Importance of income, participation and social support for the wellbeing of people with disability

Abstract

This paper applies a shadow pricing method to demonstrate the importance, for overall life satisfaction, of participation and social support relative to income, and particularly highlights their value for people with work restrictions due to disability. Using the first nine waves of the HILDA data, the paper shows that with respect to life satisfaction, the shadow costs of unemployment are up to $322,000 of equivalised household income per annum for people with work-limiting disability, compared to $161,000 for otherwise similar people without disability; the shadow price of active club membership is equivalent to $89,000 and $36,000 a year for people with and without work-limiting disability, respectively; and in terms of life satisfaction a one-unit increase of perceived social support is worth $77,000 and $58,000 of income per annum respectively for the two groups. People with not-work-limiting disability are not much different from people without disability in this respect.

Key words: disability, wellbeing, participation, social support, income

Acknowledgement: This paper uses the confidentialised unit record file from the Household, Income and Labour Dynamics in Australia (HILDA) survey. The HILDA project was initiated and is funded by the Australian Government Department of Families, Housing, Community Services and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (MIAESR). The findings and views reported in this paper, however, are those of the author and should not be attributed to either FaHCSIA or MIAESR.

Introduction

Can money buy you happiness? This is a controversial philosophical issue. Different people have different ideas, which, potentially, have profound implications for their behaviours. From a public policy perspective, the issue is also important: economists tend to believe the best policy is the one that maximises a social welfare function, which can be viewed, in a simple way, as the sum of individual wellbeing. Income support is a commonly used policy instrument for helping disadvantaged citizens, but whether it is necessarily the most effective and/or efficient would crucially depend on the extent to which money and other alternative policy instruments matter for wellbeing.

While empirical studies may help illuminate this controversial issue, the first problem is to find a valid wellbeing measure. Although still not free from debate, subjective measures of wellbeing have been increasingly accepted as a practical measure of objective wellbeing and evidence on their reliability has been built up over time (Diener et al 1999; Powdthavee 2007; Oswald and Wu 2010). The widely available survey data on these measures have also contributed to the increasing popularity of studies on subjective wellbeing. So far, empirical studies on the relation between income and subjective wellbeing are still largely inconclusive, and the answer seems to be context specific.

In contrast to the aforementioned philosophical issue, probably less controversial is that money can be among the most intuitive yardsticks for understanding the value of things, tangible or not. If income is significantly associated with subjective wellbeing, we may measure the value of subjective wellbeing in monetary terms and thus can put a price tag on other significant factors of wellbeing based on their contributions relative to income. This is the essence of the shadow pricing method; using this method, Powdthavee (2008, p.1459), for instance, shows that 'an increase in the level of social involvement is worth up to an extra £85,000 a year in terms of life satisfaction' in the United Kingdom. [1] This paper provides an analysis using recent Australian data.

Following the practice of Powdthavee (2008) and based on the Household, Income and Labour Dynamics in Australia (HILDA) Survey (2001-2009), this paper reveals that economic and social participation, perceived social support, and income are all significantly related to self-reported overall life satisfaction. Further, it highlights the relative importance of participation and social support in relation to income, especially among people with work restrictions due to disability.

For a quick preview of the main results, losing a full-time job is associated with lower life satisfaction equivalent to a $161,000 decrease in equivalised household disposable income per annum for people without disability, and for people with work restrictions due to disability the corresponding shadow cost of unemployment doubles to $322,000.[2] Similarly, an active club membership is associated with the equivalent

[1] While there are subtle differences between the concepts of happiness, subjective wellbeing, and life satisfaction, many papers in the literature use them interchangeably, so does this paper.
[2] If not otherwise specified, income in this paper refers to equivalised household disposable income per annum adjusted with the modified OECD equivalence scale and measured in 2001 Australian dollars.

in wellbeing of $89,000 for people with work restrictions due to disability and $36,000 for otherwise similar people without disability. A one-unit increase in perceived social support (on a scale from 1 to 7, with the sample mean of 5.5) is associated with $77,000 and $58,000 income per annum, respectively, for people with work-limiting disability and others. Considering the sample mean of equivalised household income per annum being less than $34,000, these estimated effects provide insight to the great personal value people, especially those with work-limiting disability, put on participation and social support. In contrast, the effect of income on life satisfaction is not significantly larger for people with disability than for the general population. These results have interesting policy implications as discussed later.

The next section of the paper reviews relevant literature, Section 3 introduces the data and the estimation method, Section 4 reports the main estimation results, and the last section concludes by summarising the key findings and discussing their implications.

Literature review

The happiness literature has a long history and is still growing at an increasing pace, especially in economics. Thus, a thorough review would need a separate paper or even a book and is well beyond the scope of this paper. Instead, this paper briefly reviews relevant studies on subjective wellbeing in several selected aspects to set a context for the research.

Reliability of subjective wellbeing measures. Economists believe people's decision making involves a process of utility maximisation. This is a very useful theoretical framework for understanding human behaviour. However, as utility is not directly observable, to model behaviours empirically is challenging. Subjective measures of wellbeing, which are widely available in survey data, can be a handy solution if only they measure human wellbeing (or utility) reliably.

Although the reliability of the subjective measures of wellbeing is still open to dispute, over the last several decades research across a number of disciplines provides increasing evidence suggesting that these measures contain genuine information about objective wellbeing (Blanchflower and Oswald 2004; Diener et al 1999; Ng 2008). For instance, psychologists have asserted that the global measures of subjective wellbeing 'possess adequate psychometric properties, exhibiting good internal consistency, …moderate stability and appropriate sensitivity to changing life circumstances', and show 'a moderate level of convergence' with self-reported daily mood, recall for positive versus negative life events, and reports of spouse and other informants (Diener et al 1999 and references therein: 277-8). The subjective measures of wellbeing are also found to be correlated well with heart rate, blood pressure and skill-resistance measures of response to stress and duration of authentic smiles (Blanchflower and Oswald 2004; Ng 2008 and references therein). At the macro level, correlations of subjective wellbeing show remarkable consistency across countries (Ng 2008) and the measures are found to be strongly correlated with national average suicide rates (Helliwell 2007). A recent article of Oswald and Wu (2010), which was published in *Science*, shows a significant state-by-state match between subjective and objective wellbeing in the United States, providing new evidence on the reliability of subjective measures of wellbeing.

Ordinality and cardinality of subjective wellbeing. This is another controversial issue, especially among economists. With a long-held belief in ordinal utility (Robbins 1932), economists tend to be more reluctant to assume cardinal subjective wellbeing than psychologists (see Kristofferssen 2010 for a more detailed discussion of the past and current debate on the issue). As such, many economic studies on subjective wellbeing tried hard to avoid the cardinal assumption (e.g., Clark and Oswald 2002; Winkelmann and Winkelmann 1998; Helliwell and Huang 2011) while incurring non-trivial costs—for instance, making the mean subjective wellbeing of a group or a nation meaningless, not fully utilising the valuable variations in subjective wellbeing (e.g., by re-classifying the subjective wellbeing scale into a binary variable), or having to apply more complicated estimation techniques.

To a large extent, the issue regarding the ordinality or cardinality of subjective wellbeing is philosophical, subject to debate and dependent on what you believe, rather than a proposition that could be proved. In fact, empirical studies consistently show that treating the subjective wellbeing measures as ordinal or cardinal makes little difference in the results (Frey and Stutzer 2002b; Ferrer-i-Carbonell and Frijters 2004; Kristofferssen 2010).

This paper holds a view that cardinality can be reasonably assumed at least for some measures of subjective wellbeing in certain circumstances. No doubt these measures have their limitations, while the same limitations are also shared by many other objective measures such as blood pressure, body temperature and even income. They all vary with race, gender, age, location and mood at measurement as well as other contextual factors. Although blood pressure and body temperature can be more accurately measured with scientific instruments, they are not necessarily error free but, at least, subject to the quality of the instruments and the skills of their operators. The measurement errors of income are also well known among economists.

Ordinality and cardinality are relative concepts. For instance, the subjective wellbeing can be classified into four categories: (1) very unhappy, (2) unhappy, (3) happy and (4) very happy. Similarly, blood pressure, body temperature and income can be classified as: (1) low; (2) normal (or middle); and (3) high. In this case, these measures are better to be treated as ordinal than cardinal.

However, if, instead, the subjective wellbeing is measured on a scale from 0 to 10 (as in the HILDA Survey), I do not see any good reasons why the measure, with little difference from the measures of blood pressure, body temperature and income, cannot be treated as cardinal. When choosing a number between 0 and 10 to represent one's subjective wellbeing, an individual is likely to think of wellbeing as continuous and accordingly choose the closest integer as the answer.

One argument against the cardinality of the subjective measure of wellbeing is that the life satisfaction scale is bounded, so it seems that people who have chosen 10 cannot be happier. This is true, but this feature does not necessarily rule out its cardinality; in many survey datasets income is also bounded (for confidentiality or other reasons), and without doubt human blood pressure and body temperature also have natural bounds. Although income, blood pressure and body temperature are continuous, they are often only reported, say, as integer or to the first decimal place. Similarly, anyone who thinks his/her happiness level falls between 9.5 and 10 in the 11-points scale may be forced to round up his/her answer to 10. To get a more accurate measure of subjective wellbeing, we can allow the survey participants to choose a non-integer; alternatively, we can use a 101-points scale from 0 to 100 or a

1001-points scale from 0 to 1000. In fact, for a person approaching the very top of the happiness scale, a further slight increase in satisfaction is of little importance, just like an extra dollar means almost nothing for a billionaire.

Another criticism of the cardinality of subjective wellbeing rests on the point that the distance between 9 and 10 has different implications from the distance between 1 and 2 with respect to subjective wellbeing. This is true, but the same criticism can also be used against many objective measures. For instance, how can you be sure that with respect to body temperature the distance between 35 and 40 means the same as that between 40 and 45? A person is likely to survive the first change and be killed in the second case. Similarly, very few would think an extra $1,000 has the same effects for a poor person as for a billionaire, and in a poor country as in a rich country. As such, if body temperature and income are accepted as cardinal, the cardinality of subjective wellbeing can hardly be denied on this ground.

In short, the ordinality and cardinality of subjective wellbeing depend on the specific measure and the context, and are a choice for researchers to make after weighing their costs and benefits. Of course, where possible, an evaluation of the two approaches would be preferable.

Correlates of subjective wellbeing and their relative importance. In the literature, many factors have been found to be related to subjective wellbeing, including but not limited to: age, gender, ethnicity, race, income, marital status, health, education, employment, religion, personality, genetics, life events, and some institutional and contextual factors such as location, democracy, inflation and economic growth. Reviewing the three-decades progress of (mainly psychological) research in subjective wellbeing since the 1960s, Diener et al (1999: 279) conclude that all demographic factors (e.g., age, gender and race) taken together, though significant, do not account for much variance in subjective wellbeing, while personality has been singled out as one of the 'strongest and most consistent predictors'. In contrast, economic happiness studies have highlighted the importance, for subjective wellbeing, of unemployment (with both direct and spillover effects) (e.g., Winkelmann and Winkelmann 1998; Helliwell and Huang 2011), wealth (e.g., Heady and Wooden 2004), inflation (e.g., Di Tella, MacCulloch and Oswald 2001), and economic growth (e.g., Deaton 2008).

The role of income with respect to subjective wellbeing is among the most controversial, and the empirical findings are far from conclusive, varying with the measures of income and subjective wellbeing as well as data used (e.g., at national or individual level, samples of young, prime working age or older cohorts) and methodology applied (e.g., cross-sectional or longitudinal). For instance, Oswald (1997) finds no significant increase in subjective wellbeing in nine European countries during a period of rapid economic growth (1973-1990), whereas Deaton (2008), by contrast, reports a strong relation between average life satisfaction and per capita national income based on data from 132 countries participating in the 2006 Gallup World Poll. Diener et al (1993) show a small but significant correlation between income and subjective wellbeing in the United States (US), while Clark and Oswald (1994) find the correlation insignificant in the United Kingdom (UK). Yu (2010) finds no significant effect of income on the subjective wellbeing of Australian youth (aged 15-24 years) using the 2001-2009 HILDA Survey data, whereas this paper reports a significant role of income among people aged 25-64 years using the same dataset.

In addition, genetics has long been suspected to be a key determinant of subjective wellbeing, on which recent studies have provided strong supporting evidence, for instance, De Neve, Fowler and Frey (2010), De Neve et al (2011), and Weiss et al (2008). The findings help explain the stability of subjective wellbeing over the life cycle of individuals and over time at the society level. However, as genes are not readily available in most survey data, unobserved heterogeneity is inevitably a serious concern to be addressed in happiness studies.

Apparently, not all the influencing factors of subjective wellbeing are equally important. Identifying their relative importance, especially identifying the most important among those amenable to public policy, has important policy implications: considering the budget (resource) constraint, priority should naturally be given to the policy instruments that are likely to be the most effective.

Regression coefficients of a happiness function can show the relative importance of the independent variables, while compensating differentials or the shadow pricing method provides a more intuitive way for this purpose. In essence, compensating differentials or shadow pricing is a method using money (income) to demonstrate the value of other factors (especially the intangibles), usually with respect to utility, which should be significantly related to both income and the other factors in question.

One common application of this method is analysing the trade-off between wage and other desirable or undesirable job characteristics in labour economics (Rosen 1986). The method is also widely applied in cost-benefit analysis, where the term shadow pricing is more commonly used. In addition, Moore et al (2006) have used this method to estimate the shadow cost of victimisation with regard to fear of crime.

In particular, this method has been increasingly used in the economics of happiness literature. For instance, based on the British Household Panel Survey (BHPS) Clark and Oswald (2002) have shown that getting married brings the same amount of happiness as having an extra £70,000 of income per annum, and the unhappiness associated with widowhood needs an extra £170,000 per annum to offset. In contrast, using the US General Social Survey (1972-1998), Blanchflower and Oswald (2004) have estimated that when compared to being widowed or separated, a lasting marriage is worth US$100,000 per annum, and to compensate for unemployment a rise in income (at the mean) of approximately US$60,000 per annum is needed.

Recently, also based on US based survey data, Helliwell and Huang (2011: 34) reveal significant spillover effects of unemployment, which are ‘twice as large as the direct wellbeing costs for the unemployed themselves and fifteen times as large as the wellbeing effects of the smaller incomes of the unemployed’. Moreover, Van Praag and Baarsma (2005) have monetarily evaluated the noise nuisance effects of the Amsterdam Airport using this method.

In addition, the importance of social relationships relative to income has been highlighted by Powdthavee (2008), also using BHPS (1997-2003): an increase in the level of social involvement is estimated to be worth up to an extra £85,000 a year in terms of life satisfaction, while actual increases in income buy little happiness.

The potential contribution of the current paper is two-fold: first, using the shadow pricing method to illustrate the monetary value of economic and social participation and social support using recent and nationally representative data of Australia; second, and more importantly, to demonstrate the relative importance of participation and social support for the wellbeing of people with disability in comparison to their

peers without disability, and hopefully to inform more effective and efficient policy interventions with respect to improving social inclusion among this focal group.

HILDA Data and estimation method

Data

The Household, Income and Labour Dynamics in Australia (HILDA) Survey is used for this research. [3] HILDA consists of a large and representative sample of the Australian population, containing nearly 20,000 individuals in about 8,000 households at its first wave. As such, findings based on HILDA can be generally applied to the broader population. HILDA is also a longitudinal dataset with rich information on individuals and households, allowing for good control of heterogeneities. More importantly, it has good and consistent measures of subjective wellbeing, for instance, mental health, satisfaction with job, and overall life satisfaction, making it ideal for a happiness study.

This paper focuses on overall life satisfaction, a comprehensive measure of subjective wellbeing. The exact wording of the question in the survey is: "*All things considered, how satisfied are you with your life?*" The participants are asked to pick a number between 0 (totally dissatisfied) and 10 (totally satisfied).

The estimation sample consists of 13,000 individuals aged 25-64 years—52 per cent being female—who participated in the first nine waves of HILDA. [4] In total, this prime working age sample has approximately 70,000 observations (person-year).

Table 1 provides summary statistics of several key variables in this research—life satisfaction, income, perceived social support, labour force participation and active club membership—by disability status.

(Table 1 about here)

Disability in this paper refers to any long-term health condition, impairment or disability that restricts one's everyday activities, and has lasted or is likely to last, for six months or more. Further, if a disability limits the type or amount of work people can undertake, it is classified as 'with work limitations'. About one quarter of the pooled sample have a disability, including 16.5 per cent with work limitations, and 7.2 per cent with no work limitations. Note that this prime working age sample contains more people with disability and also a larger proportion with work limitations than does the HILDA youth sample in Yu (2010), of which 11.4 per cent have disability and only 5.6 per cent have work limitations.

Figure 1 demonstrates the distribution of life satisfaction, which is generally skewed to the right (satisfied) side for people both with and without disability, with larger fractions of people with disability scattered to the left (dissatisfied) side.

(Figure 1 about here)

[3] For further details of the HILDA Survey, refer to http://www.melbourneinstitute.com/hilda/.
[4] A similar analysis for a sample of youth (aged 15-24 years) has been undertaken in another research, Yu (2010).

Labour force participation contains four categories: full-time employment, part-time employment, unemployment and not being in the labour force. [5] As shown in Table 1, the majority (54.7 per cent) of the pooled sample were working full-time, one fifth had a part-time job, less than three per cent were unemployed, and nearly one quarter were not in the labour force. In particular, people with disability, especially those with work limitations, are more likely to be out of the labour force or unemployed than those without disability.

Active club membership is a binary variable, taking a value of 1 if being an active member of a sporting, hobby or community-based club or association, and 0 otherwise. It represents people's participation in social activities. Slightly more than one third of the sample holds an active club membership.

Perceived social support is defined as how strongly people disagree or agree with the following statement on a scale from 1 (strongly disagree) to 7 (strongly agree): "*When I need someone to help me out, I can usually find someone.*" The sample mean of this variable is 5.5.

Income is another key variable in this paper, mostly referring to disposable household income per annum adjusted for household size (using the modified OECD equivalence scale) and measured in 2001 Australian dollars. The sample mean of equivalised household income is $33,580.

Table 2 presents the average levels of life satisfaction across sub-groups with different combinations of disability status and categories of income, participation and social support. Generally, greater income, participation and social support are associated with greater life satisfaction; while disability, especially disability with work limitations, is associated with lower levels of life satisfaction. Interestingly, consistent with the HILDA youth sample (see Yu 2010), in this prime working age sample people who are not in the labour force, with or without disability, on average also have higher levels of life satisfaction than the unemployed, and people working part-time are also more satisfied than those working full-time. Another noteworthy point is that the differences in life satisfaction are generally larger between the participation (working, and being active club member) and non-participation categories and also between high and low levels of social support than between high and low income groups. This indicates potentially greater impact, on life satisfaction, of participation and support than income.

(Table 2 about here)

Estimation method

One task of this paper is to analyse the role of income, participation and social support on subjective wellbeing, so a happiness function needs to be estimated. Another key task is to illustrate the relative importance of participation and social support in comparison to income; for this purpose, a shadow pricing method is applied. More importantly, the paper aims to demonstrate the value of participation and social

[5] Yu (2010) also considered full-time study as part of the economic participation of youth. In the prime working age sample, very few people are still studying (especially full-time), so only labour force participation is considered.

support for people with disability, who are likely to be subject to higher risks of social exclusion; as such, interaction terms of disability and participation variables are included in the happiness function.

In addition, previous studies suggest that life satisfaction is likely to be affected by some unobserved factors, such as genes (De Neve 2011). Not accounting for these unobserved heterogeneities would lead to biased estimates.

Two approaches are applied to address the issue of unobserved heterogeneity in this paper. One is to include as many potentially significant factors of subjective wellbeing as possible. To check the sensitivity of the estimates of the key variables (i.e., disability, income, participation and social support) to the inclusion of extra variables, the control variables are added in stages.

Another approach is to allow for individual level fixed effects in the model. Fixed effects approach focuses on changes across time and can remove unobserved time-constant factors of subjective wellbeing. The selection issues, such as happy people may be more inclined to join clubs and unhappy people may be more likely to be unemployed, can be addressed with this approach.

However, it should be noted that the fixed-effects method does not solve the issue of time-varying unobserved factors; for instance, some unobserved factors or events may have simultaneously triggered changes in both employment and life satisfaction. An instrument variable method may help tackle this problem, but valid instruments have not been found in this research (in this case, strictly speaking, participation, social support, and disability all can be endogenous).

As discussed later in the paper, the potential impact of time-varying unobserved factors is checked by comparing results including and excluding the likely endogenous variables, and the differences are found to be insignificant, indicating this issue may not be serious. Nonetheless, some caution should be exercised before interpreting the estimated relationships as causal.

The general specification of the happiness function can be illustrated as follows:

$$SW_{it} = \alpha_0 + \alpha_1 D_{it} + \beta_1 E_{it} + \beta_2 C_{it} + \beta_3 S_{it} + \gamma_1 D_{it} \times E_{it} + \gamma_2 D_{it} \times C_{it} + \gamma_3 D_{it} \times S_{it} + \lambda Y_{it} + Z_{it}' \delta + \theta_i + \varepsilon_{it} \quad (1)$$

where SW_{it} is the self-reported subjective wellbeing for individual i at time t; D, E, C and S refer respectively to disability status, employment status, active club membership and social support; Y is income; Z contains other personal characteristics and contextual variables (including age, age squared, health, highest education level achieved, interaction terms of gender and partnered status, homeownership, Socio-Economic Indexes for Areas (SEIFA) disadvantage index, and wave dummies) [6] [7]; θ_i refers to person-specific fixed effects (e.g., race and genes) and ε_{it} is the disturbance term. α_0, α_1, β_1, β_2, β_3, γ_1, γ_2, γ_3, λ and δ are coefficients to be estimated. And, γ_1, γ_2 and γ_3, the coefficients of the interaction terms $D_{it} \times E_{it}$, $D_{it} \times C_{it}$ and $D_{it} \times S_{it}$ inform,

[6] For more information on the SEIFA indexes, refer to http://www.abs.gov.au/websitedbs/D3310114.nsf/home/Seifa_entry_page. All other variables have the conventional meaning.

[7] As discussed later, perceived prosperity and financial difficulty, significant life events, and interaction terms of disability and personality traits are also included in some specifications.

respectively, the relative importance of economic participation, active club membership, and social support for people with disability.

In the estimation of Equation (1) income is mostly included in a quadratic form, while the income squared term turns out to be always insignificant (see Table 3). As such, the 'shadow price' of, for instance, active club membership can be simply calculated as β_2/λ for people without disability. For people with disability, by contrast, the 'shadow price' of active club membership can be calculated as $(\beta_2 + \gamma_2)/\lambda$. [8]

In order to see whether income is more important for the subjective wellbeing of people with disability, interaction of disability and income is also included. The model specification can be illustrated in the following equation:

$$SW_{it} = \alpha_0 + \alpha_1 D_{it} + \beta_1 E_{it} + \beta_2 C_{it} + \beta_3 S_{it} + \gamma_1 D_{it} \times E_{it} + \gamma_2 D_{it} \times C_{it} + \gamma_3 D_{it} \times S_{it} + \lambda_1 Y_{it} + \lambda_2 D_{it} \times Y_{it} + Z_{it}' \delta + \theta_i + \varepsilon_{it} \quad (2)$$

Then in the formula for calculating the shadow prices λ should be replaced with λ_1 for people without disability and with $(\lambda_1 + \lambda_2)$ for people with disability.

(Table 3 about here)

Results

Table 3 reports selected estimation results of a linear happiness function with fixed effects as specified in Equations (1) and (2).

The role of income. Consistently, as shown in Table 3, income is significant and positive, while income squared is not statistically significant, indicating a positive and linear relation between equivalised household income and overall life satisfaction.

The coefficient of the income variable suggests that a change in income of $10,000 is associated with a change in life satisfaction of 0.011-0.016 points (on a scale from 0 to 10). Alternatively, a representative value of $617,000-$944,000 annual income is equivalent to a one-unit increase in the 11-point life satisfaction index. Either way, such an income effect on life satisfaction is clearly very small in magnitude though statistically significant.

Also note that none of the interaction terms of disability and income are significant (Model 4) so income is not particularly more important for the wellbeing of people with disability in comparison to their peers without disability.

The 'shadow prices' of participation and social support. Table 3 also reveals that employment, active club membership and perceived social support are all significantly associated with life satisfaction. In addition, their interaction with not-work-limiting disability is consistently insignificant, while their interaction with work-limiting disability is persistently significant. As such, with respect to the roles of participation and social support on subjective wellbeing, people with not-work-limiting disability are not significantly different from those without disability, while work-limiting disability makes a significant difference—participation and social

[8] If income is included in a natural log form, the 'compensating differential' of active club membership can be estimated as $(100 \times \beta_2/\lambda)\%$; that is, in order to make up for lost satisfaction resulting from losing, for instance, an active club membership, income needs to be increased by $(100 \times \beta_2/\lambda)$ per cent. This research uses the linear form instead of the logarithm of household income because plotting life satisfaction by income shows that the linear form fits the data better, and the linear form is also more intuitive in interpreting the results.

support are significantly more important for people with work-limiting disability as more clearly demonstrated using the shadow pricing method below.

Table 4 reports the estimated shadow prices of economic and social participation and social support in Model 4 of Table 3 for people without disability, with not-work-limiting disability, and with work-limiting disability, respectively, using the formula discussed in the methodology section. The estimation of the shadow prices in Table 4 uses more accurate coefficients than those reported in Table 3 (where the figures are rounded to the third decimal place) and all the insignificant items are treated as zero.

(Table 4 about here)

As shown in Table 4, for people without disability or with not-work-limiting disability, the shadow costs of unemployment (from full-time work) with respect to lost satisfaction is equivalent to $161,000 of equivalised household income per annum; by contrast, for people with work-limiting disability, the corresponding shadow costs of unemployment double to $322,000 per annum.

Interestingly, also consistent with the findings from the HILDA youth sample (Yu 2010), part-time workers are among the happiest in Australia. Table 4 shows that moving from full-time employment to part-time work is associated with a significantly higher level of life satisfaction worth $50,000 per annum for both people without disability and those with not-work-limiting disability.

By contrast, for people with work-limiting disability, on balance such a move results in a slightly lower level of life satisfaction (though statistically insignificant). Furthermore, with respect to overall life satisfaction, not being in the labour force is not much different from working full-time for the former two groups, but for the latter group—i.e., those with work limitations—the shadow costs of moving out of the labour force are approximately $220,000 per annum. The results indicate that reducing working hours (including losing a job and changing from full-time to part-time work), whether or not as a result of work limitations due to disability, is associated with significant psychological costs for people with work-limiting disability.

Do the results primarily reflect changes in the severity of disability? It is unlikely. Although the severity of disability is not directly controlled in the model, it is partly captured by the inclusion of the two types of disability—with and without work limitations—as well as the continuous health variable. In addition, if the worsening in the severity of disability necessarily drives the reduction in working hours and is also the main reason for decreasing life satisfaction among people with work-limiting disability, we would expect to see the shadow costs of not being in the labour force are higher than those of unemployment because more severe disability is likely to be associated with moving out of the labour force than with unemployment. The results reported in Tables 3 and 4, however, show that with respect to overall life satisfaction unemployment is much worse (associated with an extra shadow cost of $102,000 per annum) than not being in the labour force for people with work-limiting disability.

Table 4 also demonstrates the great value of an active club membership. It brings the same amount of life satisfaction as having an extra $36,000 of household income per year for people without disability or with not-work-limiting disability; for people with work-limiting disability the corresponding gain in life satisfaction of being an active club member more than doubles, worth $89,000 per annum.

Social support can also make a significant difference in the subjective wellbeing of people, with disability or not. As shown in Table 4, the overall life satisfaction associated with a one-unit increase in perceived social support is worth approximately $77,000 of income per annum for people with work-limiting disability, and worth $58,000 per annum for others.

Note that the sample mean of the equivalised household income is less than $34,000 per annum. As such, the estimated shadow prices (or compensating differentials) of participation and social support are not only statistically significant but also very large in size, especially for people with work-limiting disability.

Robust tests and discussion

Before moving on to draw conclusions and implications for policy, it would be better to check how robust the findings are.

Unobserved time-varying factors. As mentioned above, strictly speaking, employment, active club membership and perceived social support are all potentially endogenous in the happiness function. And, given the same subjective nature of the measurement of perceived social support as that of self-reported life satisfaction, social support is more likely than participation and other variables to be affected by some time-varying unobserved factors shared with life satisfaction. In this case, including perceived social support in the happiness function would lead to biased estimates. As such, one robust test is comparing the estimates of models including and excluding social support. If no significant differences are observed, it may indicate that the concern regarding unobserved time-varying factors is not very serious.

Table 5 reports the results of several model specifications, excluding, in turn, social support, labour force status and active club membership along with their interaction terms with disability from Model 4 of Table 3. For comparison, the results of Model 4 in Table 3 have been replicated in the first column of Table 5.

(Table 5 about here)

One notable difference of Models 5-7 from Model 4 lies in the disability variables, which is understandable as the excluded variables comprise the interaction terms of disability and the omitted participation or social support variables. Other estimates hardly change (statistically insignificant), and the changed coefficients of a few variables (e.g., income in Model 6) are likely due to their correlation with the excluded variables (e.g., labour force status).

Table 6 presents the estimated shadow prices of labour force participation and active club membership, based on the results of Model 5 of Table 5, where social support variables are excluded. The estimates are slightly different from, but qualitatively the same as, those in Table 4.

Therefore, it seems that potential unobserved time-varying factors, if they exist, do not significantly bias the estimates.

(Table 6 about here)

Other robust tests. Table A1 in the Appendix summarises the results of several other robust tests; again, Model 4 of Table 3 is replicated for comparison.

In Model A1, interaction terms between disability and personality traits are included. Note that the sample size is smaller as personality questions were only asked in Wave

5. However, the estimates are all consistent with and mostly very similar to those in Model 4. [9]

In Model A2, 21 binary variables regarding life events in the past year are included. The life events questions were not asked in Wave 1, so the sample size is also smaller, while the R^2 is much larger than in Model 4. The differences between Model A2 and Model 4 are more remarkable (for instance, in the income and labour force status variables). However, to some extent this is as expected because some life events variables (such as major improvement/worsening in finances and job promotion) are highly correlated with income and employment. Nonetheless, the main findings regarding the importance of participation and social support relative to income as well as their relative importance for people with work-limiting disability in comparison to others remain qualitatively unchanged.

In Model A3, a few other subjective variables—perceived prosperity and financial difficulty (difficulty in raising $2000/$3000 for an emergency)—are included. Yu (2010) has undertaken the same experiment, and concluded, based on the finding that these variables are persistently significant although income variables are not, that with respect to the sufficiency of income, people's specific needs, wants and financial responsibilities should be considered. This conclusion is supported by the consistent finding of this research: as shown in Model A3, all income variables become insignificant after including the prosperity and financial difficulty variables, which are statistically significant and also large in magnitude.

In fact, even among people in the bottom income quintile of the sample nearly 40 per cent viewed their life as comfortable to prosperous; by contrast, in the top income quintile group more than 10 per cent reported just getting along or being poor. Considering the difficulty in raising $2000 ($3000 in Wave 9) in an emergency, more than one third in the bottom quintile reported they could easily do so, whereas in the top quintile, about five percent said they could not or would have to do something drastic. As such, higher income does not necessarily translate into greater prosperity and financial freedom. For most people income probably only serves as a means to achieve satisfaction by meeting material and psychological needs rather than contributing directly to happiness.

Again, the results of Model A3 confirm the relative importance of employment and active club membership for people with work-limiting disability.

Other influencing factors of subjective wellbeing. Although the main focus of this paper is on the importance of income, participation and social support, other significant factors of subjective wellbeing also can be of interest.

As shown in Tables 3, 5 and A1, better health, partnering and homeownership are all significantly and positively related to overall life satisfaction. Age is also a significant factor for life satisfaction, and a U-shape relation is revealed (minimising around mid 40s); note that the sample is restricted to people aged 25-64 years. In addition, Yu (2010) reports that partnering is associated with a significantly higher level of life

[9] Consistent with the findings on young people in Yu (2010), only the interaction between disability and the personality traits of agreeableness and openness to experience are significant, and the effects of the other three personality scales—extroversion, conscientiousness and emotional stability—are not significantly different for different disability groups. However, contrary to Yu (2010), the results of Model A1 suggest that for prime working age people the higher the score on openness to experience, the more detrimental a work-limited disability, and the higher the score on agreeableness, the less detrimental the onset of a not-work-limiting disability.

satisfaction among young women aged 15-24 than among young men at the same age, whereas this paper finds just the opposite for the prime working females and males. Education variables turn out to be always insignificant, probably due to their small variation in the prime working age group. Furthermore, no clear and consistent pattern is observed for SEIFA categories and wave dummies.

Conclusions

The results of this research show that money can buy happiness, but at a very high price: an equivalised household disposable income of $617,000-$944,000 per annum is associated with a one-unit increase in the 11-point life satisfaction scale (ranging from 0 to 10). The effect of income on life satisfaction is not significantly larger for people with disability than for the general population.

Using a shadow pricing method (or compensating differentials), the research further demonstrates that for people without work restrictions, in terms of overall life satisfaction the shadow costs of unemployment can be as high as $161,000 per annum, the value of an active club membership is equivalent to $36,000 a year, and a one unit increase in social support is worth $58,000 per annum. By contrast, for otherwise similar people with work-limiting disability, the corresponding compensating differentials of unemployment, active club membership, and a one unit change in social support are respectively $322,000, $89,000 and $77,000 per year.

The exact estimates vary when different model specifications are used, while a key message is clear and robust: income is significant for overall life satisfaction but is much less important than economic and social participation and perceived social support; and, participation and social support are particularly more important among people with work-limiting disability than among others. As such, probably money can buy you happiness, but you have to spend it on the 'right items' to make the best use of it. It also shows that money is not the only, or even best, way to get happiness.

As noted before, although many factors potentially influencing wellbeing have been controlled for in the models, and a fixed effects approach has been applied to remove individual level time-constant unobserved heterogeneities such as genes, causality still cannot be established with full confidence. This is because the estimated correlations may be, in part, the results of other possibilities; for instance, some unobserved time varying factors may have triggered both changes in the left-hand variable (i.e., life satisfaction) and the right-hand variables (e.g., disability, participation and social support). It is hard to tell exactly how large this 'part' is, while the insignificant differences between models including and excluding the potentially endogenous variables (e.g. perceived social support and participation) indicate that this 'part' may not be very big.

Even if the treatment effects of participation and social support only apply to *10 per cent* of people with work-limiting disability (this estimation is likely to be very conservative), the wellbeing effect of a *successful* effort of

- getting them a job (or keeping their current job) is equivalent to giving everyone with work-limiting disability an extra $32,000 per annum, about the same size as the sample average of equivalised household income ($34,000);
- encouraging a person with work restrictions due to disability to actively participate in a club or association is equivalent to giving him/her $8,900 extra

income a year (much higher than the cost of membership of most hobby or community based clubs and associations in Australia);

- lifting an individual's perceived social support by one unit (on a 1-7 scale) is equivalent to a $7,700 increase in income per year.

Therefore, the value of participation and social support, especially for people with work-limiting disability, is beyond doubt.

Note that the results should not be interpreted to mean income support is not important. Actually, on average in the sample the annual income in the year immediately following losing a job (being unemployed or leaving the labour force) is only slightly (less than $2000) lower than the previous year (when still in paid employment), and the income loss is even lower among those who are unemployed (about $1000). Such an income loss resulting from losing a job is apparently much lower than what would be expected. Income support plays an inherently important role.

In short, although the causality between life satisfaction and participation and perceived social support cannot be established with full confidence, the policy implications of the results are plausible. To promote the wellbeing of people, especially those with work-limiting disability, effort is warranted to improve their economic and social participation and provide targeted and timely support, which is likely to be both effective and cost efficient.

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Figure 1: Distribution of life satisfaction, by disability status

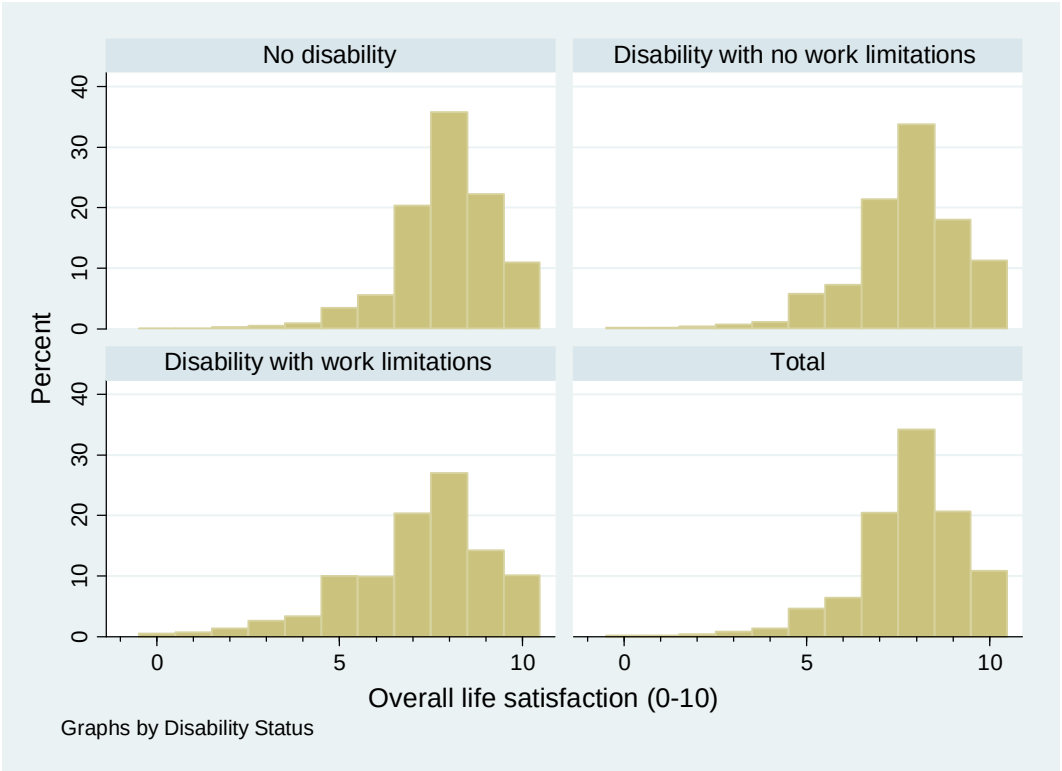

Table 1: Life satisfaction, income, participation and social support, by disability status (2011.05.05)

	All	*No disability*	*Disability with no work limitations*	*Disability with work limitations*
Life satisfaction (0-10)	7.775 (1.52)	7.911 (1.37)	7.731 (1.54)	7.167 (1.93)
Equivalised household disposable income	33,580.25 (22,032)	35,197.38 (21,742)	33,995.27 (22,761)	25,899.72 (21,427)
Social support (1-7)	5.610 (1.31)	5.684 (1.26)	5.518 (1.34)	5.308 (1.45)
Active club member (%)	35.70	36.35	37.89	31.73
Labour force participation (%):				
Full-time work (FTW)	54.74	60.95	58.67	24.26
Part-time work (PTW)	19.58	20.32	18.00	16.88
Unemployment (UNE)	2.68	2.39	2.96	3.89
Not in the labour force (NILF)	23.00	16.34	20.37	54.97
No. of obs.	69,221	52,852	4,963	11,406

Source: Waves 1-9, HILDA Release 9.0.
Note: Standard deviations in parentheses. Responding person weights applied.

Table 2: Overall life satisfaction by disability and participation status

Participation status	Disability status		
	No disability	*With disability, no work limitation*	*With disability, with work limitation*
Economic participation:			
1. Full-time work	7.841 (1.30)	7.644 (1.44)	7.333 (1.57)
2. Part-time work	8.029 (1.32)	7.777 (1.52)	7.400 (1.68)
3. Unemployed	7.307 (1.91)	7.095 (2.08)	6.645 (2.04)
4. Not in the labour force	8.111 (1.56)	8.035 (1.68)	7.058 (2.12)
Active club membership:			
0. No	7.831 (1.41)	7.660 (1.56)	7.009 (2.01)
1. Yes	8.051 (1.29)	7.848 (1.50)	7.506 (1.72)
Perceived social support:			
1-3. Very little to little	7.251 (1.69)	7.032 (1.78)	6.309 (2.15)
4. Some	7.339 (1.45)	7.180 (1.64)	6.669 (1.93)
5. Reasonable	7.554 (1.28)	7.510 (1.33)	7.001 (1.78)
6. Much	7.948 (1.18)	7.787 (1.30)	7.413 (1.68)
7. Great	8.421 (1.27)	8.314 (1.51)	7.841 (1.80)
Equivalised household income category – quintile in the year of interview (1-5) (%):			
1. First quintile	7.733 (1.68)	7.742 (1.81)	6.929 (2.12)
2. Second quintile	7.844 (1.51)	7.590 (1.70)	7.100 (2.04)
3. Third quintile	7.848 (1.41)	7.613 (1.57)	7.269 (1.81)
4. Fourth quintile	7.936 (1.29)	7.735 (1.44)	7.369 (1.69)
5. Fifth quintile	8.035 (1.20)	7.917 (1.33)	7.453 (1.64)

Source: Waves 1-9, HILDA Release 9.0.
Note: standard deviations in parentheses. Responding person weights have been used.

Table 3: Estimation results of linear happiness equations with fixed effects

Explanatory variables	Model 1	Model 2	Model 3	Model 4
Income	1.375e-6***	1.621e-6***	1.059e-6***	1.210e-6***
Income squared	5.153e-13	7.185e-13	4.766e-13	6.101e-13
Disability without wok limitations (DN)	-0.080	-0.079	-0.074	-0.080
Disability with work limitations (DW)	-0.236***	-0.192***	-0.161***	-0.132*
Club membership	0.054***	0.054***	0.044**	0.044**
Club member × DN	-0.028	-0.027	-0.028	-0.027
Club member × DW	0.090**	0.094**	0.061*	0.064*
Part-time work (PW)	0.060***	0.061***	0.060***	0.061***
Unemployed (UE)	-0.202***	-0.200***	-0.196***	-0.195***
Not in the labour force (NILF)	0.059**	0.062**	0.034	0.036
PW × DN	-0.050	-0.049	-0.043	-0.042
PW × DW	-0.119**	-0.125**	-0.095*	-0.099*
UE × DN	-0.061	-0.060	-0.065	-0.061
UE × DW	-0.195**	-0.213**	-0.183**	-0.195**
NILF × DN	-0.011	-0.011	-0.010	-0.007
NILF × DW	-0.333***	-0.348***	-0.256***	-0.266***
Social support	0.085***	0.085***	0.070***	0.070***
Social support × DN	0.004	0.004	0.010	0.010
Social support × DW	0.017*	0.017*	0.023**	0.023**
Health (0-100)			0.014***	0.014***
Age			-0.078***	-0.078***
Age squared			0.001***	0.001***
Male			Omitted	Omitted
Partnered			0.434***	0.433***
Partnered male			0.099*	0.010*
Bachelor or above degree			0.023	0.023
Year 12 or equivalent			-0.053	-0.054
Year 11 or below education			0.020	0.019
Homeowner			0.087***	0.086***
DN × income		3.150e-8		2.335e-7
DW × income		-1.410e-6		-9.087e-7
DN × income squared		-1.240e-12		-1.030e-12
DW × income squared		1.540e-13		-3.820e-14
Seifa quintiles	No	No	Yes	yes
Wave dummies	yes	yes	yes	yes
Constant	7.356***	7.347***	7.735***	7.736***
No. of obs.	69,272	69,272	68,377	68,377
Overall R^2	0.1156	0.1159	0.1738	0.1738

Source: Waves 1-9, HILDA Release 9.0.

Note: * Significant at 5%; ** Significant at 1%; *** Significant at 0.1%. The notation of e-6 refers to 10^{-6}.

Table 4: Valuations of economic and social participation and perceived social support, by disability status

	With no disability	With not-work-limiting disability	With work-limiting disability
Economic participation:			
Full-time work (reference)			
Part-time wok	$50,205	$50,205	0
Unemployment	-$161,045	-$161,045	-$322,190
Not in the labour force	0	0	-$220,093
Social participation:			
Being an active club member	$35,998	$35,998	$88,826
Perceived social support (1-7):			
One unit increase	$57,887	$57,887	$77,082

Source: Waves 1-9, HILDA Release 9.0.
Note: Estimated using the results of Model 4, Table 3.

Table 5: Estimation results of linear happiness equations with fixed effects, excluding, in turn, social support, employment and active club membership

Explanatory variables	Model 4 (replicated from Table 3)	Model 5	Model 6	Model 7
Income	1.210e-06***	1.248e-06***	1.095e-06***	1.197e-06***
Income squared	6.101e-13	6.186e-13	5.569e-13	6.000e-13
Disability without wok limitations (DN)	-0.080	-0.034	-0.086	-0.085
Disability with work limitations (DW)	-0.132*	-0.014	-0.291***	-0.120*
Club membership	0.044**	0.044**	0.043**	
Club member × DN	-0.027	-0.028	-0.029	
Club member × DW	0.064*	0.070*	0.063*	
Part-time work (PW)	0.061***	0.057**		0.061***
Unemployed (UE)	-0.195***	-0.195***		-0.193***
Not in the labour force (NILF)	0.036	0.028		0.037
PW × DN	-0.042	-0.035		-0.043
PW × DW	-0.099*	-0.100*		0.099*
UE × DN	-0.061	-0.081		-0.062
UE × DW	-0.195**	-0.206**		-0.193**
NILF × DN	-0.007	-0.008		-0.007
NILF × DW	-0.266***	-0.254***		-0.267***
Social support	0.070***		0.070***	0.070***
Social support × DN	0.010		0.010	0.009
Social support × DW	0.023**		0.023**	0.024**
Health (0-100)	0.014***	0.015***	0.014***	0.014***
Age	-0.078***	-0.080***	-0.077***	-0.079***
Age squared	0.001***	0.001***	0.001***	0.001***
Male	Omitted	Omitted		
Partnered	0.433***	0.437***	0.437***	0.433***
Partnered male	0.010*	0.106*	0.094*	0.099*
Bachelor or above degree	0.023	0.021	0.013	0.023
Year 12 or equivalent	-0.054	-0.058	-0.048	-0.054
Year 11 or below education	0.019	0.025	0.016	0.022
Homeowner	0.086***	0.086***	0.089***	0.087***
DN × income	2.335e-07	4.774e-07	1.424e-07	1.967e-07
DW × income	-9.087e-07	-7.584e-07	5.891e-07	-7.910e-07
DN × income squared	-1.030e-12	-1.516e-12	-7.838e-13	-9.596e-13
DW × income squared	-3.820e-14	-2.596e-14	-1.653e-12	-8.341e-14
Seifa quintiles	yes	yes	Yes	Yes
Wave dummies	yes	yes	yes	Yes
Constant	7.736***	8.089***	7.700***	7.764***
No. of obs.	68,377	68,549	68,394	68,377
Overall R2	0.1738	0.1445	0.1738	0.1728

Source: Waves 1-9, HILDA Release 9.0.

Note: * Significant at 5%; ** Significant at 1%; *** Significant at 0.1%. The notation of e-6 refers to 10^{-6}.

Table 6: Valuations of economic and social participation (perceived social support excluded), by disability status

	With no disability	With not-work-limiting disability	With work-limiting disability
Economic participation:			
Full-time work (reference)			
Part-time wok	$45,919	$45,919	0
Unemployment	-$156,558	-$156,558	-$321,970
Not in the labour force	0	0	-$203,660
Social participation:			
Being an active club member	$35,517	$35,517	$91,599

Source: Waves 1-9, HILDA Release 9.0.
Note: Estimated using the results of Model 5, Table 5.

Appendix

Table A1: Estimation results of linear happiness equations with fixed effects, excluding social support

Explanatory variables	**Model 4** (replicated from Table 3)	**Model A1**	**Model A2**	**Model A3**
Income	1.210e-06***	1.616e-06***	1.137e-06***	5.869e-07
Income squared	6.101e-13	-5.410e-13	8.004e-13*	3.190e-13
Disability without wok limitations (DN)	-0.080	-0.418*	-0.100	-0.048
Disability with work limitations (DW)	-0.132*	-0.341*	-0.143*	-0.110
Club membership	0.044**	0.046**	0.039**	0.041**
Club member × DN	-0.027	-0.034	-0.023	-0.029
Club member × DW	0.064*	0.050	0.075*	0.066*
Part-time work (PW)	0.061***	0.074***	0.072***	0.092***
Unemployed (UE)	-0.195***	-0.148***	-0.102*	-0.124***
Not in the labour force (NILF)	0.036	0.033	0.035	0.086***
PW × DN	-0.042	-0.086	-0.039	-0.062
PW × DW	-0.099*	-0.127**	-0.061	-0.090*
UE × DN	-0.061	-0.019	0.103	-0.032
UE × DW	-0.195**	-0.261***	-0.235**	-0.183**
NILF × DN	-0.007	-0.061	0.020	-0.005
NILF × DW	-0.266***	-0.274***	-0.243***	-0.251***
Social support	0.070***	0.070***	0.062***	0.065***
Social support × DN	0.010	-0.000	0.011	0.008
Social support × DW	0.023**	0.027**	0.033***	0.021*
Health (0-100)	0.014***	0.014***	0.014***	0.013***
Age	-0.078***	-0.078***	-0.060***	-0.081***
Age squared	0.001***	0.001***	0.001***	0.001***
Male	Omitted			
Partnered	0.433***	0.439***	0.306***	0.382***
Partnered male	0.010*	0.064	0.078	0.128**
Bachelor or above degree	0.023	0.017	-0.018	-0.004
Year 12 or equivalent	-0.054	-0.054	0.051	-0.523
Year 11 or below education	0.019	0.027	0.097	0.022
Homeowner	0.086***	0.074***	0.076***	0.069***
DN × income	2.335e-07	1.285e-09	5.147e-07	-2.541e-07
DW × income	-9.087e-07	-1.496e-06	-1.827e-06*	-1.307e-06
DN × income squared	-1.030e-12	2.096e-12	-1.205e-12	3.356e-13
DW × income squared	-3.820e-14	1.312e-12	-1.223e-12	9.805e-13
Seifa quintiles	yes	Yes	Yes	Yes
Wave dummies	yes	Yes	yes	Yes
Personality traits × disability (DN, DW)[†]		yes		
Life events dummies[‡]			Yes	
Perceived prosperity (1. prosperous – 6. very poor)				-0.207***
Difficulty in raising $2,000 in an emergency^				
1. Could easily (reference)				
2. Could, but with sacrifices				-0.056***
3. Would have to do something drastic				-0.182***

4. Could not raise emergency funds				-0.256***
Constant	7.736***	7.743***	7.233***	8.803***
No. of obs.	68,377	57,833	57,849	67,629
Overall R2	0.1738	0.1812	0.2127	0.1840

Source: Waves 1-9, HILDA Release 9.0.

Note: * Significant at 5%; ** Significant at 1%; *** Significant at 0.1%. The notation of e-6 refers to 10^{-6}. †Personality information is only available in Wave 5; among the 10 interaction terms of the five personality traits (extroversion, agreeableness, conscientiousness, emotional stability, and openness to experience) and the two disability variables (DN and DW), only the interaction term of agreeableness and DN (positive) and the interaction term of openness to experience and DW (negative) are statistically significant. ‡ Life events questions were not asked in Wave 1; significant and positive life events in the past year include got married, pregnancy, birth/adoption of new child, changed jobs, job promotion, major improvement in finances, and changed residence; significant and negative life events include separated from spouse, serious personal injury/illness, death of spouse or child, death of a close friend, victim of physical violence, victim of a property crime, and major worsening in finances. ^ Wave 9 uses $3,000 in the question.