Methodological and Ideological Options

Objective and Subjective Indicators of Life Satisfaction in Australia: How Well Do People Perceive What Supports a Good Life?

Ida Kubiszewski[a,*], Nabeeh Zakariyya[b], Robert Costanza[a]

[a] Crawford School of Public Policy, The Australian National University, Australia
[b] Research School of Economics, The Australian National University, Australia

A B S T R A C T

Wellbeing is the product of a complex set of factors, some of which are well perceived by individuals while others are not. Surveys based on answers to the question: 'how satisfied are you with your life?' have allowed increased understanding of the factors affecting perceived life satisfaction. We use the Household, Income and Labour Dynamics in Australia (HILDA) survey to analyse the relationship between self-reported 'subjective' explanatory variables and 'objective' variables that measure similar domains in explaining overall life satisfaction. We explain about 49% of the variation in individual overall life satisfaction when using 8 of the subjective satisfaction variables included in HILDA, but only about 12% when using 19 of the objective variables covering similar domains. This is partly due to the differences between objective life situations and individual's perceptions of them. Understanding the relationships between objective and subjective variables is imperative for better policy. We find that individual's perceptions of the full range of objective conditions that support their wellbeing is quite limited. An integrated understanding of wellbeing is needed that can incorporate both what individuals do perceive and value and the factors that they do not perceive well but that are nonetheless valuable in supporting their wellbeing.

1. Introduction

Sustainable human wellbeing can be thought of as the ultimate goal of society (Costanza et al. 2016a; Kubiszewski et al. 2010). This was recently substantiated when the United Nations created the Sustainable Development Goals (SDGs), a set of 17 goals, 169 targets, and over 300 indicators that all countries agreed to strive toward. For the first time in history, all UN countries agreed on what a good society entails. However, the SDGs do not define an overall goal or how to measure overall progress toward achieving it (Costanza et al. 2016b). On the national level, gross domestic product (GDP) is the most common metric used to assess progress. But GDP only measures marketed economic activity within the country; it does not account for how income is distributed, ignores environmental and other costs, and leaves out many crucial non-market contributors to wellbeing, including social and environmental aspects (Costanza et al. 2014b; Fioramonti 2013, 2017; Kubiszewski et al. 2013). Economic performance (as measured by GDP) is often thought of as a primary contributor to national wellbeing. However, research has shown that beyond a certain point, further improvements in GDP do not lead to an increase in the overall societal wellbeing (Inglehart et al. 2008; Kahneman and Krueger 2006; Kubiszewski et al. 2013; Myers 2000).

Dozens of indicators exist that attempt to estimate national wellbeing in various ways (Kubiszewski et al. 2013; Smith et al. 2013). They can be split into three groupings: (1) those that adjust economic indicators to include social and environmental aspects, (2) those that measure quality of life or life satisfaction directly through surveys, and (3) those that are composite indicators bringing together a multitude of aspects (Costanza et al. 2014b). As shown in the three groupings, wellbeing measures can use both subjective and objective variables, independently and jointly (Vemuri and Costanza 2006). Although some indicators have become more prominent than others, no consensus exists around the ideal measure.

Governments can primarily influence objective indicators and, from a policy perspective, would like to know how these indicators affect wellbeing at both the individual and larger scales. But we also know that individuals often do not accurately perceive the connection between their wellbeing and objective indicators. This is due to a range of factors, including: lack of information, distorted media portrayals, personality traits, individual's limited information processing abilities, and cultural factors (Kahneman 2011). We need to better understand these complex connections in order to build better assessments of wellbeing and the factors that contribute to it.

In this paper, we correlate overall self-reported life satisfaction (LS) with various subjective and objective aspects of an individual's life to help build this understanding. However, correlations of subjective or objective variables with life satisfaction may pose problems, especially when trying to create new and better wellbeing indicators.

Subjective life satisfaction indicators use people's own evaluation of their satisfaction with their lives - a cognitive evaluation of their entire lives (Myers and Diener 1995). Life satisfaction, or quality of life, assumes that a person has the ability to assess how they feel about their life in context of their own relative standards (Diener and Suh 1997). It implies that a person can identify what is significant in their lives and how important that aspect is to them. Measuring the degree of life satisfaction also allows for a common variable to be established, allowing for comparison between regions and populations while incorporating diverse influences (Campbell 1981; Stiglitz et al. 2009; Western and Tomaszewski 2016).

However, the use of life satisfaction survey scores to measure overall wellbeing has its weaknesses. One problem is that scores vary based on factors such as daily mood, recent events remembered, cultural norms, personality, framing, priming, and a multitude of other factors that cannot be fully accounted for in a survey (Campbell et al. 1976; Kahneman 2011; Schwarz and Strack 1991). Individual life satisfaction may also vary based on relative improvement in conditions over time, regardless of current objective conditions. Humans also have a strong predilection to adapt to situations, where their satisfaction with life is relative to their past situation and the situation of those around them.

Objective variables represent the conditions and assets that allow people to meet their needs and experience subjective life satisfaction (Costanza et al. 2007). These assets, which overlap and interact in complex ways, can be categorized into four broad groups (Costanza et al. 2013):

- **Built capital**: Buildings, machinery, transportation infrastructure, and all other human artifacts and services that fulfil basic human needs such as shelter, subsistence, mobility, and communications.
- **Human capital**: Human beings and their attributes, including physical and mental health, knowledge, and other capacities that enable people to be productive members of society. This involves the balanced use of time to meet basic human needs such as fulfilling employment, spirituality, understanding, skills development, creativity, and freedom.
- **Social and cultural capital**: The web of interpersonal connections, social networks, cultural heritage, traditional knowledge, trust, and the institutional arrangements, rules, norms, and values that facilitate human interactions and cooperation between people. These contribute to social cohesion to strong, vibrant, and secure communities, and to good governance, and help fulfil basic human needs such as participation, affection, and a sense of belonging.
- **Natural capital**: The natural environment and its biodiversity, which, in combination with the other three types of capital, provide ecosystem goods and services: the benefits humans derive from ecosystems. These goods and services are essential to basic needs such as survival, climate regulation, habitat for other species, water supply, food, fiber, fuel, recreation, cultural amenities, and the raw materials required for all economic production.

Objective variables are based on observable and quantitative factors, including access to material goods, crime, inequality, proximity to green spaces, and others (D'Acci 2011). Strict standards around collection also enable comparability between geographical regions and populations. Many of these variables reflect normative ideas that a society holds, regardless whether individuals perceive these.

On the other hand, objective variables also have their limitations. Ensuring consistent boundaries and standards around measuring of these variables is critical for comparison purposes (Dolan and Metcalfe 2012). Also, collecting such data becomes difficult in developing cultures where many aspects of the culture are informal and take place outside official institutions. For example, infant mortality when childbirth occurs at home or inequality when a large portion of the economy is informal (Diener and Tov 2012). With many of these variables, the

question of cost versus benefits and optimization has to also be assessed and whether the optimal point is the same for every individual. At what point does the cost of increasing an indicator outweigh the life satisfaction benefits, for example, cutting down trees or extending longevity?

This paper evaluates how closely subjective and objective variables correlate with self-reported life satisfaction (LS) and with each other. It looks at how perception and reality differ around the same aspects of life and how there may be aspects that we don't yet know how to measure well at the societal level, like individual's personality.

2. Data and Methods

2.1. Data

We use cross-sectional data from waves 1–16 (collected in 2001–2016) of the Household, Income and Labour Dynamics in Australia (HILDA) Survey.[1] The HILDA Survey is a longitudinal, national household panel study, which began in 2001 (Watson and Wooden 2012).

There are a total 40,746 individuals in the HILDA Survey dataset. Out of those, 30,484 individuals gave a valid response to our dependent variable. However, only 20.2% of these individuals were respondents in each of the 16 waves, while 36.4% responded to at least 10 waves, and 57.2% responded to at least 6 waves. This shows that our sample is heavily unbalanced. Appendix Fig. A1 plots the relative frequency distribution of individuals by the number of waves in which they responded to the overall life satisfaction question, which is our dependent variable.

2.2. Dependent Variable – Overall Life Satisfaction

Our main dependent variable is self-reported overall life satisfaction measured as a response to the question "All things considered, how satisfied are you with your life?" Responses are given on an 11-point Likert scale where 0 means totally dissatisfied and 10 stands for totally satisfied. In all 16 waves, responses are skewed toward higher scores, with a modal score and median of 8.

A major debate in the use of Likert items in empirical analysis centres on whether responses should be treated as ordinal (where the distance between two specific items on the scale are not known) or cardinal (where distance of individual items are equidistant). Ferrer-i-Carbonell and Frijters (2004) compared the results from models under various assumptions and found that assuming cardinality or interpersonal ordinality of satisfaction responses makes little difference to the results. Kristoffersen (2017) also examines the information contained within subjective wellbeing scores, specifically life satisfaction in HILDA Survey data, by comparing the ordinality and cardinality assumption. She finds that both assumptions are compatible with life satisfaction scores, in particular, that the scores are equidistant, supporting cardinal comparability.

Since utility is inherently unobservable, many assume ordinal comparability since the data behaves in a way consistent with that assumption (Kristoffersen 2017). In this regard, some use the blow up and cluster (BUC) estimator that appreciates the ordinal nature of the life satisfaction responses (Gregori et al., 2015; Manning et al. 2016). However, the behavior of subjective wellbeing data is also
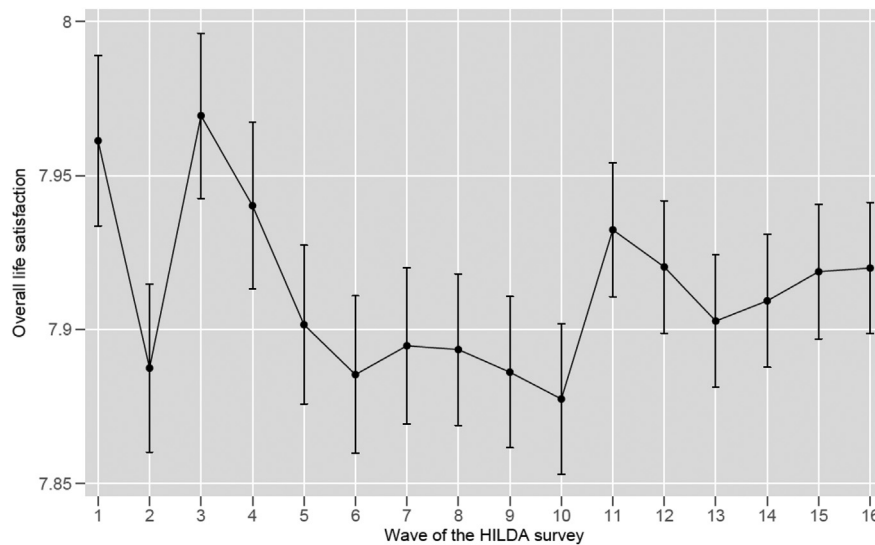

Fig. 1. Trends in mean overall life satisfaction over time. The figure shows the annual average of overall life satisfaction and the 95% confidence interval.

consistent with what is expected of a cardinal measure and that differences in estimates from the two perspectives are generally small (Ferrer-i-Carbonell and Frijters 2004; Kristoffersen 2017; Kromrey and Rendina-Gobioff 2002; Newsom 2012; Ng 1997). While we acknowledge the validity of arguments for and against treating life satisfaction responses as continuous, we proceed with the assumption that life satisfaction responses are continuous. This implies that the difference between a response of an 8 and a 9 is assumed to be the same as the difference between a 3 and a 4, and so on. This provides greater flexibility in the use of parametric approaches to analyse life satisfaction. Most specifically it allows for the use of ordinary least squares (OLS) estimations with overall life satisfaction as the dependent variable. In this regard, we can examine trends in mean overall life satisfaction over the 16 waves. Fig. 1 plots the trend in means from wave 1 to 16 and the 95% confidence interval for each annual mean. For all waves, mean overall life satisfaction score is relatively stable around 7.9.

2.3. Estimation Strategy

The question that we strive to answer is, which variables are highly correlated with self-reported life satisfaction in the Australian population. In this regard, we examine the relationship with specific subjective variables such as self-reported satisfaction with different aspects of life, as well as, objective indicators such as household disposable income, employment, education, age, and others. In this regard, we examine the relationship between overall life satisfaction and each set of indicators (subjective and objective) by themselves, and in combination.

We first estimate the relationship between overall life satisfaction and subjective variables by themselves. The subjective variables are selected based on their generality and their correlation with overall life satisfaction and with each other. In this regard, the variables specific to segments of the sample or highly correlated with other variables were excluded. Questions around satisfaction with: children, relationship with partner, job, relationship with parents were excluded because they were not general to the entire sample.

We estimate the following model:

$$\text{Overall Life Satisfaction}_i = \alpha + \beta \text{ Specific Satisfaction}_i + \varepsilon_i \quad (1)$$

where "Specific Satisfaction" is a vector of specific subjective variables.

Second, we examine the relationship between overall life satisfaction and objective variables such as household disposable income, employment status, and so on, specified by the following equation

$$\text{Overall Life Satisfaction}_i = \alpha + \gamma \text{ Obj Vars}_i + \varepsilon_i \quad (2)$$

where "Obj Vars" consists of all objective variables.

Third, we include objective variables to the model in addition to the subjective variables. This is specified by

$$\text{Overall Life Satisfaction}_i = \alpha + \beta \text{ Specific Satisfaction}_i + \gamma \text{ Obj Vars}_i + \varepsilon_i \quad (3)$$

To provide greater insights into the relationship between objective variables and specific aspects of life satisfaction, our fourth estimation is a set of regressions using objective variables on each of the specific subjective variables (Table A1).

$$\text{Specific Satisfaction Variable}_i = \alpha + \gamma \text{ Obj Vars}_i + \varepsilon_i \quad (4)$$

Although the HILDA Survey is a panel dataset, our models involve Ordinary Least Squares (OLS) regressions instead of panel data methods, such as random effects and fixed effects estimations. Almost half of the sample responded to overall life satisfaction in < 6 waves. The models use both random and fixed effects, and we conducted Hausman tests to check whether individual fixed effects were correlated with the independent variables. On all models, the tests revealed that the random effects estimator was inconsistent (p < 0.001). However, estimating via fixed effects excludes a large number of variables of interest that remain fixed over time. Hence, we ran pooled OLS on all 16 waves combined (Table 1) and waves 10–16 (Table 1). Waves 10–16 were run separately because they were most recent and were the only waves to include Internet use as an objective variable, significant in the regression. We also ran the models for each wave individually (Table A2) and compared the coefficients and standard errors between the pooled OLS results and across waves. Table A3 in the Appendix compares the coefficients and standard errors for our pooled OLS with an ordered logit, a random effects, and fixed effects model. Overall, we find that there are no significant differences between the models.

3. Results

3.1. Sample Statistics

The average age of our sample is 44 years old. Fig. 2 is a kernel-weighted local polynomial regression of overall life satisfaction on age, with the associated 95% confidence interval. The plot indicates an inverted U-shaped relationship between age and overall life satisfaction until around 80 years of age (beyond 80 years the confidence interval becomes wider indicating a loss of precision in the relationship).

Table 2 reports the means and standard deviations of the continuous variables in wave 16, grouped by overall life satisfaction scores.

Table 1
Pooled ordinary least squares (OLS) model run on all 16 waves combined and waves 10-16 separately. For each, subjective and objective variables were considered independently, and also together. Waves 10-16 were run separately as they were most recent and were the only waves to include Internet use as an objective variable, significant in the regression.

Variables	All waves						Waves 10–16					
	Subjective only	se	Objective only	se	Both	se	Subjective only	se	Objective only	se	Both	se
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Satisfaction - how satisfied are you with your life	.	(.)	.	(.)	.	(.)	.	(.)	.	(.)	.	(.)
Age			−0.065***	(0.001)	−0.020***	(0.001)			−0.071***	(0.002)	−0.022***	(0.001)
Age squared			0.001***	(0.000)	0.000***	(0.000)			0.001***	(0.000)	0.000***	(0.000)
Sex = 1, [1] male			−0.089***	(0.007)	−0.106***	(0.005)			−0.087***	(0.010)	−0.100***	(0.007)
Indigenous			0.204***	(0.027)	0.195***	(0.020)			0.258***	(0.035)	0.225***	(0.026)
Immigrant = 1, immigrant from English speaking country			0.032*	(0.013)	0.048***	(0.010)			0.017	(0.018)	0.034**	(0.014)
Immigrant = 2, immigrant from non-English speaking country			−0.102***	(0.014)	−0.048***	(0.010)			−0.107***	(0.019)	−0.051***	(0.014)
Immigrant = 3, unable to determine			−0.118***	(0.043)	−0.021	(0.034)			−0.156***	(0.069)	−0.037	(0.055)
English = 1, speaks well			0.390***	(0.045)	0.234***	(0.035)			0.313***	(0.059)	0.200***	(0.046)
Marital status from person questionnaire = 1, [1] legally married			0.390***	(0.012)	0.261***	(0.009)			0.414***	(0.016)	0.277***	(0.012)
Marital status from person questionnaire = 2, [2] de facto			0.283***	(0.012)	0.255***	(0.009)			0.302***	(0.016)	0.260***	(0.012)
Marital status from person questionnaire = 3, [3] separated			−0.339***	(0.028)	−0.113***	(0.021)			−0.213***	(0.038)	−0.013	(0.029)
Marital status from person questionnaire = 4, [4] divorced			−0.03	(0.020)	0.092***	(0.015)			0.048*	(0.027)	0.130***	(0.020)
Marital status from person questionnaire = 5, [5] widowed			0.143***	(0.022)	0.090***	(0.017)			0.165***	(0.031)	0.101***	(0.024)
Has kids			0.004	(0.003)	0.028***	(0.002)			0.001	(0.004)	0.032***	(0.003)
Education = 2, year 12 only			−0.093***	(0.010)	−0.056***	(0.008)			−0.070***	(0.015)	−0.044***	(0.011)
Education = 3, certificate/diploma			−0.087***	(0.009)	−0.031***	(0.007)			−0.067***	(0.013)	−0.017*	(0.010)
Education = 4, degree or higher			−0.135***	(0.010)	−0.130***	(0.007)			−0.102***	(0.014)	−0.118***	(0.010)
Education = 5, undetermined			0.009	(0.210)	0.032	(0.143)			0.136	(0.285)	0.05	(0.192)
Employment = 2, employed (part-time)			−0.070***	(0.013)	0.016	(0.010)			−0.090***	(0.018)	0.005	(0.013)
Employment = 3, unemployed			−0.567***	(0.028)	−0.128***	(0.021)			−0.575***	(0.038)	−0.129***	(0.028)
Employment = 4, not in labor force			−0.236***	(0.021)	0.032*	(0.016)			−0.266***	(0.029)	0.013	(0.021)
Employment = hours worked			−0.005***	(0.000)	0	(0.000)			−0.006***	(0.001)	0	(0.000)
Household disposable income (ln)			0.064***	(0.004)	−0.004	(0.003)			0.073***	(0.007)	−0.001	(0.005)
Any other adults present at time of filling out survey			−0.098***	(0.007)	−0.072***	(0.005)			−0.088***	(0.009)	−0.063***	(0.007)
Has access to the internet at home = 2, [2] no									−0.059***	(0.019)	0.022	(0.015)
How often participate in physical activity = 2, [2] less than once a week			0.109***	(0.015)	0.013	(0.011)			0.139***	(0.021)	0.022	(0.015)
How often participate in physical activity = 3, [3] 1 to 2 times a week			0.260***	(0.014)	0.014	(0.011)			0.293***	(0.019)	0.028*	(0.014)
How often participate in physical activity = 4, [4] 3 times a week			0.347***	(0.014)	0.013	(0.011)			0.378***	(0.020)	0.025*	(0.015)
How often participate in physical activity = 5, [5] > 3 times a week			0.440***	(0.014)	0.009	(0.011)			0.461***	(0.019)	0.01	(0.015)
How often participate in physical activity = 6, [6] every day			0.551***	(0.015)	0.052***	(0.012)			0.584***	(0.021)	0.056***	(0.016)
Long term health condition = 2, [2] no			0.545***	(0.009)	−0.018**	(0.007)			0.569***	(0.012)	−0.003	(0.009)
Combined h/min per week of volunteer/charity work			0.010***	(0.001)	0.004***	(0.001)			0.008***	(0.001)	0.003***	(0.001)
Own, rent or live rent free = 2, [2] rent (or pay board)/rent-buy scheme			−0.184***	(0.008)	0.098***	(0.006)			−0.167***	(0.012)	0.093***	(0.009)
Own, rent or live rent free = 3, [3] live here rent free/life tenure			−0.103***	(0.022)	0.025	(0.017)			−0.094***	(0.030)	0.028	(0.023)
SEIFA 2011 Decile of Index of relative socio-economic advantage/disadvantage = 2, [2] 2nd decile			0.051***	(0.017)	−0.031**	(0.013)			0.085***	(0.023)	−0.022	(0.018)
SEIFA 2011 Decile of Index of relative socio-economic advantage/disadvantage = 3, [3] 3rd decile			0.086***	(0.016)	−0.028**	(0.013)			0.111***	(0.023)	−0.041**	(0.017)
SEIFA 2011 Decile of Index of relative socio-economic advantage/disadvantage = 4, [4] 4th decile			0.050***	(0.017)	−0.072***	(0.013)			0.078***	(0.023)	−0.066***	(0.018)
SEIFA 2011 Decile of Index of relative socio-economic advantage/disadvantage = 5, [5] 5th decile			0.050***	(0.017)	−0.082***	(0.013)			0.065***	(0.023)	−0.107***	(0.018)
SEIFA 2011 Decile of Index of relative socio-economic advantage/disadvantage = 6, [6] 6th decile			0.057***	(0.016)	−0.118***	(0.012)			0.060***	(0.022)	−0.141***	(0.017)
SEIFA 2011 Decile of Index of relative socio-economic advantage/disadvantage = 7, [7] 7th decile			0.092***	(0.016)	−0.111***	(0.012)			0.117***	(0.023)	−0.126***	(0.017)
SEIFA 2011 Decile of Index of relative socio-economic advantage/disadvantage = 8, [8] 8th decile			0.104***	(0.016)	−0.126***	(0.012)			0.115***	(0.022)	−0.128***	(0.017)

Table 1 (*continued*)

Variables	All waves						Waves 10–16					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Subjective only	se	Objective only	se	Both	se	Subjective only	se	Objective only	se	Both	se
SEIFA 2011 Decile of Index of relative socio-economic advantage/disadvantage = 9, [9] 9th decile			0.195***	(0.016)	−0.112***	(0.012)			0.221***	(0.023)	−0.125***	(0.017)
SEIFA 2011 Decile of Index of relative socio-economic advantage/disadvantage = 10, [10] highest decile			0.193***	(0.016)	−0.134***	(0.012)			0.212***	(0.023)	−0.143***	(0.017)
ASGS 2011 Remoteness Area (RA) = 1, [1] Inner Regional Australia			0.158***	(0.008)	−0.004	(0.006)			0.162***	(0.012)	0.016*	(0.009)
ASGS 2011 Remoteness Area (RA) = 2, [2] Outer Regional Australia			0.205***	(0.011)	−0.014	(0.009)			0.192***	(0.016)	−0.011	(0.012)
ASGS 2011 Remoteness Area (RA) = 3, [3] Remote Australia			0.272***	(0.028)	−0.011	(0.020)			0.295***	(0.040)	0.016	(0.029)
ASGS 2011 Remoteness Area (RA) = 4, [4] Very Remote Australia			0.331***	(0.052)	−0.057	(0.038)			0.196*	(0.080)	−0.079	(0.052)
Wave of the HILDA survey = 2	−0.059***	(0.015)	−0.070***	(0.020)	−0.043***	(0.015)						
Wave of the HILDA survey = 3	−0.059***	(0.015)	0.042**	(0.020)	−0.048***	(0.015)						
Wave of the HILDA survey = 4	−0.086***	(0.015)	−0.122***	(0.047)	−0.097***	(0.037)						
Wave of the HILDA survey = 5	−0.104***	(0.015)	−0.163***	(0.046)	−0.112***	(0.036)						
Wave of the HILDA survey = 6	−0.112***	(0.015)	−0.183***	(0.047)	−0.116***	(0.037)						
Wave of the HILDA survey = 7	−0.137***	(0.015)	−0.189***	(0.047)	−0.150***	(0.037)						
Wave of the HILDA survey = 8	−0.137***	(0.014)	−0.208***	(0.047)	−0.144***	(0.037)						
Wave of the HILDA survey = 9	−0.147***	(0.015)	−0.200***	(0.047)	−0.151***	(0.037)						
Wave of the HILDA survey = 10	−0.110***	(0.014)	−0.214***	(0.047)	−0.112***	(0.037)						
Wave of the HILDA survey = 11	−0.124***	(0.014)	−0.164***	(0.046)	−0.132***	(0.036)	−0.014	(0.013)	0.047***	(0.017)	−0.020	(0.013)
Wave of the HILDA survey = 12	−0.118***	(0.014)	−0.164***	(0.046)	−0.117***	(0.036)	−0.010	(0.012)	0.044**	(0.017)	−0.007	(0.013)
Wave of the HILDA survey = 13	−0.122***	(0.014)	−0.173***	(0.046)	−0.123***	(0.036)	−0.013	(0.012)	0.035**	(0.017)	−0.011	(0.013)
Wave of the HILDA survey = 14	−0.120***	(0.014)	−0.169***	(0.047)	−0.118***	(0.037)	−0.010	(0.012)	0.037**	(0.017)	−0.005	(0.013)
Wave of the HILDA survey = 15	−0.135***	(0.014)	−0.042**	(0.018)	−0.111***	(0.014)	−0.024*	(0.012)	0.200***	(0.070)	0.016	(0.056)
Wave of the HILDA survey = 16	−0.131***	(0.014)	−0.042**	(0.018)	−0.101***	(0.014)	−0.020*	(0.012)	0.198***	(0.070)	0.026	(0.056)
Satisfaction - your financial situation	0.104***	(0.002)			0.105***	(0.002)	0.100***	(0.002)			0.103***	(0.002)
Satisfaction - the home in which you live	0.140***	(0.002)			0.138***	(0.002)	0.140***	(0.003)			0.141***	(0.003)
Satisfaction - your health	0.189***	(0.002)			0.194***	(0.002)	0.199***	(0.003)			0.202***	(0.003)
Satisfaction - the amount of free time you have	0.098***	(0.001)			0.096***	(0.001)	0.093***	(0.002)			0.093***	(0.002)
Satisfaction - feeling part of your local community	0.052***	(0.002)			0.048***	(0.002)	0.050***	(0.002)			0.045***	(0.002)
Satisfaction - the neighbourhood in which you live	0.036***	(0.002)			0.042***	(0.002)	0.023***	(0.003)			0.032***	(0.003)
Satisfaction - how safe you feel	0.129***	(0.003)			0.125***	(0.003)	0.144***	(0.004)			0.137***	(0.004)
I often feel very lonely	−0.107***	(0.002)			−0.104***	(0.002)	−0.108***	(0.002)			−0.106***	(0.002)
Constant	2.813***	(0.025)	7.617***	(0.087)	3.123***	(0.070)	2.680***	(0.033)	7.432***	(0.109)	2.991***	(0.088)
Observations	207,694		190,200		188,087		103,764		94,719		93,605	
Adjusted R-squared	0.481		0.114		0.498		0.495		0.121		0.512	

Robust standard errors in parentheses.
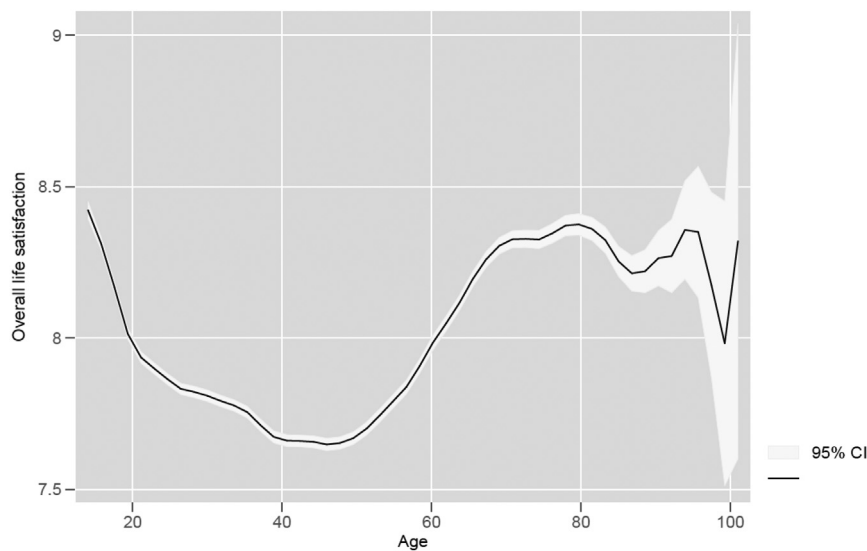
*** p < 0.01.

** p < 0.05.

* p < 0.1.

Fig. 2. Relationship between age and overall life satisfaction (time-adjusted).

Table 2

The means and standard deviations (in parenthesis) of the continuous variables in wave 16, grouped by overall life satisfaction scores.

	Overall life satisfaction						Total
	1–5	6	7	8	9	10	
Household disposable income	78,239	91,575	104,246	108,773	113,562	100,112	105,433
	(75,305)	(69,083)	(138,667)	(121,704)	(100,970)	(97,844)	(113,921)
Hours worked	13.35	22.80	25.26	24.71	21.08	15.64	22.18
	(19.92)	(21.67)	(20.62)	(20.45)	(20.63)	(19.62)	(20.80)
Hours in volunteering	0.909	0.921	0.845	1.059	1.146	1.111	1.029
	(5.013)	(3.700)	(3.361)	(3.805)	(3.535)	(3.811)	(3.735)
Satisfaction							
Home	6.238	6.895	7.433	8.007	8.672	9.253	8.041
	(2.503)	(1.871)	(1.611)	(1.434)	(1.288)	(1.350)	(1.713)
Financial situation	3.945	5.060	5.969	6.790	7.511	7.831	6.673
	(2.402)	(2.012)	(1.827)	(1.724)	(1.702)	(2.163)	(2.099)
How safe you feel	6.530	7.271	7.790	8.343	8.868	9.341	8.318
	(2.313)	(1.651)	(1.335)	(1.169)	(1.025)	(1.154)	(1.463)
Local community	4.641	5.448	6.155	6.811	7.541	7.962	6.798
	(2.487)	(2.111)	(1.883)	(1.830)	(1.804)	(2.189)	(2.114)
Your health	4.365	5.754	6.565	7.343	8.021	8.387	7.225
	(2.365)	(1.886)	(1.660)	(1.503)	(1.421)	(1.729)	(1.897)
Neighbourhood	6.131	6.774	7.334	7.906	8.502	8.968	7.901
	(2.280)	(1.829)	(1.530)	(1.380)	(1.283)	(1.554)	(1.663)
"I often feel very lonely" (0 to 5)	4.508	3.778	3.118	2.508	2.040	1.968	2.631
	(1.962)	(1.835)	(1.698)	(1.563)	(1.432)	(1.632)	(1.743)

Household disposable income increases with life satisfaction at the lower levels, but then sharply decreases at overall life satisfaction of 10. Life satisfaction initially increases with hours worked and then declines as hours increase (Fig. 3).

A large majority of our variables are categorical. Table 3 reports the percentage of observations by group, the difference in mean life satisfaction between groups (adjusted for waves), and the respective 95% confidence interval. In our sample, 51% of observations are women. Adjusted for waves, women have, on average, 0.06 points higher scores compared to men (95% CI [0.05,0.07]). Similarly, those who are married compose 48.15% of the sample and score 0.28 points higher than those who are not. Adjusted for wave, those who are unemployed (3.87% of the sample) score 0.46 lower than those who are employed.

3.2. Regression Results

In this section, we present the results of our pooled OLS regressions. For each of the three models, we conducted two pooled OLS regressions – one for all 16 waves and one for waves 10–16. The 7 final waves were the only ones to contain the independent variable ("Internet at home").

In order to check the robustness of the pooled OLS estimates, we ran OLS estimations on each wave separately. The results of the estimations for each individual wave are fairly similar to the pooled estimates. Similarly, we conducted random effects and fixed effects estimations on the full panel, which result in coefficients of similar magnitude and significance as the pooled estimates. We also estimated the full panel as a pooled cross section using an ordered logit model. Except for physical activity, the logit model compares well with our pooled OLS. Appendix Table A2 includes the complete set of regressions by each wave, the random effects, fixed effects, and the ordered logit estimation.

In the following subsections, we focus on the results of the pooled OLS estimates on (i) subjective variables and overall life satisfaction (titled "Subjective only" in the tables) (ii) objective variables and overall life satisfaction (titled "Objective only") and (iii) both types of variables together on overall life satisfaction (titled "Both").

3.2.1. Subjective Variables and Overall Life Satisfaction

The correlation between overall life satisfaction and subjective
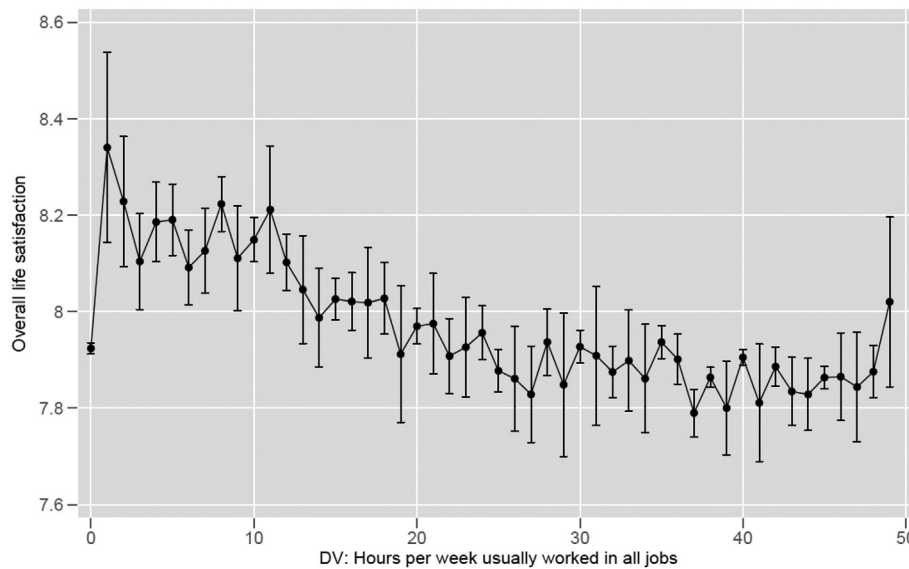
Fig. 3. Relationship between hours worked and overall life satisfaction (time-adjusted). The figure is a margins plot of average life satisfaction by hours worked adjusted by wave. The vertical bands are 95% confidence intervals.

variables found an adjusted R^2 of 0.481 for all waves (column 1, Table 1) and 0.495 for waves 10–16 (column 7, Table 1). Appendix Table A2 shows a similar adjusted R^2 when looking at all the waves independently.

In all these regressions, out of the subjective variables used, two relate to built capital, two to human capital, and four to social capital. Questions regarding natural capital are not present in the HILDA Survey. All of the subjective variables were statistically significant ($p < 0.01$), with positive coefficients. The only variable with a negative coefficient in all regressions was 'I often feel very lonely.'

In the regression where all the waves were combined, satisfaction with health (0.189), home in which you live (0.140), and how safe you feel (0.129) have the largest coefficients (column 1, Table 1). These three variables take into account human, built, and social capitals, respectively. On the other hand, the satisfaction with the neighbourhood you live in (0.036), feeling part of the community (0.052), and amount of free time you have (0.098) have the lowest coefficients. These variables take into account only the social and human capitals. The regression done on waves 10–16 show similar results with the marginal values differing slightly, but retaining their statistical significance.

3.2.2. Objective Variables and Overall Life Satisfaction

The correlation with overall life satisfaction in these regressions

Table 3
This table shows the percentage of observations by group, the difference in mean life satisfaction between groups (adjusted for waves), and the respective 95% confidence interval.

	% of obs	Difference in means between respective groups*	95% CI
Women	51.25	0.06	[0.05,0.07]
Indigenous	2.53	0.06	[0.02,0.10]
Born in Australia	64.11	0.11	[0.09,0.12]
Speaks English well	99.05	0.66	[0.59,0.72]
Married	48.15	0.28	[0.27,0.29]
Unemployed	3.87	−0.46	[−0.42,−0.50]
No internet at home	11.84	−0.08	[−0.05,−0.11]
Physical activity everyday	12.55	0.31	[0.29,0.33]
No long term health condition	72.76	0.5	[0.48,0.51]
Home owners	68.34	0.36	[0.34,0.37]

found an adjusted R^2 of 0.114 (column 3, Table 1) for all waves combined and 0.121 for waves 10–16 (column 9, Table 1). Similar adjusted R^2 are found when regressions were run on the waves separately (Appendix Table A2). From these objective variables, nine were related to human capital, six to social capital, and two to built capital. No natural capital variables were present in the HILDA Survey.

When the 16 waves were combined, the regression shows significance of all variables except marital status of divorced, having children, and a specified education. Also, certain portions of the Australian population had a higher life satisfaction levels, including those that: self identified as being indigenous (coefficient of 0.204), females (0.089), spoke English well (0.390), exercised daily (0.551), volunteered (0.01), and lived very remotely (0.331). The variables with the highest coefficients included, unemployed (−0.567), daily exercise (0.551), and no long-term health condition (0.545). The variables with the lowest coefficients included having children (0.004), hours worked (0.005) and volunteer work (0.010).

In the regression we ran on wave 10–16, access to Internet at home was added as a social capital variable. Having no access to Internet was significant with $p < 0.01$ and had a negative coefficient (−0.059). In the most recent seven waves, we found similar trends as in all the waves, but in this case daily physical activity had the highest coefficient of 0.548, followed by unemployment (−0.575), and having no long-term health condition (0.569). On the other hand, lowest coefficients were seen in having children (0.001), number of hours worked (0.006), and time volunteered (0.008).

3.2.3. Combined Subjective and Objective Variables and Life Satisfaction

The third set of regressions looked at the relationship between the subjective and objective variables combined and overall life satisfaction (columns 5 and 11, Table 1). The adjusted R^2 of these regressions is slightly higher compared to models with only subjective variables, and significantly higher when compared to regressions with only objective variables. The adjusted R^2 is 0.498 for all the waves combined and increases to 0.512 for waves 10–16 when Internet is included. The adjusted R2 are similar when each wave is considered individually (Appendix Table A2).

Fig. 4 plots the coefficients and the 95% confidence intervals from the regressions using just the subjective variables (column 7, Table 1) and those with both subjective and objective variables (column 11, Table 1) for the pooled OLS of waves 10–16. There is only a slight change in the coefficients when objective variables are included in the
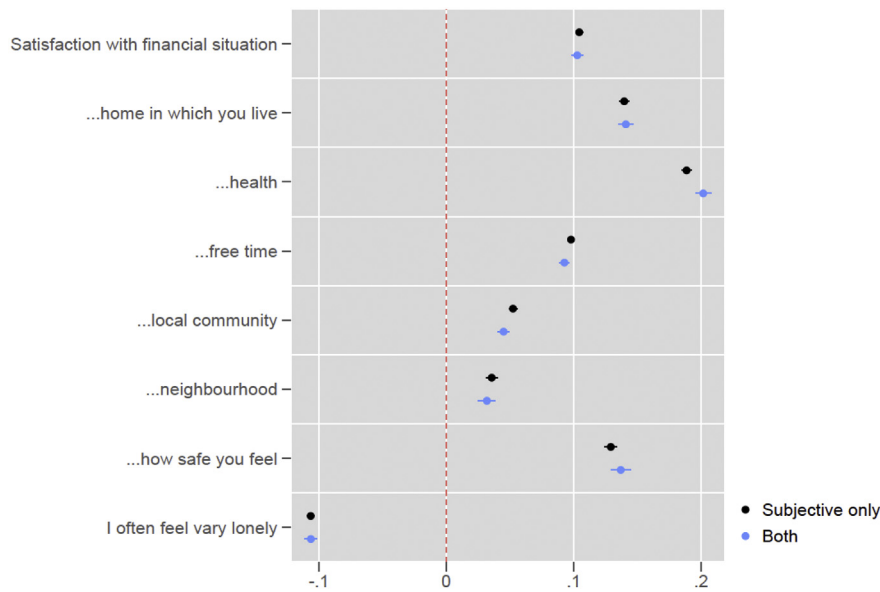
Fig. 4. Coefficient plot of subjective variables regressed on overall life satisfaction by themselves and together with objective variables.

model (Fig. 4).

Fig. 5 plots the coefficients and the 95% confidence intervals from the regressions using only the objective variables (column 9, Table 1) and using both subjective and objective variables (column 11, Table 1) for the pooled OLS of waves 10–16. Including subjective variables leads to a reduction in coefficient on many of the objective variables. In some cases, the direction of the relationship itself changes. Both Figs. 4 and 5 plots were generated in STATA using the user written command coefplot (Jann 2014).

For instance, household disposable income is statistically significant and with a positive coefficient when only objective variables are

included, however, when combined with subjective variables it is negative and not statistically significant. Access to Internet makes a similar change, going from having negative coefficient and being highly significant, to being positive and not significant. Other variables only changed signs but remained highly significant, including someone owns/rents/lives rent free, which relative social-economics status they have, and in how remote of an area they live.

We examined the variance inflation factors of the variables in our combined model to examine if the sign changes were due to multicollinearity. Only the age variables had a VIF of above 10. The fact that subjective variables display similar coefficients by themselves and upon
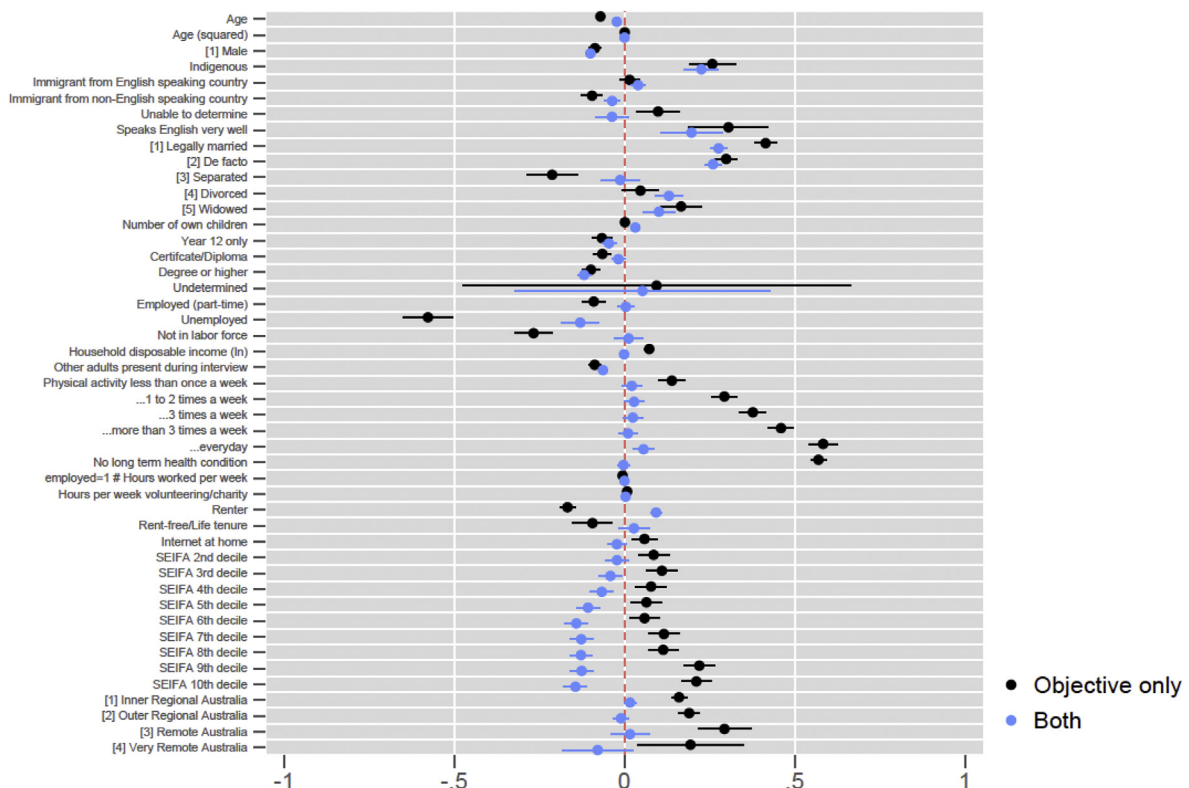

Fig. 5. Coefficient plot of objective variables regressed on overall life satisfaction by themselves and together with subjective variables.

the inclusion of objective variables, while the coefficients on the objective variables change significantly when subjective variables are included in the regression, poses questions on the extent to which perceptions on specific life satisfaction is influenced by objective factors such as income, housing and so on.

3.2.4. Relationship Between Subjective and Objective Variables

Appendix Table A1 shows the correlation between each subjective variable and the objective variables. Column 3 in Table 1 is also included as column 1 in Appendix Table A1 to enable easier comparison the relationship of the objective variables and overall life satisfaction with the same objective variables and the specific subjective variables.

On average, compared to females, males show a lower overall life satisfaction score, as well as, lower satisfaction with their financial situation, the home they live, their health, feeling part of the community, and their neighbourhood. Females, on average, report a lower satisfaction with the amount of free time they have and how safe they feel, and tend to feel lonelier.

There is a positive and statistically significant relationship between all satisfaction indicators and household disposable income, except for the loneliness variable, which has a statistically significant but negative relationship with disposable income. Looking at satisfaction with financial situation as a dependent variable, most of the objective variables have a statistical significance, except with those that identify as indigenous, finished year 12 only, or are in the 2nd or 4th deciles on the relative socio-economic advantage/disadvantage index.

Those that identified as indigenous show less correlation with many of the individual satisfaction variables. Although there was a very significant correlation between the indigenous population and overall life satisfaction, there was no significance with satisfaction of financial situation, home you life in, health, or neighbourhood you live in. On the other hand, amount of free time, feeling part of local community, how safe you feel, and loneliness were all significant.

The strongest correlations (> 1.0) between the objective and subjective variables were when looking at unemployment and satisfaction with your financial situation (-1.866), physical activity > 3 times a week or everyday and satisfaction with your health (1.126 and 1.317, respectively), no long-term health condition and satisfaction with your health (1.782), being in the 8th, 9th, or 10th decile of the index of relative socio-economic advantage/disadvantage and satisfaction in the house you live in (1.025, 1.170, and 1.311, respectively), living in very remote Australia and satisfaction with feeling part of the local community (1.498).

4. Discussion

In this paper, we focus on overall life satisfaction at the individual level. Previous studies focused on satisfaction with specific aspects of an individual's life or aggregate life satisfaction at different scales. For example, satisfaction at the US state (Oswald and Wu 2010) or European city (Okulicz-Kozaryn 2013; Okulicz-Kozaryn and Valente 2018) levels show high correlation between objective indicators and subjective life satisfaction at those scales. An Australian study focused on the relationship between gender, class, age, and ethnicity and overall life satisfaction, while also looking at the inequalities of its distribution (Ambrey and Fleming 2014b; Western and Tomaszewski 2016). Others focused on the relationship between income inequality and life satisfaction (Nguyen et al. 2015).

Regression (1) in Table 1 uses overall life satisfaction as the dependent variable and eight other variables about different aspects of life satisfaction as the independent variables. With an adjusted R^2 of 0.481, we find that about half of variation in overall life satisfaction can be explained by these eight specific subjective variables. This implies that aspects are missing, potentially including the individual's personality (Soto 2015) and satisfaction with environmental amenities and natural

capital (Ambrey and Fleming 2014a; Ambrey and Fleming 2012, 2014c).

Regression 2 (column 3) in Table 1, labelled 'Objective only,' shows a less precise fit with an R^2 of 0.114. This is to be expected to some extent. However, when selecting the objective variables, we attempted to include those that corresponded with the subjective variable. Variables like "satisfaction with your financial situation" had an equivalent in the objective variables with "household disposable income." "Satisfaction with the home you live in" was related to the objective variable "own, rent, or live rent free", and so on. Besides the variables that corresponded to the subjective variables, others were added as well. But the difference in the degree of fit between the two sets of variables indicates that the objective variables do not fully capture individual's perceptions of their life conditions and how they contribute to overall life satisfaction.

The financial variables show that although finance is a highly significant contributor to overall life satisfaction, it does not have the highest marginal effect. The subjective variable of "how satisfied are you with your financial situation" had a marginal effect of 0.104, while the objective variable of household disposable income had a marginal effect of 0.064. These are significantly smaller than aspects like health, the home you life in, or how safe you feel on the subjective side and majority of the variables on the objective side. The variables that have a lower marginal effect than household disposable income are having children, hours worked, hours spent volunteering, being divorced, immigrating from an English speaking country, and being in the 2nd, 4th, 5th, or 6th decile of relative socio-economic advantage/disadvantage index. This can also be seen in Table 2, where household disposable income increases with overall life satisfaction, except for those that indicate a score of 10, in which household disposable income is significantly lower.

The difference between regressions 1 and 2, in Table 1, may be due to a variety of factors, including variations in personality, differences between perception and reality, individuals' ability to adapt, and the lack of natural capital questions in the survey. We explore these possibilities next.

4.1. Personality

Although personality has been shown to be a critical factor in self-reported life satisfaction, this study does not consider individuals' personality. Personality traits, such as agreeableness, conscientiousness, extraversion, and neuroticism, are associated with differences in reported life satisfaction (Soto 2015). For example, agreeable people have an easier time establishing relationships and social networks, both professionally and personally. Extraverted individuals are also perceived as more polite and respectful, and tend to perceive events more positively than introverts (Jensen-Campbell et al. 2002; Lyubomirsky et al. 2005). Conscientious individuals tend have more success professionally, as they are more thorough and reliable, leading to successful careers and more income, both correlated with life satisfaction (Berry et al. 2007). On the other hand, neuroticism has been linked to mental and physical health problems, and negative feelings of loneliness, anxiety, fear, and an overall lower sense of life satisfaction (Boyce et al. 2013). Boyce et al. (2013) found that an individual's personality is more strongly correlated to life satisfaction than income.

Self-reported life satisfaction incorporates personality. This is particularly true given that an individual's personality changes over the course of their life (Boyce et al. 2013). Objective indicators may remain the same in a person's life, but their perception of those aspects may change. Or, conversely, different personality types may interpret changes in objective conditions differently. For example, individuals with high neuroticism may rank changes in income more highly than those low on this aspect.

4.2. Perception (Subjective) Versus Reality (Objective)

Self-reported life satisfaction is completely based on an individual's perception on his or her own wellbeing. However, perception of objective factors can be drastically different than reality. Crime, for example, is often perceived to be higher than actual crime levels (Ambrey et al. 2014). The difference could be due to a personal experience of crime or distress about other factors within society (Tyler and Boeckmann 1997). These other factors could be lack of satisfaction with community cohesion, concern with the opportunities for the next generation, or anxiety over the state of the economy (King and Maruna 2009) or simply overemphasis of crime in the media.

Differences between perception and reality may also exist with other subjective variables. For example, regression (8) in Appendix Table A1, where the dependent variable is "How safe do you feel?", shows that the aspects that were most significant (p < 0.01) were age, sex, indigenous, immigration status, marital status, participation in physical activity, longer-term health condition, rent/owning, relative socio-economic advantage/disadvantage, and the remoteness of where you lived. All these variables contribute significantly to an individual's feelings of safety. In this regard, a male is likely to feel safer than a female from the same demographic and other characteristics.

Another subjective satisfaction question is: How satisfied are you with your financial situation? (regression (10) in Appendix Table A1). In this regression, household disposable income is significant (p < 0.01) but so are other variables, including age, sex, immigration status, marital status, having children, education, participation in physical activity, long term health condition, home rent or ownership status, relative socio-economic status, and how remotely you live. Although income, or household disposable income, is an aspect for feeling satisfied with your financial situation, it is just one small part of it. An individual's satisfaction with his/her financial situation also depends on his/her wealth. Although it is not included in our regressions due to a lack of data on wealth, we include housing tenure and compare homeowners with others. We find that those who do not live in their own home report significantly lower levels of satisfaction with their financial situation. Cost can also be an important factor in the satisfaction with financial situation. There is a statistically significant negative relationship between the number of children and satisfaction with financial situation. One reason could be increasing costs associated with more children. Similarly, living outside of metropolitan areas could also affect satisfaction with finances through lower costs.

However, the relationship is even more complex. In addition to factors that directly relate to finances, demographic factors such as age and gender also exhibit statistically significant relationships with satisfaction with financial situation. Additional factors such as personality traits could also be relevant in the relationship between perceptions and reality.

Media plays a significant role in creating perceptions (Duffy et al. 2008). By covering crime extensively, it increases stress and concerns about security. By discussing job losses, it can create financial insecurity. How society is portrayed by the news can greatly impact an individual's perception on how well they are doing.

Individuals also adjust to their circumstances rapidly. Events may occur that change life circumstances, either for the better or worse, but after a time, their life satisfaction returns to a similar level (Brickman et al. 1978; Suh et al. 1996). However, if a person's life situation changes drastically, and becomes poor at an extreme level, then objective and subjective variables, or perception and reality, may begin to align to a greater degree (Cummins 2000). This adaptability also varies among different cultures and thus where immigrants come from has an effect (Graham 2011; Graham et al. 2010).

4.3. Lack of Natural Capital Variables

Natural capital, or the natural environment, is often overlooked when assessing contributions to life satisfaction. This is also true in the HILDA Survey. It has been shown that at a country level, including both developed and developing countries, a correlation exists between natural capital and subjective life satisfaction (Engelbrecht 2009).

In our study, we found that subjective questions regarding the satisfaction with the home and the neighbourhood in which you live address the environment indirectly. For example, by having a view of nature out their window, individuals show a greater satisfaction with their home and neighbourhood (Kaplan 2001). However, no direct questions about the environment are posed. And yet, the environment is critical to human survival (Millennium Ecosystem Assessment (MEA), 2005; Okulicz-Kozaryn 2015). It provides us perceived and non-perceived goods and services that are essential to not only human wellbeing, but to life on Earth; these include oxygen, water, food, a stable climate, recreation, and a lot more (Costanza et al. 2014a; Costanza et al. 2011). Some ecosystems and species providing integral services may be misunderstood, not perceived, or even looked negatively upon, like mosquitos or wetlands (Ambrey et al. 2016).

Nature has a fundamental impact on our life satisfaction, both physically and mentally (Bratman et al. 2012; Russell et al. 2013). Physically, people that live in proximity to nature have been shown to live longer (Takano et al. 2002). The degradation of nature has also been shown to increase health problems and mortality levels (Jardine et al. 2007; Speldewinde et al. 2011). For example, the loss of trees has increased cardiovascular and lower-respiratory-tract illness in local populations (Donovan et al. 2013). Even contact with animals, like ownership of pets, has proven to help the recovery from certain health problems, such as acute myocardial infarction (Friedmann and Thomas 1995). And a view of nature benefits prison inmates – those having a view of nature versus the prison courtyard showed less demand on the prison health care system (Moore 1980).

Nature significantly influences mental health. These impacts can be observed in the form of stress reduction and recovery (Hartig et al. 1997; Kaplan 1995; Leather et al. 1998; Ulrich et al. 1991), increase in self-esteem (Barton and Pretty 2010; Wells and Evans 2003), improved learning capabilities and concentration (Berman et al. 2008; Berto 2005; Taylor et al. 2002; Tennessen and Cimprich 1995), and reduced aggression (Hartig et al. 1991; Kuo and Sullivan 2001).

Just the feeling of being connected to nature has been shown to increase overall wellbeing and satisfaction with life (Howell et al. 2011; Mayer and Frantz 2004). Interacting or living in nature has also been shown to increase life satisfaction using data at both the national and state scales (Abdallah et al. 2008; Gyourko and Tracy 1991). This can be seen directly when people are willing to forgo additional income or accept greater costs of living to be in proximity to nature (Gabriel et al. 2003).

Correlation also exists between wellbeing and carbon emissions. A higher carbon footprint is associated with lower levels of wellbeing (Ambrey and Daniels 2017). This relationship may be due to income levels, as income increases so do carbon emissions but wellbeing levels off (Lenzen and Cummins 2013). The relationship between material welfare and environmental degradation has been previously established to be proportional (Akbostancı et al. 2009; Jorgenson and Dietz 2015).

The HILDA Survey does not include variables about the environment or natural capital. Given how important we know them to be in contributing to life satisfaction, we plan to extend our analysis in future studies to incorporate these variables.

5. Conclusions

Many factors affect an individual's self-reported life satisfaction (LS), their subjective wellbeing (SWB), and their broader sustainable wellbeing. A primary policy goal is the creation of the conditions that allow people to maximize their wellbeing. We have used the HILDA Survey to look at how the 'objective' conditions of life, which are open to policy manipulation, relate to LS. We compared this with how

individual's subjective satisfaction with a range of variables similar to these objective conditions relate to LS. These connections are complex and individuals do not fully perceive the connections between objective conditions and their own wellbeing. This is due to a range of factors, including lack of information, media portrayals, personality traits, individual's limited information processing abilities, and cultural factors. In addition, some objective variables that we know to be important in contributing to LS are not included in the HILDA Survey, notably environmental amenities and natural capital.

Nevertheless, we have identified several objective conditions that significantly influence LS and together explain approximately 12% of the variation across individuals. These include age, health, immigration status, education, physical exercise, access to the Internet, employment, volunteering, home ownership, economic disadvantage, and rural location.

We also looked at the relationships between specific subjective satisfaction questions that break down the components of overall life satisfaction and mirror these objective conditions. These specific subjective satisfaction factors together explain 49% of individual LS variation. It is interesting that this adjusted R^2 is not higher. Individuals should be able to identify the factors that contribute to their overall LS and this could be considered as merely decomposing the total into its parts. This implies that certain important components are missing. For example, adding personality factors (which are included in some HILDA Survey years) (Soto 2015) may significantly improve this relationship. Environmental factors and other missing objective factors need to be included in future work.

Ultimately, sustainable wellbeing is the product of a complex set of factors, some of which are well perceived by individuals and incorporated into their assessments of their own LS, and some are not. From a public policy perspective, governments are mainly concerned with influencing the objective factors affecting wellbeing. Better understanding of both how these factors relate to perceived, self-reported LS and how to improve individual's perception of the factors that do influence their sustainable wellbeing are important. This paper helps to understand the difference.

In addition, this work needs to be extended to other countries and used to inform policy aimed at creating the conditions for improved wellbeing. Better understanding of the subjective and objective conditions supporting wellbeing and their interconnections and limitations will help do that.

Finally, better measures of sustainable wellbeing are urgently needed. The UN Sustainable Development Goals (SDGs), agreed to by all member countries, embody the range of factors that contribute to sustainable wellbeing. They go far beyond the current misuse of GDP growth as the primary policy goal, based on the false assumption that more growth will always improve sustainable wellbeing (Kubiszewski et al. 2013). Implementing the SDGs will require better specific and aggregate measures of wellbeing at multiple scales. It will require integrating subjective and objective measures of well-being with estimates of the sustainability of the system (Costanza et al. 2016a). Our current results illuminate some of these connections and are a step toward creating more integrated and comprehensive measures of sustainable wellbeing and achieving the SDGs.

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