.3		BC	52.0		A
Vegetable consumption							
Doesn't eat vegetables	0.3	51.2	0.76	A	47.5	0.00	A
Doesn't eat 5 serves daily	82.9	51.3		A	52.6		B
Eats 5 or more serves daily	16.5	51.1		A	53.1		B
Fruit consumption							
Doesn't eat fruit	3.8	51.1	0.21	A	51.8	0.00	A
Doesn't eat 2 serves daily	38.9	51.5		A	52.1		A
Eats 2 or more serves daily	57.2	51.1		A	53.1		B
BMI							
Obese	16.7	48.9	0.00	A	52.3	0.08	A
Overweight	33.4	51.2		AB	52.8		A
Underweight	2.3	50.0		BC	51.6		A
Normal	42.9	52.3		C	52.7		A
Psychosocial Factors							
Number of life stressors							
None	46.8	51.6	0.00	A	54.1	0.00	A
One	30.3	51.4		AB	52.3		B
Two	12.5	50.6		BC	51.0		C
Three or more	10.4	50.4		C	48.3		D
Social Support							
None or little support	15.4	49.6	0.00	NA	50.9	0.00	NA
Some to a lot of support	84.6	51.5			52.9		
Burden of Disability							
None in family or not much burden	82.8	51.6	0.00	A	53.3	0.00	A
A little or fairly big burden	13.2	49.6		B	50.2		B
Big or very big burden	3.7	48.0		C	46.5		C

[a]Percentages may not add up due to missing values

[b]Mean scores are based on values transformed by cubed root, not the raw values

[c]Using Tukey B harmonic mean for unequal sample size

Table 2: Association between demographic, socioeconomic, behavioural and psychosocial variables

	age	gender	area	marital	education	work	income	spending	insurance	smoking	exercise	drinking	BMI	veg	fruit	sumcont	stress	support	burden
age[a]		0.016	0.186	**0.646**	-0.212	**0.747**	**-0.360**	-0.077	0.011	0.037	-0.138	-0.243	0.097	0.079	0.136	-0.288	0.130	0.075	-0.035
gender[d]				0.205	0.129	0.260	0.085	0.065	ns	0.137	0.082	0.173	0.180	0.086	0.109	0.043	0.038	0.118	0.042
area[c]				0.131	0.180	0.176	0.277	0.142	0.079	0.101	0.053	0.139	0.065	0.064	0.073	0.008	0.078	ns	0.066
marital[c]					0.284	0.269	**0.421**	0.174	0.194	0.161	0.151	**0.317**	0.082	0.079	0.138	0.206	0.203	0.101	0.093
education[b]						**0.391**	**0.284**	0.110	0.181	0.049	0.138	0.089	0.140	ns	0.036	0.046	-0.036	0.059	ns
work status[c]							**0.538**	**0.300**	0.188	0.208	0.170	0.294	0.070	0.075	0.134	0.252	0.157	0.104	0.140
income[b]								**0.351**	**0.320**	0.015	0.115	0.186	0.090	ns	-0.047	-0.016	0.025	0.097	0.076
spending[b]									0.189	0.096	0.074	0.054	0.103	ns	0.045	-0.208	0.121	0.118	0.097
insurance[d]										0.173	0.048	0.126	0.052	ns	0.075	0.091	0.106	0.063	ns
smoking[b]											0.063	-0.177	0.022	0.014	0.150	-0.089	0.055	0.047	ns
exercise[b]												0.092	0.106	0.057	0.090	-0.037	ns	0.054	0.035
drinking[b]													0.061	-0.024	-0.122	0.047	-0.037	0.052	0.048
BMI[c]														0.035	0.028	0.058	ns	ns	0.056
vegetables[b]															0.145	-0.047	ns	0.038	-0.034
fruit[b]																-0.083	0.050	0.043	ns
sumcontrol[a]																	-0.255	0.121	-0.182
stressors[b]																		ns	0.117
soc support[d]																			ns
burden[b]																			

[a]interval variable [b]ordinal variable [c]nominal variable [d]dichotomous variable

Phi is calculated for dichotomous*dichotomous or Cramers V for nominal*nominal or nominal*dichotomous (range 0 to 1)

Contingency coefficient is calculated for nominal*ordinal (range 0 to 1)

Kendall's tau_b is calculated for ordinal*ordinal or ordinal*interval (range 0 to 1)

Eta is calculated for nominal*interval or dichotomous*interval (range 0 to 1)

Table 3: Significance of main demographic, socioeconomic, behavioural and psychosocial effects

	Physical Functioning				Mental Functioning			
	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]
	p-value				p-value			
Demographic								
Age	0.00	0.01	0.00	0.00	0.00	0.00	0.23	0.30
Gender	0.25	0.40	0.84	0.80	0.00	0.00	0.00	0.00
Area	0.97	0.99	0.95	0.93	0.44	0.34	0.42	0.46
Cum Adjusted R^2	*0.063*	*0.045*	*0.064*	*0.046*	*0.020*	*0.021*	*0.020*	*0.021*
Socioeconomic								
Education	0.01	0.31	0.01	0.22	0.01	0.01	0.00	0.01
Work Status	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.15
Household Income	0.02	0.03	0.05	0.06	0.30	0.37	0.17	0.10
Spending Power	0.00	0.01	0.63	0.55	0.00	0.00	0.95	0.93
Private health insurance	0.07	0.15	0.10	0.14	0.71	0.77	0.99	0.76
Marital status	0.15	0.11	0.02	0.01	0.00	0.00	0.02	0.04
Cum Adjusted R^2	*0.137*	*0.124*	*0.138*	*0.125*	*0.086*	*0.088*	*0.086*	*0.088*
Behavioural								
Smoking Status	*	0.00	*	0.01	*	0.13	*	0.81
Physical Activity	*	0.00	*	0.00	*	0.00	*	0.03
BMI	*	0.00	*	0.00	*	0.58	*	0.72
Alcohol Consumption	*	0.01	*	0.02	*	0.75	*	0.26
Fruit Consumption	*	0.20	*	0.13	*	0.07	*	0.35
Vegetable Consumption	*	0.41	*	0.25	*	0.40	*	0.63
Cum Adjusted R^2		*0.170*		*0.171*		*0.094*	*0.086*	*0.093*
Psychosocial								
Perceived Control	*	*	0.00	0.00	*	*	0.00	0.00
Number of stressors	*	*	0.30	0.60	*	*	0.00	0.00
Social Support	*	*	0.07	0.27	*	*	0.00	0.01
Burden of disability	*	*	0.01	0.02	*	*	0.00	0.00
Total adjusted R^2	*0.137*	*0.170*	*0.191*	*0.215*	*0.086*	*0.094*	*0.332*	*0.331*

[a] Model 1 is the basic demographic and socioeconomic model

[b] Model 2 is the basic model with behavioural variables added

[c] Model 3 is the basic model with psychosocial variables added

[d] Model 4 is the basic model with behavioural and psychosocial variables added

Table 4: Parameters for physical and mental functioning by staged grouping of explanatory factors

	Physical Functioning				Mental Functioning			
	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]	Model 1[a]	Model 2[b]	Model 3[c]	Model 4[d]
Age	**-0.15**	**-0.07**	**-0.21**	**-0.13**	**0.16**	**0.16**	ns	ns
Gender								
Female	ns	ns	ns	ns	**-0.09**	**-0.09**	**-0.05**	**-0.05**
Male	*	*	*	*	*	*	*	*
Education								
Primary school or less	**-0.07**	ns	**-0.07**	ns	**-0.04**	-0.03	**-0.04**	**-0.04**
Some high school	-0.04	ns	**-0.05**	ns	0.02	0.04	0.00	0.01
Completed high school	-0.03	ns	-0.03	ns	0.00	0.02	0.00	0.01
Tafe Certificate	**-0.04**	ns	**-0.05**	ns	0.02	0.03	0.02	0.02
Tertiary	*	*	*		*	*	* *	
Work Status								
Self employed	0.00	0.00	0.00	0.01	0.01	0.01	ns	ns
Unemployed	-0.02	-0.02	-0.01	-0.01	**-0.04**	**-0.03**	ns	ns
Home Duties	-0.02	-0.01	-0.02	-0.01	-0.02	-0.03	ns	ns
Retired	**-0.10**	**-0.10**	**-0.10**	**-0.10**	-0.04	-0.04	ns	ns
Student	-0.02	-0.02	-0.02	-0.02	0.00	0.00	ns	ns
Unable to work/other	**-0.20**	**-0.19**	**-0.17**	**-0.16**	**-0.09**	**-0.09**	ns	ns
Employed for wages or salary	*	*	*		*	*	*	*
Household Income								
Under $20,000	-0.06	-0.05	ns	ns	ns	ns	ns	ns
$20,001-$40,000	-0.01	0.00	ns	ns	ns	ns	ns	ns
$40,001-$60,000	0.03	0.04	ns	ns	ns	ns	ns	ns
$60,001-$80,000	0.00	.0.18	ns	ns	ns	ns	ns	ns
$80,000-$100,000	0.01	0.01	ns	ns	ns	ns	ns	ns
Over $100,000	*	*	*	*	*	*	*	*
Spending Power								
Spend more than get	**-0.07**	**-0.06**	ns	ns	**-0.16**	**-0.15**	ns	ns
Just enough to next payday	**-0.05**	-0.03	ns	ns	**-0.18**	**-0.17**	ns	ns
Some left over but just spent	-0.03	-0.01	ns	ns	**-0.08**	**-0.07**	ns	ns
Save a bit every now and then	-0.01	-0.01	ns	ns	**-0.09**	**-0.09**	ns	ns
Save a bit regularly	-0.01	0.00	ns	ns	-0.04	-0.05	ns	ns
Save a lot	*	*	*	*	*	*	*	*
Marital Status								
Never married	ns	ns	-0.02	-0.02	-0.01	-0.01	0.00	0.01
Defacto	ns	ns	-0.02	-0.02	0.00	0.00	0.03	0.02
Divorced	ns	ns	0.03	0.03	**-0.04**	**-0.04**	-0.03	-0.02
Separated	ns	ns	**0.03**	**0.03**	**-0.08**	**-0.09**	**-0.03**	**-0.03**
Widowed	ns	ns	-0.01	-0.02	**0.04**	**0.04**	0.01	0.01
Married	ns	ns	*	*	*	*	*	*
Smoking status								
Smoker		**-0.07**		**-0.05**		ns		ns
Ex smoker		-0.02		-0.01		ns		ns
Never smoked at all or reg		*		*		*		*
Physical Activity								
None		**-0.16**		**-0.15**		**-0.06**		**-0.04**
Up to 150 mins per week		**-0.11**		**-0.10**		**-0.05**		-0.02
150 mins per week or more		*		*		*		*
BMI								
Obese		**-0.12**		**-0.11**		ns		ns
Overweight		**-0.07**		**-0.06**		ns		ns
Underweight		-0.02		-0.02		ns		ns
Normal		*				*		*
Alcohol consumption								
Doesn't drink		-0.05		ns		ns		ns
Low risk		0.01		ns		ns		ns
Risky		0.00		ns		ns		ns
High risk		*		*		*		*

Perceived Control	**-0.24**	**-0.22**	**-0.49**	**-0.48**
Number of life stressors				
No stressors	ns	ns	**-0.10**	**-0.10**
One stressor	ns	ns	**-0.05**	**-0.05**
Two stressors	ns	ns	**-0.08**	**-0.08**
Three or more stressors	*	*	*	*
Social Support				
Some to a lot	ns	ns	**0.04**	**0.04**
None to a little	*	*	*	*
Burden of Disability				
Big or very big burden	**-0.03**	-0.02	**-0.10**	**-0.10**
A little or fairly big burden	**-0.03**	**-0.04**	**-0.05**	**-0.05**
None in family or not much burden	*	*	*	*

Parameters significant at p<0.05 are presented in bold text

[a] Model 1 is the basic demographic and socioeconomic model

[b] Model 2 is the basic model with behavioural variables added

[c] Model 3 is the basic model with psychosocial variables added

[d] Model 4 is the basic model with behavioural and psychosocial variables added