

Subjective wellbeing in New Zealand: Some recent evidence

Research Note 2016/3

May 2016

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New Zealand Productivity Commission Research Note: Subjective wellbeing in New Zealand: Some recent evidence

Te Kōmihana Whai Hua o Aotearoa¹

Date: May 2016

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JEL classification: I31: General welfare, Basic needs, Living standards, Quality of life, Happiness

ISBN: 978-0-478-44033-1

Acknowledgements: Kevin Jia was an intern at the Productivity Commission between November 2014 and February 2015. Conal Smith is a senior economist at the Statistics Directorate of the OECD. We are grateful to Commissioners and staff at the Productivity Commission for their support and encouragement throughout this project. In particular, Grant Scobie, Arthur Grimes, Paul Conway and Lisa Meehan provided helpful comments and modelling suggestions.

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¹ The Commission that pursues abundance for New Zealand.

Abstract

This paper analyses a range of factors associated with the subjective wellbeing of New Zealanders. It provides international comparisons based on the Better Life Index developed by the OECD. In addition it draws on data from three waves of the New Zealand General Social Survey (NZGSS). The OECD Better Life Index shows that New Zealand compares favourably with the average for the OECD countries in all aspects of wellbeing except income and work-life balance. Health, education and the environment are factors that New Zealanders assess as important for overall wellbeing. Based on data from the NZGSS, having support in a crisis is associated with higher levels of subjective wellbeing, a finding consistent with previous studies. We find that subjective wellbeing increased modestly by some three to four percent between 2008 and 2012, after controlling for variation in individual characteristics. To better understand the determinants of wellbeing, further research into New Zealanders' perceptions of their wellbeing and the development of panel datasets to conduct longitudinal analysis are suggested.

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1 Introduction

While higher incomes has always been one focus for public policy, it is recognised that ultimately it is the wellbeing of individuals that matters. We value higher incomes and growth in economic productivity not for their own sake, but because they provide a basis for the improving the so-called “wellbeing” of New Zealanders. Wellbeing is a complex, multi-dimensional concept which reflects not only material standards of living, but encompasses broader aspects of an individual’s social, environmental and societal context (Grimes and Hyland, 2015).

In recent years there has been increasing emphasis on supplementing traditional measures of economic progress, such as GDP, with measures of the wellbeing of individuals. This reflects the now well documented shortcomings of more narrow economic measures, which too often are taken as measures of welfare (Stiglitz, Sen and Fitoussi, 2009). Some approaches to measuring wellbeing focus on specific outcomes in areas such as health, education and safety that enable an individual to live the kind of life that they value (eg, Ministry of Social Development, 2010; OECD, 2011; OECD, 2013b). Other approaches focus on individuals’ subjective perceptions of wellbeing.

Drawing on the idea that the simplest way to find out how someone is doing is to ask them, survey questions on subjective wellbeing are now increasingly taken seriously by economists (OECD, 2013b) and are being collected by national statistical agencies in almost all developed countries (Helliwell, Layard, & Sachs, 2015).

It is essential to be clear about what subjective indicators of wellbeing are measuring if they are to provide meaningful insights for policy. Although subjective wellbeing measures are often referred to as measures of “happiness”, there is a range of distinct aspects of subjective wellbeing that can be measured. Generally speaking, psychologists and economists identify three different concepts of subjective wellbeing (OECD, 2013b):

- Measures of *life evaluation* that capture a person’s cognitive assessment of how their life is going.
- Measures of *positive affect* (eg, happiness, joy, contentment) and *negative affect* (eg, sadness, worry, anger) that capture the feelings experienced by a person at a particular point in time.
- Measures of *eudaimonia* that capture aspects of psychological wellbeing and good mental functioning relating to meaning and purpose, sense of self-worth, and locus of control.

Much of the literature on subjective wellbeing focuses on measures of life evaluation, as data of this sort are collected in a number of cross-sectional and panel surveys. The underlying concept is also closer to an economist’s notion of utility as the criteria by which people evaluate life choices, than is the case for the two other dimensions of subjective wellbeing. In this paper we follow the literature in focusing on the evaluative dimension of subjective wellbeing, rather than the other dimensions. This takes advantage of the fact that high quality data on life evaluation are available from the New Zealand General Social Survey (NZGSS) and that results are comparable with the findings from other studies on the determinants of subjective wellbeing.

In the past there have been a number of significant concerns about the validity of subjective wellbeing measures. For example, some studies have shown that recent positive experiences and weather appear to be correlated with reported measures of life evaluation, and this has raised concerns about the reliability of such measures. However, provided the sample is of adequate size and the survey is conducted with a consistent methodology, such “chance” events function as random noise around a valid signal rather than as measurement bias. Moreover, there is evidence that reported life satisfaction scores across two time periods are positively correlated providing some comfort that subjective wellbeing measures have systematic components. Further, life satisfaction is correlated with “unfakeable smiles”, evaluations of wellbeing by friends and relatives and sleep quality (Kahneman & Krueger, 2006).

Until the mid-2000s there was also a belief that individuals' subjective wellbeing adapts to their situation. In a widely cited paper, Brickman, Coates, and Janoff-Bulman (1978) analysed a cross-sectional survey of both lottery winners and tetraplegics, and found that reported measures of life satisfaction were not much different to the population as a whole. This was interpreted as evidence of a psychological set point to which a person's subjective wellbeing will return.

However, it has been shown conclusively using large panel datasets that people do not adapt to changes in disability (Lucas, 2007) and unemployment (Lucas, Clark, Georgellis, & Diener, 2004), or that adaptation is only partial as in the case of income (Di Tella, Haisken-De New, & MacCulloch, 2010). In fact, even the results of Brickman et al (1978) are consistent with income and disability having a sustained impact on subjective wellbeing once the small sample size is taken into account (Lucas, 2007).

In addition to these causal analyses based on panel data sets, there is a large literature on the cross-sectional correlates of subjective wellbeing. Boarini, et al. (2012) provide an overview of the objective correlates of subjective wellbeing, and a brief summary is provided below:

- higher incomes are associated with higher levels of life evaluation both within and across countries;
- unemployment is associated with a large decrease in subjective wellbeing;
- poor health is associated with lower subjective wellbeing;
- extraversion and low neuroticism are associated with increased wellbeing (Diener & Seligman, 2002);
- poor work/life balance and higher time spent commuting is associated with lower subjective wellbeing;
- education does not appear to affect subjective wellbeing once other factors, such as income, are controlled for;
- social connections are positively associated with subjective wellbeing;
- democracy and levels of generalised trust in a country are both positively associated with subjective wellbeing; and
- higher quality environment and lower crime are also both associated with higher levels of subjective wellbeing, but the relationship is weaker and as yet not well studied.

The analyses in this paper are intended to have a tentative look at the data to provide a contribution to the literature on wellbeing, specific to New Zealand. While the results establish some important associations between wellbeing as reflected in reported levels of life satisfaction, and a range of both societal factors and individual characteristics, causality cannot and should not be inferred.

The paper proceeds by first documenting the data sources. This is followed in Section 3 by an analysis of New Zealand's performance relative to the OECD; using the Better Life Index (OECD, 2011). Section 4 is based on a data from a New Zealand survey in which we identify those factors that are associated with life satisfaction. Section 5 provides a discussion of the results and explores changes in New Zealanders' reported life satisfaction from 2008 to 2012, while conclusions are drawn in Section 6.

2 Data sources

A number of worldwide surveys now measure subjective wellbeing. In particular, the Gallup World Poll (GWP)² and the World Values Survey (WVS)³ both provide measures of subjective wellbeing and possible correlates for a wide range of countries over several years. However, although widely used,

² See <http://www.gallup.com/services/170945/world-poll.aspx>

³ See <http://www.worldvaluessurvey.org/WVSContents.jsp>

both surveys have a number of limitations; the most significant being that both rely on relatively small sample sizes at the country level (approximately 1,000 people per wave for New Zealand) and rather mediocre response rates.

In contrast, the New Zealand General Social Survey (NZGSS), conducted by Statistics New Zealand, combines a much larger sample size (approximately 8,000 people per wave) with a high response rate. It is a cross-sectional survey that is conducted every two years, with data available from the 2008, 2010 and 2012 waves. The survey covers a full range of factors that may potentially influence wellbeing, in addition to providing an indicator of overall life satisfaction.

Based on data from the 2008 wave of the NZGSS, Brown et al. (2012) found, in line with other studies, that mental health was moderately correlated with life satisfaction. Income was positively correlated, while being unemployed, not owning a home and a range of social life and community relationships were all negatively correlated with life satisfaction, albeit at very modest levels.

Other studies have focused on individual domains in the NZGSS, and found that housing quality has no significant impact on subjective wellbeing (Statistics New Zealand, 2013c); crime in an individual's broader region contributes significantly to fear of crime (Breetzke & Pearson, 2014); and that Asian and Pacific peoples experience the most workplace discrimination (Daldy, Poot, & Roskrugge, 2013).

3 OECD Better Life Index

The OECD Better Life Index (BLI) was developed in 2011 as a measure that "moves beyond GDP" in measuring wellbeing. The index is based on the "How's Life?" framework (OECD, 2011; Durand, 2015), where an individual's wellbeing is considered a function of their material living conditions and quality of life. Wellbeing is measured across 11 areas referred to as domains, and between one to four indicators are used to summarise each domain (Table 1). These indicators were selected because they are comparable between countries and focus on outcomes. For each domain, the relevant variables are rescaled to give a score between 0 and 10. These scores are then averaged to give an index for the domain.

Because individuals consider the importance of each domain differently, the OECD has intentionally not weighted the outcome domains to provide a composite indicator of wellbeing. Instead, visitors to the OECD Better Life Index website are invited to create their own composite indicator by entering their own weighting for each domain. These weights and visitor metadata are collected by the website, making it possible to calculate the average weights given by visitors to the website by country-of-traffic origin. This provides a dataset which captures the preferences of individuals in different countries across the 11 domains of the BLI.

There are a number of caveats with the BLI preference data. Firstly, the weights are likely to be biased due to self-selection of website visitors, and possible inaccuracies in country identification. In addition, the weights that a person enters may not necessarily reflect that which is actually important to the respondent in their life. Rather it may reflect that which they believe will be important to them, or alternatively that which they perceive to be socially desirable. Despite these limitations, the weights still provide some insight into those areas considered as important to individuals in a given country.

Table 1 OECD Better Life Index domains and variables

Domain	Variables
Housing	Dwellings without basic facilities
	Housing expenditure
	Rooms per person
Income	Household net adjusted disposable income
	Household net financial wealth
Jobs	Employment rate
	Job security
	Long-term unemployment rate
	Personal earnings
Community	Quality of support network
Education	Educational attainment
	Student skills
	Years in education
Environment	Air pollution
	Water quality
Civic engagement	Consultation on rule-making
	Voter turnout
Health	Life expectancy
	Self-reported health
Safety	Assault rate
	Homicide rate
Work-life balance	Employees working very long (50+) hours
	Time devoted to leisure and personal care
Life satisfaction	Overall life satisfaction

Source: OECD (2011).

3.1 New Zealand's relative performance

The 2014 BLI data show that New Zealand is performing above the OECD average in all domains except for income and work-life balance. In particular, New Zealand has low household income and wealth relative to the OECD, and has a relatively high proportion of people working more than 50 hours per week. This is consistent with analysis by Conway and Meehan (2013), which shows that New Zealand has low labour productivity and high hours worked per capita relative to other OECD countries.

New Zealand has top ranking for health, and performs well in civic engagement, community and environment. Furthermore overall life satisfaction is well above the OECD average (Table 2). In particular, New Zealand's index score in the community domain, as defined by the quality of social

support,⁴ is the highest in the OECD. It is also worth noting that New Zealand's relatively good performance in housing is due to the inclusion of "dwellings without basic facilities" and "rooms per person" as variables. However, New Zealand's average housing expenditure relative to income is one of the highest in the OECD.

Table 2 OECD Better Life Index scores by domain: New Zealand and the OECD average: 2014

Domain	New Zealand	OECD average	NZ relative to the OECD average (%)
Health	89.6	66.4	135
Civic engagement	72.1	54.0	134
Community	100.0	75.0	133
Environment	86.5	67.6	128
Safety	92.6	80.5	115
Housing	67.8	59.3	114
Education	71.3	66.3	108
Jobs	72.5	70.6	103
Work-life balance	62.8	69.7	90
Income	18.3	36.1	51
Simple average across 10 domains			
Life satisfaction	83.9	61.3	137

Source: OECD (2013a), authors' calculations.

3.2 New Zealand's relative weightings

While acknowledging there are limitations in the BLI system of weights, some insights can, nevertheless be gained by examining how well the weights New Zealanders attach to each domain corresponds to the country's performance in that area. The OECD's BLI database is derived from the weightings chosen on a scale from 0 to 10 by 596 website visitors from New Zealand.⁵

There are two possible approaches to evaluating the relative importance placed by New Zealanders on each domain:

- Percentage point deviation from average weightings submitted by all visitors to the BLI website;
- Percentage point deviation from the case that all ten domains and overall life satisfaction are weighted equally.

The first method captures how the preferences of New Zealanders differ from those in the rest of the world. However, it is flawed as a measure of that which New Zealanders value, as by comparing the New Zealand score with the average for the rest of the world, information on New Zealanders' assessment of the importance of each domain is lost. For example, this method would result in civic engagement being seen as more important to New Zealanders relative to the average for the rest of

⁴ The indicator is based on the question "If you were in trouble, do you have relatives or friends you can count on to help you whenever you need them, or not?"

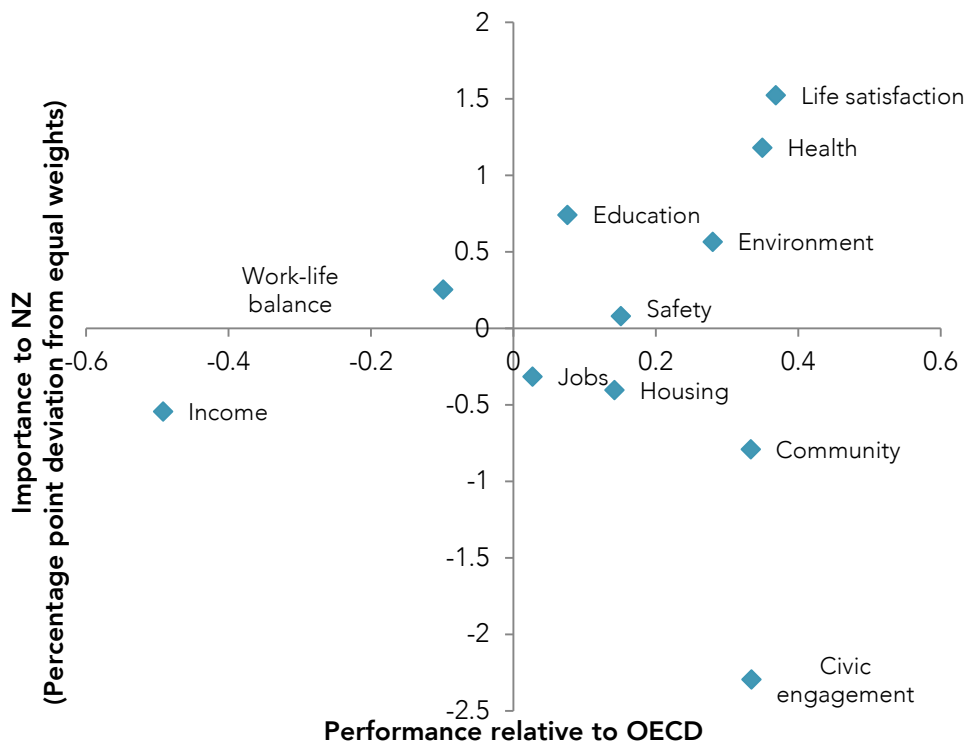
⁵ Weightings based on the OECD BLI database as of October 2014.

the world, despite the fact that New Zealanders assigned it the lowest weighting out of all the domains (OECD, 2014).

For this reason, we have chosen to focus on the second approach based on the deviation from the case where all domains are assigned an equal importance weighting. This provides a better guide to the domains that matter more to New Zealanders, although it is not immediately apparent as to whether the implied weights should be viewed as marginal or average responses. Could the respondents have been weighting more heavily those aspects for which they would like more of at the margin; or simply that on the whole they felt a particular factor needed a high weighting? This matter would tend to influence the interpretation that is put on the findings.

Work-life balance is in the upper left quadrant (Figure 1) which indicates that New Zealand performs poorly on this domain relative to the OECD average but has a relatively high importance for New Zealanders. Income – an area where New Zealand does poorly compared with the OECD average – has a relatively low importance weighting. In contrast, New Zealanders rank life satisfaction the highest, followed closely by health, education, and then environment. The rankings are broadly similar to those submitted by users in Australia and the United States (OECD, 2014).

Figure 1 Relative performance vs importance, deviation from equal weights.



Source: OECD BLI database, authors' calculations.

Figure 1 suggests there is a weak positive relationship is evident between the priority New Zealanders assign to a domain and New Zealand's performance in that domain relative to the OECD. Those domains where New Zealand does best relative to the OECD tend to be those domains weighted most highly on the BLI. Similarly, those domains where New Zealand does poorly are generally those with lower weights. Community and civic engagement are outliers in this sense.

As noted, the results in Figure 1 are dependent on the weights assigned by those visiting the BLI website. To overcome this limitation and establish a more representative picture of the weights that New Zealanders attach to each of the domains, we turn now to an analysis based on the NZGSS.

4 Analysis based on the New Zealand General Social Survey

4.1 Introduction

The NZGSS is a biennial survey that measures satisfaction with a range of social and economic outcomes, along with demographic data of the survey respondents. Three waves of NZGSS data are available; these surveys were conducted in 2008, 2010 and 2012. Around 8,000 people aged 15 years and over were interviewed in each wave (Statistics New Zealand, 2013b).

The survey was developed to cover the domains of the New Zealand Social Report (Ministry of Social Development, 2010), which consist of the following ten domains and an overall life satisfaction indicator:

- Health
- Knowledge and skills
- Paid work
- Economic standard of living
- Civil and political rights
- Cultural identity
- Leisure and recreation
- Physical environment
- Safety
- Social connectedness
- Life satisfaction

For each domain, both subjective (eg, satisfaction with your job) and objective (eg, employment status) measures are reported. As indicated in Table 3 below (section 4.3), these domains are broadly aligned with those in the OECD BLI.

This report analyses all three waves of NZGSS data as provided in the confidentialised unit record file (CURF). This reduced dataset contains individual responses with confidential details suppressed (eg, location) or categorised (eg, age and income) to prevent identification (Statistics New Zealand, 2013a).

4.2 Methodology

The analysis of NZGSS data proceeds in two stages. In the first stage we use a similar method to Brown et al. (2012) to confirm whether the NZGSS data for each of the BLI outcome domains show the expected correlations with the reported life satisfaction of New Zealanders. The coefficients derived from this analysis provide an indication of the importance individuals place on each of the domains. In the second stage, these coefficients are used to replicate the analysis depicted in Figure 1. This involved replacing the weights derived from New Zealand visitors to the Better Life website with standardise weights

The model of subjective wellbeing follows that of Brown et al. (2012):

$$W = \beta_1 D + \beta_2 X + \beta_3 E + \varepsilon$$

where:

- W is an individual's reported life satisfaction;
- D is a vector containing the individual's demographics;

- X is a vector of observed or reported values of the variables in each of the domains;
- E is a vector containing individual-specific factors that cannot be observed (e.g. genetic and environmental); and
- ε is the random error term.

Because the NZGSS is not a panel in which individuals are tracked over time, it is not possible to estimate the vector E . Hence, the estimates for β_1 and β_2 will be potentially biased. However, if we assume that E is uncorrelated with the independent variables in the vectors D and X , then any omitted variables will affect only the error term (ε), leaving unbiased the estimates of β_1 and β_2 .

In the NZGSS, overall life satisfaction is defined as the response to the following question, “How do you feel about your life as a whole right now?”, and is measured on a 5-point scale:⁶

- 1 = very dissatisfied;
- 2 = dissatisfied;
- 3 = no feeling either way;
- 4 = satisfied;
- 5 = very satisfied.

This measurement assumes that wellbeing is ordinally comparable between people; that is, people agree on the ordering and wording of the individual levels (e.g. ‘very satisfied’ is better than ‘satisfied’). The appropriate models in this case are ordered logit or ordered probit; however the interpretation of the estimated coefficients from these models is not straight forward.

To address this, a further assumption is made: namely that life satisfaction responses are cardinally comparable. This means that the difference between, say, 1 and 2 is equivalent to the difference between 4 and 5. Although this is arguably a tenuous assumption, it does allow the use OLS models which are much easier to interpret. Ferrer-i-Carbonell and Frijters (2004) suggests that, in practice, there is little difference between estimates from the least squares and ordered probit models in the analysis of measures of life satisfaction, suggesting that the assumption of cardinality is not unwarranted. By way of confirmation, both ordered probit and OLS models are fitted; reassuringly they yield broadly similar results.

Separate regressions are fitted for the variable(s) in each domain to capture the indirect effects of a domain variable rather than to control for them, even though this may lead to missing variable bias. A full model with all variables is also fitted.

4.3 Variable selection

The approach for this analysis is to develop a model that could be used to help evaluate whether broad outcomes in different wellbeing domains are consistent with areas most strongly associated with overall life satisfaction. The OECD BLI domains are used as a basis for the areas that we wish to address, and suitable “headline” variables from the NZGSS are identified to represent each domain. The selected variables are chosen on the basis of their broad compatibility with the BLI variables, subject to availability in the NZGSS.

We attempted to only use objective variables as explanatory variables in this model, as we wish to avoid shared method variance⁷ which inflates the size and significance of coefficients associated with subjective variables (OECD, 2013b). However, this was not always possible, so coefficients for the health and community domains – which are based on subjective data – should be interpreted with additional

⁶ This is the reverse of the scale provided in the NZGSS CURF, but is used as it is easier to interpret.

⁷ “If respondents exhibit habitual response styles when answering self-reported survey questions, this can present risks to the accuracy of the responses and any subsequent analyses that explore relationships between variables. One of the key risks associated with response styles is that, by introducing a relatively stable bias across several self-reported variables, they can artificially inflate correlations between those variables – a phenomenon often described in the literature as shared or common method variance. This is a particular problem for cross-sectional analyses of survey data” (OECD, 2013b,p.116)

caution. Table 3 gives a summary of the domain variables selected, and where appropriate, the method of derivation.

Table 3 Variables selected from the NZGSS corresponding to each BLI domain

OECD BLI Domain	Objective variables selected from the NZGSS
Health ⁽¹⁾	SF-12 physical health score (1-100) SF-12 mental health score (1-100) These are composite scores based on responses to whether a person's health affected their ability to perform everyday tasks (Ware, Kosinski, & Keller, 1996).
Income ⁽²⁾	Log (median household income of income category equivalised by household size and discounted to 2008 dollars, base = 2).
Jobs	Labour force status of the individual (employed, unemployed, not in labour force).
Community	Dummy variable for having support in a time of crisis.
Education	Person's highest qualification as classified by the levels of the National Qualifications Framework – this is a proxy for the number of years in education past Year 11, and is treated as continuous.
Environment	None.
Civic engagement	Voting status of the individual, in the last general election (voted, not voted, not qualified to vote).
Housing	Measure of household crowding, derived from: (Number of persons in household / Number of bedrooms).
Safety	Crime victimisation in the past 12 months (the maximum of: no crime, non-violent crime, violent crime).
Work-life balance	Dummy variable for working over 50 hours a week (note this can only be derived for people in employment).

Notes:

- (1) SF-12 is generic, multipurpose short-form survey with 12 questions related to an individual's health which, when combined, scored and weighted, provides an index of mental and physical health. See www.iqola.org/instruments.aspx.
- (2) Equivalisation refers to adjusting income figures to take into account household size. The OECD standard of dividing income by square root of household size is used in this case (OECD, 2009).

There is no suitable variable in the NZGSS to represent the environment domain; the physical environment variables in the NZGSS refer more to local facilities and utility services. The CURF divides New Zealand into six discontinuous regions (for example, Northland, Bay of Plenty and Gisborne are combined into one region), and hence does not have the detail necessary to make inferences on environmental quality.

A number of demographic variables are also used in the analysis; these and any imputations required to generate these are given in Table 4. The summary statistics for the selected variables are given in Table A.1 of Appendix A.

Table 4 Demographic variables used in analysis

Demographic variable	Description
Gender	Dummy variable: female=0, male=1.
Age	Age is given in 5-year categories in the CURF, so we impute ages based on the population age distribution within the 5-year bands for each sample year.
Age squared	This is to account for the usual U-shape relationship between age and wellbeing in the literature.
Ethnicity	Multiple reported ethnicities are summarised into one ethnicity through the following priority: Māori, Pacific Peoples, Asian, European / Other (Statistics New Zealand, 2004). The 2008 NZGSS does not separate Europeans and MELAA (Middle Eastern, Latin American and African) groups, so these groups are combined for consistency in the 2010 and 2012 waves.
Partnered	Dummy variable, yes/no.
Dependent child	Dummy variable, yes/no.
Sample year	2008, 2010 or 2012.

4.4 Results

This section reports on the empirical results of the analyses. A broader discussion of the results follows in Section 5.

Table 5 reports the regression coefficients and their statistical significance associated with the different wellbeing indicators and demographic variables. These were derived from estimating equation (1). Two sets of estimates are presented: in the first column are those from an OLS model, while in the second column the estimates were derived using an ordered probit model. Both models are intended to capture the independent impact on life satisfaction of each variable (both wellbeing and demographic) after controlling for the contribution of all other variables. The results from the ordered probit model are broadly similar in magnitude and statistical significance as those from the OLS model, suggesting that OLS provides a reasonable model in this case.

For gaining insights into potential policy responses it would be valuable to know how much of an impact an equivalent change in each wellbeing variable has on life satisfaction. However, the regression coefficients in Table 5 cannot be directly compared this way, as their absolute magnitude depends on the unit of measurement.

There are several approaches to overcoming this limitation by making the coefficients comparable. One method recasts the regression coefficients in terms of a unit change in $\log(\text{income})$ such that a one unit change is equivalent to doubling household income. Dividing each regression coefficient by the coefficient on a unit change in $\log(\text{income})$ gives the magnitude of a one unit change in each variable compared to a doubling of household income. A magnitude of 1 means that a unit change has the same effect on wellbeing as a doubling of income, while a magnitude of 2 is equivalent to a four-fold increase etc. The multiplier given is in positive terms even when the relative coefficient is negative. Where this is the case, the multiplier refers to the effects of moving from a state back to the baseline. This approach does not actually standardise the coefficients, but does provide an intuitive way to view the impact of a given change on life satisfaction.

A potential limitation of this technique is that income is not necessarily truly independent. To the extent that it is endogenously determined then the coefficient on income will be biased downwards (Fujiwara,

2013, p.19). The effect of this will be to artificially amplify the adjusted coefficients on the other variables.

Table 5 Regression results

Variable		OLS regression		Ordered probit regression	
Dependent variable: Overall life satisfaction score (coded on a five-point scale)					
Physical health		0.01	***	0.01	***
Mental health		0.03	***	0.05	***
Log(HH income)		0.04	***	0.07	***
Employment (base: employed)	Unemployed	-0.26	***	0.12	***
	Not in labour force	0.06	**	-0.31	***
Voting (base: voted)	Did not vote	-0.08	**	-0.04	.
	Not qualified to vote	-0.04	.	-0.13	**
Education (NQF levels)		0.02	***	0.04	***
Have crisis help		0.26	***	0.37	***
Safety (base: no crime)	Experienced violent crime	-0.04	.	-0.04	.
	Experienced non-violent crime	-0.03	.	-0.04	.
Persons per room		-0.06	***	-0.11	***
Gender	Male	-0.10	***	-0.16	***
Age		-0.02	***	-0.03	***
Age ²		0.00	***	0.00	***
Ethnicity (base: European / MELAA / Other)	Asian	-0.11	***	-0.23	***
	Māori	-0.02	.	-0.03	.
	Pacific	-0.12	***	-0.22	***
Partnered		0.17	***	0.29	***
Have dependent children		-0.03	.	-0.04	.
Sample year (base: 2008)	2010	0.12	***	0.17	***
	2012	0.12	***	0.18	***

Source: Authors' calculations based on NZGSS.

Notes:

1. Probability sampling weights supplied by Statistics New Zealand were used to account for the stratified nature of the sample, and statistical significance levels are calculated from replicate weights.
2. Significance symbols: *** = $p < 0.001$, ** = $p < 0.01$, * = $p < 0.05$, . = $p < 0.1$
3. In the NZGSS, the number of working hours is only collected for people in paid employment, hence the work over 50 hours dummy and employment cannot be analysed together; therefore the former was dropped from the regression.
4. All coefficients have been rounded to 2 decimal places.

A second approach is to adjust every variable to have a standard deviation of 1. This makes the variables in the regression equally important, and the size of the regression coefficients gives an indication of the importance of that variable on life satisfaction. Unfortunately, this approach is of limited usefulness here as it is restricted to continuous variables, and most of the variables from the NZGSS used here are categorical.

For categorical variables, the coefficients could be weighted by the proportion of people in each category. In this way, the weighted coefficients refer to the impact on the average level of life satisfaction for a doubling of the number of people belonging to that category.

The results from all three approaches are summarised in Table 6.

Table 6 Results of standardisation approaches on full regression

Variable		Coefficient size relative to income	Effective multiplier on income	Standardised regression coefficient	Coefficients weighted by percentage
Physical health		0.22	1.2	0.10	
Mental health		0.80	1.7	0.35	
Log(HH income)		1.00	2.0	0.05	
Employment	Unemployed	-6.08	67.8		-0.00
(base: employed)	Not in labour force	1.35	2.6		-0.15
Voting	Did not vote	-1.96	3.9		-0.01
(base: voted)	Not qualified to vote	-0.89	1.9		-0.01
Education	(NQF levels)	0.52	1.4	0.06	
Have crisis help		6.26	76.9		0.43
Safety	Exp. violent crime	-0.86	1.8		-0.00
(base: no crime)	Exp. non-violent crime	-0.65	1.6		-0.02
Persons per room		-1.37	2.6	-0.27	
Gender	Male	-2.36	5.1		
Age		-0.54	1.5		
Age2		0.01	1.0		
Ethnicity	Asian	-2.60	6.1		
(base: European / MELAA / Other)	Māori	-0.56	1.5		
	Pacific	-2.9	7.5		
Partnered		4.09	17.0		
Have dependent children		0.67	1.6		
Sample year	2010	2.75	6.7		
(base: 2008)	2012	2.89	7.4		

Source: Authors' calculations based on NZGSS.

Note:

1. All coefficients have been rounded to 2 decimal places.

The results in Table 5 is that there appears to be a slight increase in average life satisfaction over 2008-2012 as reflected in the coefficients on the dummy variables for each period. This increase is also visible in the annual mean life satisfaction scores for the NZGSS as shown in Table 7. However, the changes, while statistically significant, are very modest, of the order of a 3 to 4% increase. To further investigate this, separate regressions for each wave are run to account for changes in age, income and other variables across the three waves of the NZGSS. The results of this are shown in Table 8.

Table 7 Average life satisfaction scores for each wave of the NZGSS

Survey year	Average life satisfaction
2008	4.08
2010	4.11
2012	4.12

Source: Authors' calculations based on NZGSS.

Table 8 Separate regression results for each wave of the NZGSS

Variable		2008	2010	2012
Intercept		1.03 ***	1.42 ***	1.75 ***
Physical health		0.01 ***	0.01 ***	0.01 ***
Mental health		0.04 ***	0.03 ***	0.03 ***
Log(HH income)		0.02 **	0.06 ***	0.04 ***
Employment	Unemployed	-0.33 ***	-0.27 **	-0.20 **
(base: employed)	Not in labour force	0.09 *	0.07 *	0.02 .
Voting	Did not vote	-0.07 .	-0.02 .	-0.13 ***
(base: voted)	Not qualified to vote	-0.09 *	-0.00 .	-0.00
Education	(NQF levels)	0.02 ***	0.02 ***	0.02 ***
Have crisis help		0.44 ***	0.10	0.26 ***
Safety	Experienced violent crime	0.02 .	-0.05 .	-0.08
(base: no crime)	Experienced non-violent crime	0.01 .	-0.07 .	-0.01
Persons per room		-0.05 .	-0.03 .	-0.11 ***
Gender	Male	-0.12 ***	-0.10 ***	-0.08 **
Age		-0.02 ***	-0.02 ***	-0.03 ***
Age ²		0.00 ***	0.00 ***	0.00 ***
Ethnicity	Asian	-0.17 ***	-0.10 *	-0.09 *
(base: European / MELAA / Other)	Māori	-0.02 .	0.02 .	-0.06
	Pacific	-0.10 .	-0.06 .	-0.18 ***
Partnered		0.21 ***	0.17 ***	0.15 ***
Have dependent children		-0.03 .	0.04 .	0.07 *

Source: Authors' calculations based on NZGSS.

Notes:

1. Significance symbols: *** = $p < 0.001$, ** = $p < 0.01$, * = $p < 0.05$, . = $p < 0.1$
2. All coefficients have been rounded to 2 decimal places.

In broad measure both the magnitude and sign of the coefficients are similar across the three waves. An interesting result is that those not in the labour force have higher life satisfaction than the employed, although this effect is only weakly significant. Some 34% of the respondents were not in the labour force; this group consists primarily of students and retirees.

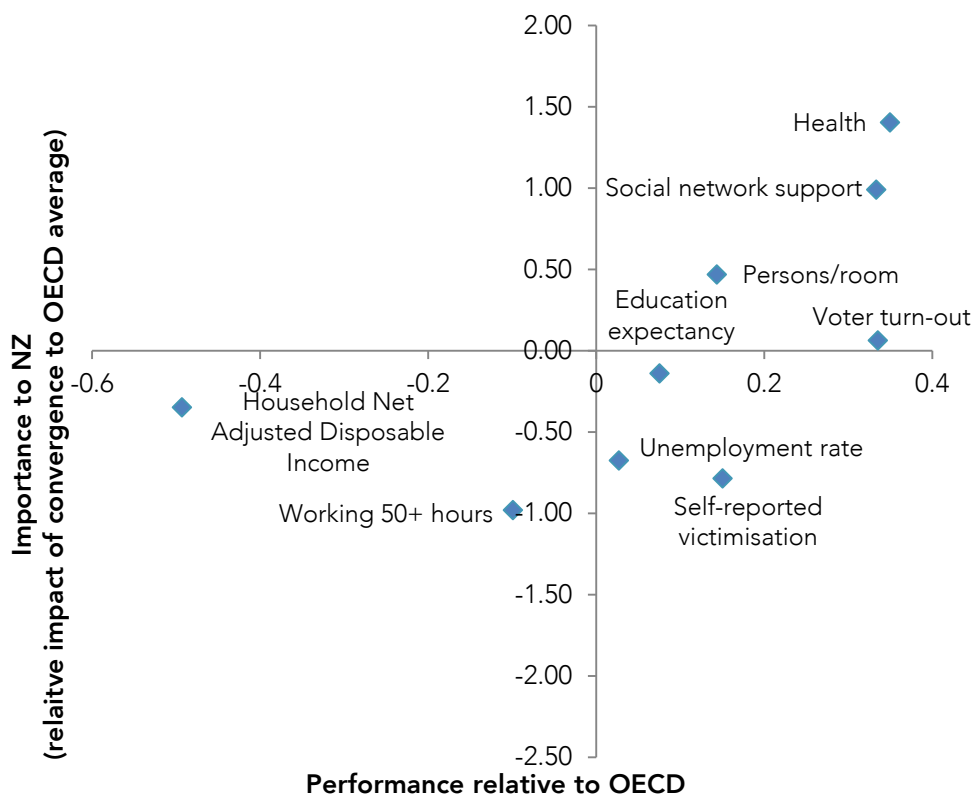
Neither of the approaches presented in Table 5 provide an unambiguous weighting across all the BLI domains. In the case of the income-relative coefficients, the results still face the issue of different units

of measurement for each variable, while the other approaches to standardisation cannot be applied to all variables.

One alternative to the above approaches, that has some relevance for policy, is to consider the effect of each outcome domain converging to the OECD average on life satisfaction in New Zealand. This thought experiment is the basis of Figure 3 in which performance relative to the OECD is calculated in the same way as for Figures 1 and 2. However, in this case the weights reflecting the importance of each factor influencing life satisfaction are calculated by multiplying the corresponding regression coefficient (OLS regression, Table 5) by the actual gap in the indicator between New Zealand and the OECD average.

For those outcomes where New Zealand performs better than the OECD average, the importance weight is the loss in life satisfaction to New Zealanders associated with convergence to the OECD average, while for those areas where New Zealand does worse than the OECD average it is proportional to the potential gain in life satisfaction. In all cases the importance weights are normalised so that an importance weight of zero the mean gain/loss across all domains.

Figure 2 Relative performance vs. importance, impact of movement to OECD average

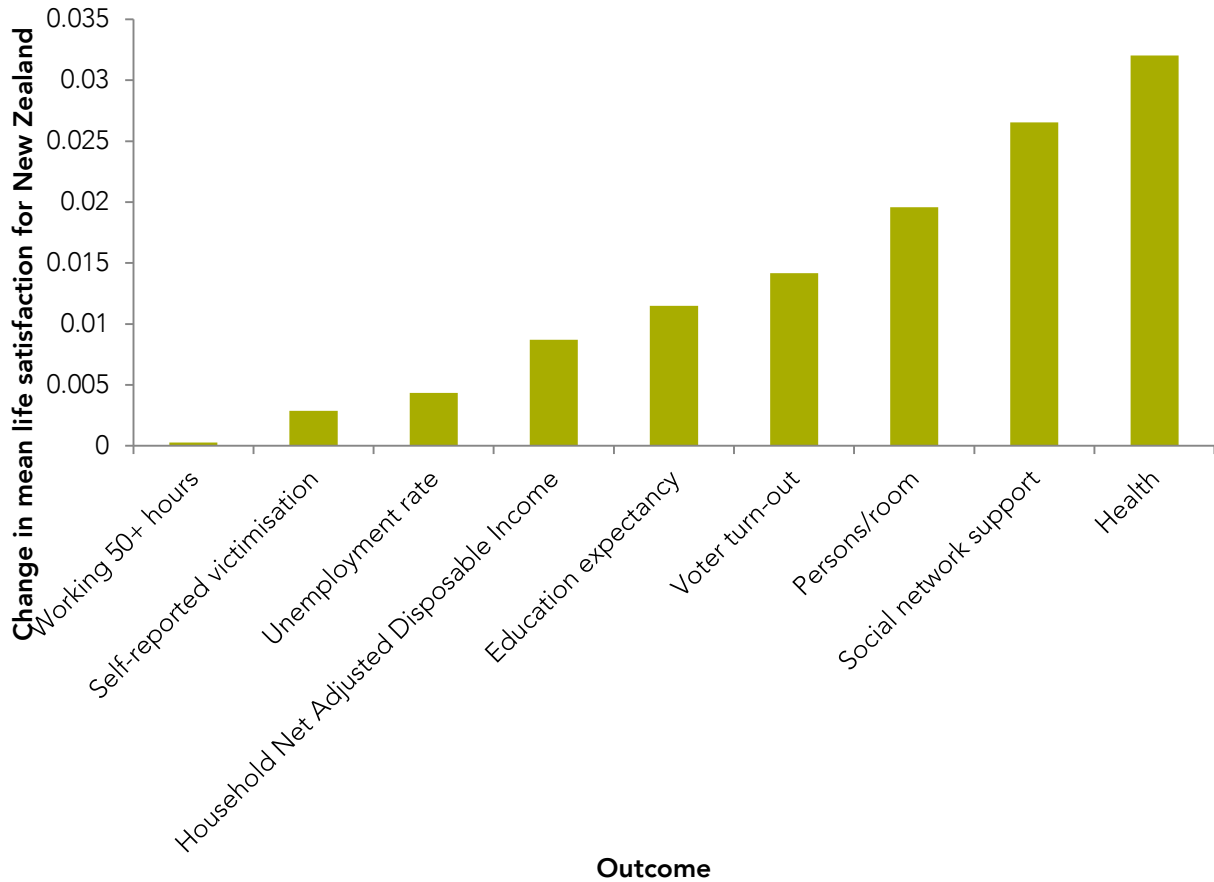


Using this approach, comparable weights can be calculated for all outcome domains except health, as data on the SF-12 health scale is not available for most OECD countries. However, the SF-12 was validated against the population of the United States, for which it has a mean value of 50. The relative importance attached to the health domain in Figure 2 is therefore calculated as the impact of New Zealand converging to a mean score of 50 in both the physical and mental health scales (Ware et al., 1996). This approach is obviously imperfect, and the weight provided for health in Figure 3 should therefore be treated with more caution than the other figures.

The interpretation of Figure 2 is not straight forward. If all outcome domains were equally important to New Zealanders, then the impact on life satisfaction of converging to the OECD average (vertical axis) would be directly proportional to the distance from the OECD average in terms of performance (horizontal axis). In this case, we would expect to see a "V-shaped" relationship between importance and performance. In the areas above the "V" are outcomes that have a large impact on the life satisfaction of New Zealanders for any given improvement in performance, while below the "V" are those that have a relatively small impact on life satisfaction relative to their performance.

Figure 3 presents the absolute magnitude of the impact of convergence to the OECD average on life satisfaction on its own based on the same calculations as in Figure 2. This highlights the areas where there are potentially large gains/losses in wellbeing associated with convergence to the OECD average.

Figure 3 Impact on mean life satisfaction in New Zealand of convergence to OECD mean outcomes



5 Discussion

5.1 Full NZGSS regressions

The results in the regression models are broadly consistent with the analysis in Brown et al. (2012). After controlling for demographic variables, the most important correlates with life satisfaction are mental health, unemployment and having someone who can be called on for help in a crisis. These all have fairly strong associations with life satisfaction both as a proportion of $\log(\text{income})$ and in the standardised regression.

In terms of demographics, the expected relationships also hold. Males have a lower average level of life satisfaction compared with females; we observe the expected u-shaped relationship for age, with the trough occurring at 45 years of age. Having a partner improves wellbeing, whereas having dependent children does not appear to have a significant impact.

Higher qualification levels (post-Year 11) lead to modest increases in life satisfaction after controlling for income and employment. This is in contrast to the approach used by Brown et al. (2012), where dummy variables for secondary and vocational qualifications were found to be statistically significant.

In line with much of the literature on the determinants of life satisfaction (eg, Boarini et al., 2012), income is highly significant and positively related to life satisfaction. However, the potential impact is

small. The elasticity of life satisfaction with respect to $\log(\text{income})$ is estimated to be 0.15. In other words, a 10% increase in $\log(\text{income})$ would result in a 1.5% increase in the life satisfaction score (evaluated at the mean levels of the both variables).

It is of interest to note that the coefficient on income in New Zealand is low in relative as well as absolute terms. Sacks, Stevenson, and Wolfers (2010), estimate that the coefficient on \log income is approximately 0.3 (i.e. a doubling of income results in an increase of 0.3 points on an 11 point life satisfaction scale). After adjusting for the fact that the NZGSS uses a five-point scale, the comparable effect size for income taken from Table 5 would be only 0.16. In other words, income has a much smaller effect on life satisfaction in New Zealand than is the case for other countries.

In this analysis, holding all other variables constant, the number of persons per bedroom has a negative effect on reported life satisfaction, confirming the intuition that crowding is a negative aspect of housing quality. Brown et al. (2012) did not include persons per bedroom as a proxy for a person's housing wellbeing.

Although a full analysis of the relationship between ethnicity and the determinants of life satisfaction is beyond the scope of this paper, it is nonetheless interesting to briefly consider the picture presented in Table 5 from this perspective. In the OLS regression, people identifying as Asian or Pacific had lower overall life satisfaction compare with those identifying as European or other. Again, however, the absolute effect is very small. Relative to European and other, Asian and Pacific respondents had a life satisfaction score of about 0.11 points lower. In other words, after controlling from other variables, Asian or Pacific ethnicity has a very modest effect.

Interestingly, the coefficient on life satisfaction for Māori is small, and is not statistically significant, indicating that the life satisfaction of Māori respondents does not differ from that of European respondents once differences in income and life circumstances are taken into account. It is tempting to see this as reflecting a distinction between population groups with a large proportion of recent migrants (Asian, Pacific) and population groups with a longer history in New Zealand and possibly an element of shared culture. This could be a hypothesis worth exploring further.

5.2 Importance of outcome domains

Although it is not possible to produce a complete set of weights for the different outcome domains that is directly comparable between domains, the analysis that is possible is nonetheless interesting. Of the domains covered in Figure 3, the three outcomes where convergence to the OECD average would have the biggest impact on life satisfaction in New Zealand are health, social network support, and housing. While health was also identified as important in the BLI weights, neither housing nor social network support (community in the BLI), were given such a high weight. Education, unemployment, and incomes all had medium weights in the life satisfaction analysis, but scored low weights in the BLI-derived data. Work-life balance scored extremely low in the life-satisfaction weights.

The lack of impact associated with work-life balance is, at first glance, surprising. In this case the issue is likely to be an analytical problem. Long work hours are strongly and inversely correlated with income, and thus the coefficient from income is artificially low given that the negative effect of long work hours is largely offset by the positive effect of associated income gains. This is not the case for the other outcome domains where spill-overs across domains are likely to be in the same direction (eg, higher income both yields satisfaction in itself but has positive spill-overs to income, jobs, and health).

5.3 Changes across NZGSS waves

The three waves of the NZGSS coincidentally capture the immediate aftermath of the 2007-2008 global financial crisis. In the full regression model we find that there is a statistically significant increase in life satisfaction in 2010 and 2012, relative to 2008 after controlling for demographics and domain effects. One possibility is that the increase may occur because the analysis does not control for possible effects of the global financial crisis, beyond that which is captured by the income and labour market variables included in the regression model.

A standard ANOVA on life satisfaction against sample year shows only a weakly significant increase in life satisfaction. A similar result was noted in an Australian study by Saunders and Wong (2011). However, this does not take into account the effect of changes in demographics and domain variables.

When the three NZGSS waves are analysed separately, the intercept terms (the life satisfaction of a hypothetical person with baseline levels or zero for all variables) show an increasing trend, indicating that life satisfaction as a whole may be increasing in society.

Across the three waves, the coefficient for income more than doubled between 2008 and 2010, but it decreased in 2012. This may be due to changes in perceptions; in the immediate aftermath of the global financial crisis, having a steady income would be seen as more important than otherwise, and expectations take time to readjust. The post-Christchurch earthquake environment might also have driven some of these changes. Persons per room became statistically significant in 2012, suggesting that New Zealand's housing situation has increased in prominence as a correlate of life satisfaction over the period 2008 to 2012.

6 Conclusions and future work

The analysis of the three waves of the NZGSS dataset is consistent with findings from previous analysis by Brown et al. (2012) and the (OECD, 2013a). The results confirm previous findings that mental health, unemployment and having help in a crisis are factors that have a significant impact on life satisfaction scores, when other factors are held constant. Although these results do not imply causation in either direction, they do give some preliminary indications of those areas where improvements in outcomes could potentially contribute to greater life satisfaction.

Compared with user-submitted weights on the OECD Better Life Index website, we find that the biggest determinants of life satisfaction are not necessarily those that are perceived as important by individuals, and vice versa. Even though the data for weightings are unrepresentative of the population, it highlights a potential disconnect between perception and reality; more survey work could be done to elucidate this.

From a broader perspective, this analysis also gives some indication that baseline wellbeing has increased between 2008 and 2012, beyond that explained by the range of variables controlled for. Given the surprisingly large size of the time trend compared to plausible changes in other variables, a case can be made to further examine this effect. In particular, the hypothesis that New Zealanders' life satisfaction has increased because New Zealand has come through the global financial crisis fairly unscathed compared with other countries may be worth exploring further.

This paper provides only a very modest starting point for exploring the factors influencing the wellbeing of New Zealanders and potential areas of outcome improvements that might enhance wellbeing. There are a number of additional analyses that could be done to further enhance our understanding of wellbeing:

- Building a structural model of subjective wellbeing, that incorporates appropriate objective measures as explanatory variables for each of the domains. In this way the problem of shared method variance associated with subjective variables could be minimised.
- Dolan, Fujiwara, and Metcalfe (2011) and Fujiwara (2013) found that using subjective wellbeing as a proxy for utility, such as used in this paper, overestimates monetary values for non-market goods; this is also observed in this analysis. They advocate a two- or three-stage method to better account for the indirect effects of income. These methods could be applied to the NZGSS data to gain better estimates on the equivalent income compensation of changes in the domain variables.
- Use a panel survey to analyse changes in individual perceptions over time, and account for the unmeasurable genetic and environmental factors that affect wellbeing. The New Zealand Values

and Attitudes Survey (Sibley, 2014), is a 20-year longitudinal survey with life satisfaction and objective variables that may provide the necessary data for such an analysis.

- Extend the analysis of the relationship between ethnicity and subjective wellbeing using Te Kupenga, the Māori Social Survey (Statistics New Zealand, 2014b). This survey focuses on domains specific to Māori, specifically wairuatanga (spirituality), tikanga (Māori customs and practices), te reo Māori (the Māori language) and whanaungatanga (social connectedness). This allows analysis of whether the importance of the different wellbeing outcome areas varies between Māori and European New Zealanders as well as testing more specific hypotheses. For example, Te Kupenga captures information on the perceived wellbeing of the respondent's Iwi as a whole, and it might be of value to explore the degree to which this impacts on individual subjective wellbeing.
- To further probe the potential determinants of wellbeing using the NZGSS data. This might take the form of further experimentation with different domain variables. In 2014, a supplement on social networks was added to the NZGSS (Australian Productivity Commission & New Zealand Productivity Commission, 2012) with the data expected to be released in August 2014; and in 2016, the supplement will be on civic and cultural participation (Statistics New Zealand, 2014a). Both could be useful for identifying which specific elements of these domains correlate strongly with wellbeing.

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Appendix A Summary statistics

Table A.1 Overall summary statistics for variables used in the analysis

Variable	Category	Mean	Min	Max	Standard error
Life satisfaction		4.11	1	5	0.007
Physical health		50.20	4	72	0.078
Mental health		50.85	-4	76	0.086
Log(Household income) ²		14.22 (\$19,069)	-2.138 (\$0.23)	15.88 (\$60,305)	0.012
Education	(NQF levels)	3.41	0	10	0.026
Persons per room		0.99	0.2	8	0.004
Employment	Employed	62.2%			
	Unemployed	3.5%			
	Not in labour force	34.2%			
	Don't know / no response	0.1%			
Voting	Voted	78.8%			
	Did not vote	8.6%			
	Not qualified to vote	8.8%			
	Don't know / no response	3.8%			
Have crisis help	Yes	95.7%			
	No	3.8%			
	Don't know / no response	0.5%			
Safety	Experienced no crime	81.9%			
	Experienced violent crime	1.5%			
	Experienced non-violent crime	9.1%			
	Don't know / no response	7.5%			
Work over 50 hours	Yes	12.1%			
	No	49.1%			
	No data	38.7%			
Gender	Male	55.6%			
	Female	44.3%			
Age		44.29			
Ethnicity	European / MELAA / Other	77.7%			
	Asian	6.6%			
	Māori	11.8%			
	Pacific	3.8%			
Partnered	Yes	54.9%			
	No	45.1%			
Have dependent children	Yes	33.7%			
	No	66.3%			
Sample year		2008	33.9%		
		2010	33.2%		
		2012	32.9%		

Source: Authors' calculations based on NZGSS.

Notes: 1. For continuous variables, the mean and standard error calculated using replicate weights are reported. For categorical variables, the percentage in each category is reported. 2. Log(median household income category equalised by household size and discounted to 2008 dollars, base=2).

Table A.2 Continuous variables summary - 2008 wave

Variable	Mean	Min	Max	Standard error
Life satisfaction	4.08	1	5	0.013
Physical health	50.86	6	72	0.144
Mental health	52.43	-1	75	0.132
Log(Household income)	14.30	-1.95	15.88	0.017
Education (NQF levels)	3.27	0	9	0.042
Persons per room	1.0007	0.2	8	0.009

Source: Authors' calculations based on NZGSS.

Table A.3 Continuous variables summary - 2010 wave

Variable	Mean	Min	Max	Standard error
Life satisfaction	4.11	1	5	0.011
Physical health	49.99	4	72	0.120
Mental health	50.00	-4	76	0.157
Log(Household income)	14.19	-2.06	15.82	0.025
Education (NQF levels)	3.44	0	11	0.043
Persons per room	0.998	0.2	7	0.007

Source: Authors' calculations based on NZGSS.

Table A.4 Continuous variables summary - 2012 wave

Variable	Mean	Min	Max	Standard error
Life satisfaction	4.12	1	5	0.011
Physical health	49.79	4	70	0.140
Mental health	50.17	0	69	0.151
Log(Household income)	14.17	-2.14	15.74	0.018
Education (NQF levels)	3.52	0	11	0.041
Persons per room	0.98	0.2	5	0.007

Source: Authors' calculations based on NZGSS.

Table A.5 Categorical variables summary - by NZGSS waves

Variable	Category	2008	2010	2012
Employment	Employed	63.9%	61.7%	60.9%
	Unemployed	2.8%	3.7%	4.0%
	Not in labour force	33.2%	34.5%	35.1%
	Don't know / no response	0.1%	0.2%	0.1%
Voting	Voted	78.6%	79.3%	78.5%
	Did not vote	7.7%	8.2%	9.9%
	Not qualified to vote	9.5%	8.7%	8.0%
	Don't know / no response	4.2%	3.8%	3.6%
Have crisis help	Yes	95.8%	95.6%	95.8%
	No	3.7%	3.9%	3.7%
	Don't know / no response	0.5%	0.5%	0.5%
Safety	Experienced no crime	80.6%	81.5%	83.8%
	Experienced violent crime	1.7%	1.5%	1.3%
	Experienced non-violent crime	9.5%	9.4%	8.3%
	Don't know / no response	8.2%	7.6%	6.7%
Work over 50 hours	Yes	14.5%	13.7%	8.2%
	No	48.5%	46.9%	51.9%
	No data	37.0%	39.3%	39.9%
Gender	Male	45.0%	44.2%	43.9%
	Female	55.0%	55.8%	56.1%
Partnered	Yes	55.4%	55.3%	54.0%
	No	44.6%	44.7%	46.0%
Have dependent children	Yes	33.8%	34.0%	33.2%
	No	66.1%	66.0%	66.5%

Source: Authors' calculations based on NZGSS.

Appendix B Glossary

Name	Variable
ANOVA	Analysis of variance
BLI	Better Life Index
CURF	Confidentialised Unit Record File
GWP	Gallup World Poll
GDP	Gross Domestic Product
NQF	National Qualifications Framework
NZGSS	New Zealand General Social Survey
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Squares regression model
SF-12	A short 12 questionnaire form using individual responses to construct an index of physical and mental health
WVS	World Values Survey