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Theory and Validity of Life Satisfaction Scales

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Abstract National accounts of subjective well-being are being considered and adopted by nations. In order to be useful for policy deliberations, the measures of life satisfaction must be psychometrically sound. The reliability, validity, and sensitivity to change of life satisfaction measures are reviewed. The scales are stable under unchanging conditions, but are sensitive to changes in circumstances in people's lives. Several types of data indicate that the scales validly reflect the quality of respondents' lives: (1) Differences between nations in life satisfaction associated with differences in objective conditions, (2) Differences between groups who live in different circumstances, (3) Correlations with nonself-report measures of life satisfaction, (4) Genetic and physiological associations with life satisfaction, (5) Systematic patterns of change in the scales before, during, and after significant life events, and (6) Prediction by life satisfaction scores of future behaviors such as suicide. The life satisfaction scales can be influenced by factors such as question order, current mood, and mode of presentation, but in most cases these can be controlled. Our model of life satisfaction judgments points to the importance of attention, values, standards, and top-down effects. Although the scales are useful in research on individual well-being, there are policy questions that need more analysis and research, such as which types of subjective well-being measures are most relevant to which types of policies, how standards influence scores, and how best to associate the scores with current policy deliberations.

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Global life satisfaction scales ask respondents to evaluate their lives as a whole on a scale ranging from very satisfying to very dissatisfying. These scales have been used by researchers for many decades, and they are now receiving interest in terms of national accounts of well-being, with the scores potentially being used to inform policy deliberations. For example, the Prime Minister of the United Kingdom, David Cameron, in 2010 announced that the well-being of citizens would be a government concern, and a survey of subjective well-being, including life satisfaction, would be initiated. The assessment of quality of life in societies by economic and social indicators is thought by the advocates of subjective well-being measures to provide an incomplete picture that can be augmented by measures of life satisfaction and other types of subjective well-being (e.g., Denissen et al. 2008).

In light of the measurement issues regarding life satisfaction scales, for example the effects of item-order on scale scores, it is necessary to review the validity of the scales. In this review we focus on global measures of people's satisfaction with their entire lives, and do not cover in detail the validity of scales that measure satisfaction with specific domains of life or scales that focus respondents on a specific standard for comparison (e.g., social comparison).

Life satisfaction surveys are thought to complement existing indicators by reflecting the influences of diverse facets of quality of life and allowing respondents to freely weight different aspects. Thus, the scales can take people's values and preferences into account as well as the outcomes of their choices. Because the measures are relatively inexpensive and easy to administer, they provide a useful supplement in assessing the quality of life in societies. In this paper we review the extensive literature that supports the reliability, validity, sensitivity, and value-added features of the measures, discuss problems that can compromise the validity of scales scores, and describe open issues related to using life satisfaction to inform policy. We review experiential measures of subjective well-being elsewhere (Scollon et al. 2003; Tay and Diener 2012).

1 Reliability of the Scales

A general assumption about measurement scales is that they are reliable, that is, they yield identical scores when administered in the same conditions. For self-report scales judgments about reliability are based on whether different items and scales assessing the same concept converge with each other (i.e., produce equivalent scores) and whether the scores remain the same over time when conditions are unchanging. Retest correlations represent a lower bound of reliability because lower scores can be due to true changes. Retest correlations usually decrease over time because true change is typically larger over greater time intervals. High correlations between life evaluation scores from different measures and between a measure given repeatedly across short time intervals indicate the high reliability of life satisfaction measures.

The convergence between alternative life satisfaction items and scales reveals that people answer in a consistent manner. Correlations between different scales are in the moderate-to-high range (Diener et al. 1985; Pavot and Diener 1993b; Pavot et al. 1991).

The Cronbach alphas for multi-item scales such as the Satisfaction with Life Scale tend to be in the .80's (Diener et al. 1985), or even higher (between .90 and .96 in the study of Eid and Diener 2004), indicating convergence among life satisfaction items that are worded in different ways. Factor analyses of multi-item life satisfaction scales usually reveal essentially a single underlying dimension (Diener et al. 1985; Slocum-Gori et al. 2009).

The stability of life satisfaction scores across time and situations suggests that consistent psychological processes are involved and similar information is used when people report their scores. Stability coefficients over a period of several weeks for the Satisfaction with Life Scale can be above .80 (Pavot and Diener 1993b). Over periods of several months the coefficients remain high (Diener et al. 1985; Pavot and Diener 1993b). Just as the coefficients show relative stability across short periods of time, they also reveal considerable consistency in life satisfaction judgments reported in differing situations, such as in work versus leisure settings (Diener and Larsen 1984).

Fujita and Diener (2005) found in a panel of respondents followed for many years that the one-year stability coefficient for life satisfaction assessed with a single item was about .56, and over greater numbers of years declined progressively to about .24 after 16 years. Twenty-four percent of respondents showed a significant change in 5-year mean life satisfaction from the beginning to end of the period. Thus, there is considerable stability in life satisfaction judgments over short time intervals but greater changes over time as circumstances in lives are likely to change.

Certain characteristics of the scales influence their reliability. For example, items that are phrased in terms of your "current life" or "these days" may produce somewhat lower stability estimates (Krueger and Schkade 2008), as one would expect because these phrases reflect a briefer recent time span than of one's life. Single-item scales are less stable than multi-item life satisfaction scales. Michalos and Kahlke (2010) found that a single item asking about satisfaction with overall life was stable at .67 and .65 for 1 and 2 years, respectively, whereas the five-item Satisfaction with Life Scale produced correlations of .80 and .75. Schimmack and Oishi (2005) meta-analyzed studies and concluded that for single-item scales temporal stabilities are about .50 for short intervals, whereas the multi-item scales showed correlations of about .70 for such intervals. Lucas and Donnellan (2011) estimated the reliability of single-item life satisfaction measures in four large representative samples, taking into account the occasion-specific changes in the measures over time. They found that the reliabilities varied from .68 to .74, with a mean of .72.

Societal-level mean life satisfaction also shows very strong consistency (e.g., Diener et al. 1995). In the Gallup World Poll, in which there was an identical life evaluation question in the identical item-order collected over years, we found a .93 correlation across waves of the data for 1-year intervals ($N = 336$ nation-wave pairs), and a .91 correlation across a 4-year interval ($N = 74$ nations). The World Values Survey (WVS) and European Values Study (EVS) asked the same question about life satisfaction from 1981 to 2009, making it possible to analyze consistency over long periods of time. The results show a .78 correlation between the earliest and latest available measure across a mean time span of 16.5 years ($N = 72$ nations). As at the individual level, national average levels of satisfaction tend to be stable over short periods of time but are only moderately stable over longer time periods.

Life satisfaction also is stable over time when measured by different scales administered by different organizations. For example, the WVS/EVS and the Gallup World Poll asked in the same 97 countries: "All things considered, how satisfied are you with your life as a whole these days?" Although the WVS/EVS used a 1–10 scale and the Gallup scale ranged from 0 to 10, and the questions were asked in different years, the results were strikingly

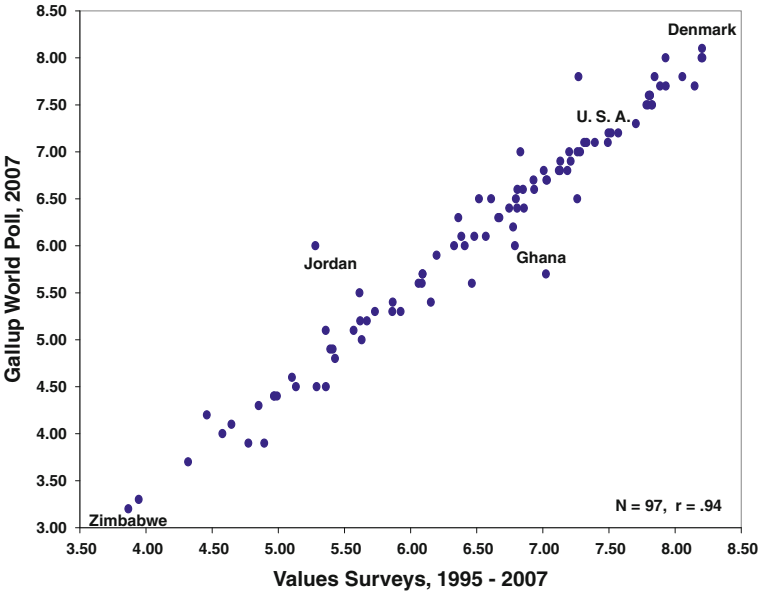


Fig. 1 Life satisfaction of nations from the 2007 Gallup World Poll and 1995–2007 world and European value surveys. *Source*: Inglehart and Welzel (2010)

similar, showing an overall correlation of $r = .94$. Figure 1 shows this association. Although there are a few modest outliers such as Jordan and Ghana, most nations achieve equivalent scores in the two surveys.

The reliability coefficients of life satisfaction scales are important because they reveal that over short intervals, when most people's lives are unlikely to have changed substantially, they report similar levels of evaluation. Although people's moods are likely to differ substantially across short periods of time (see Diener and Larsen 1984), life evaluation judgments are relatively stable across short time intervals in most survey settings. However, the stabilities decrease over time and are relatively low over long periods, suggesting the impact of changing life circumstances. Importantly, the scores are found to change when life conditions change, and this evidence is reviewed later under "Sensitivity."

2 Validity of Life Satisfaction Judgments

The scales are relatively stable, but are they valid? Do they reflect thoughtful and reasonable evaluations people make of their lives? During the past 30 years the World Values Surveys have asked more than 400,000 people how happy they are. Across scores of countries, 98 % of the people answered the question. This is an exceptionally high response rate, which suggests that people understand the subjective well-being questions and can readily answer them.

2.1 Convergence with Nonself-Report Measures

Evidence for scale validity can be found in the fact that life satisfaction self-report scores correlate with other types of measures of well-being that are not based on reports by the

respondents. For example, when reports on the estimated life satisfaction of target participants are collected from family and friends, they show moderate correlations with the targets' self-reports (Sandvik et al. 1993; Pavot and Diener 1993b; Pavot et al. 1991; Steger et al. 2006). Schneider and Schimmack (2009) meta-analyzed forty-four studies and found a mean correlation of .42 between self-reports and informant reports of life satisfaction, which was higher than the comparable figure for moods and emotions. Greater numbers of informants and more satisfaction items raised agreement. Similarly, Zou, Schimmack, and Gere (2012) found that life satisfaction scores converged more with self-reports of the target respondent when more informants were used.

Life satisfaction scores correlate significantly with physiological variables that are thought to track positive moods (e.g., Urry et al. 2004; Steptoe et al. 2005). Life satisfaction judgments also converge with the number of good versus bad life events that people can recall in timed periods (Pavot et al. 1991), and with mood reports that are aggregated over 6 weeks (Sandvik et al. 1993). Seder and Oishi (in press) found that life satisfaction reported in the final year of college correlated significantly with genuine smiles shown on students' *Facebook* pages during their first year in college. Self-reports of life satisfaction also converge with ratings made by trained raters after interviewing respondents (Diener et al. 1985; Pavot and Diener 1993b; Sandvik et al. 1993). The U-shaped pattern of life satisfaction across the adult lifespan that is found in many highly industrialized nations is mirrored by the use of antidepressant medications, which peaks in the late 40's (Blanchflower and Oswald 2012).

2.2 Known-Group and Societal Differences

Another type of validity evidence for the life satisfaction scales is the difference between groups of individuals who appear to have fortunate versus unfortunate life circumstances. For instance, mental inpatients (Frisch et al. 1992), prisoners (Joy 1990), clients entering psychotherapy (Pavot and Diener 1993b), the homeless (Biswas-Diener and Diener 2006), those suffering PTSD after brain injury (Bryant et al. 2001), and street prostitutes (Baker et al. 2004) score extremely low on life satisfaction, whereas wealthy people score higher than nationally representative samples (Diener et al. 1985). It is noteworthy that not a single one of the sex workers surveyed by Baker et al. scored above the neutral point on life satisfaction; that is, all were dissatisfied with their lives.

National mean levels of life satisfaction provide strong evidence for the validity of the scales in reflecting quality of life differences in societies. For instance, the average life satisfaction in nations correlates with civil and political rights (Diener et al. 1995), political freedom (Veenhoven 2005), and lower levels of corruption (Oishi 2012; Oishi and Roth 2009). Life evaluations in nations also correlate strongly with the Gross Domestic Product per capita (Diener et al. 2010a) and average societal household income (Diener et al. 2012).

Figure 2 shows the association across nations between the GDP of nations and the average life evaluations in them. The correlation of .83 indicates that societal income strongly influences average life satisfaction. Inglehart (1990) found that the happiness in societies is also strongly related to democratic governance (see also Frey and Stutzer 2000; Inglehart and Klingemann 2000). Data from the World Values Surveys reveals that, across the more than 90 societies surveyed in these studies, life satisfaction shows substantial and significant correlations with corruption ($r = -.66$) and with bureaucratic quality ($r = .68$).

Figure 3 shows the association of good versus bad societal conditions and life evaluations across the nations of the world. The figure reveals that the sum of bad conditions affecting nations (e.g., people going hungry and being assaulted) strongly predicts the

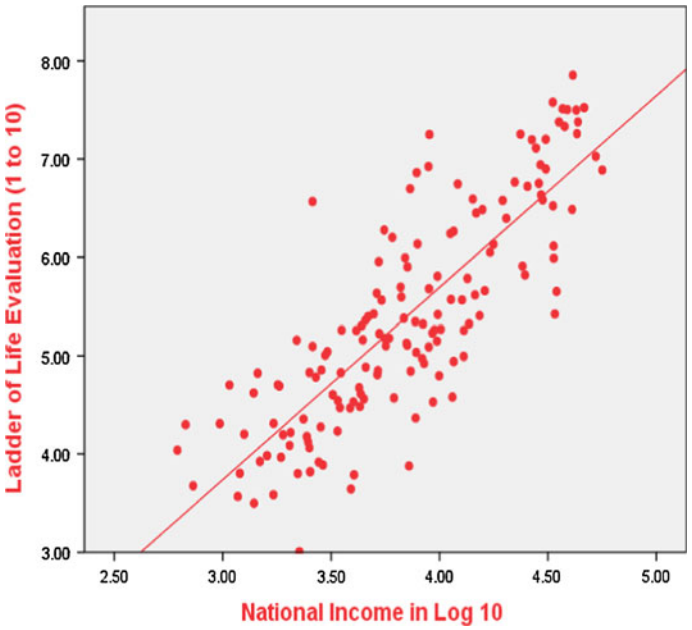


Fig. 2 Household income and life satisfaction in nations

average life satisfaction in them. The correlation indicates that over half of the variance in life satisfaction between nations can be accounted for by the conditions in them. This is confirmed in a study by The Economist Intelligence Unit (2004) where it was found that societal circumstances (e.g., health, political freedom and stability, and material well-being) taken together predicted over 80 % of the variability of nations in life satisfaction ($r = .92$). Within a single culture Lawless and Lucas (2011) found that the average life satisfaction in counties of the USA were predictable from income, population density, health, and education. Similarly, Oswald and Wu (2010) found a substantial correlation between quality of life factors, such as amount of sunshine, across states of the United States and life satisfaction.

Figure 4 presents the distribution of life evaluation scores in Togo and in Denmark, the least and most satisfied nations in the Gallup World Poll. As can be seen, the distributions are virtually nonoverlapping. Thus, when many bad conditions or many good conditions are aggregated together, they have a pronounced cumulative effect on life evaluations. It can be concluded that life satisfaction relates in strong and predictable ways to life circumstances at the societal level. It also can provide weights for how various conditions affect people.

2.3 Heritability

Heritability studies of life satisfaction also support the validity of the scales. For example, Lykken and Tellegen (1996) reported that the scores of monozygotic ("identical") twins reared apart were moderately correlated (intraclass $r = .52$). Other studies have sometimes found lower correlations, but the correlations between identical twins are always positive and usually statistically significant (e.g., Stubbe et al. 2005; Roysamb et al. 2002). Oishi

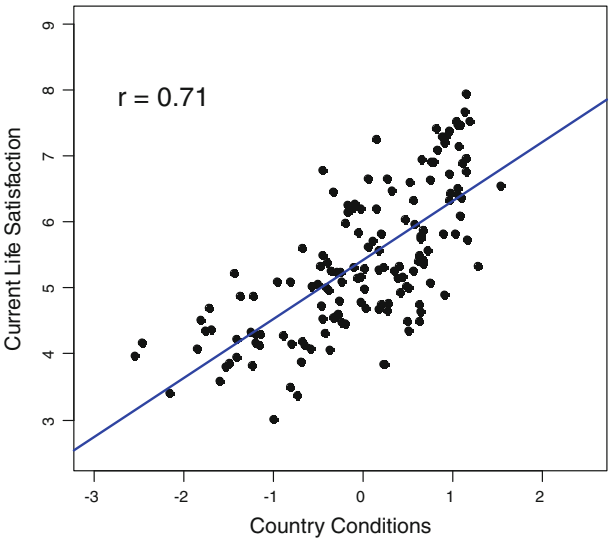
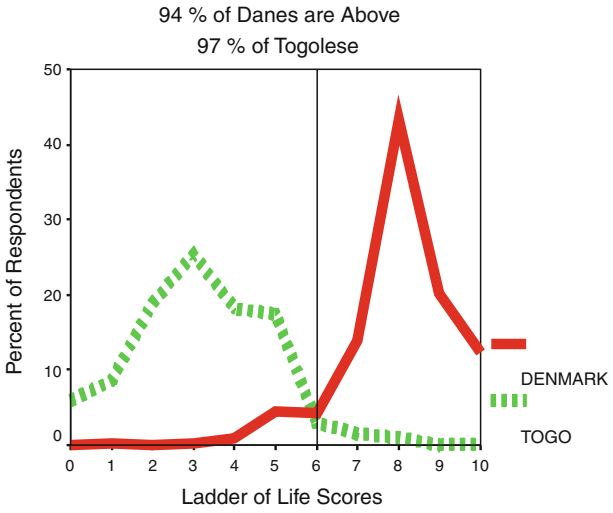


Fig. 3 Circumstances in nations and life satisfaction. Low country conditions include low life expectancy, not enough money for food and for shelter, not feeling safe, property stolen, and having been assaulted

Fig. 4 Life satisfaction in the least and most satisfied nations



(2012) reviewed the studies and concluded that heritabilities for life satisfaction are in the .30 to .50 range. DeNeve (2011) found that variations in life satisfaction are associated with different alleles in the serotonin transporter gene. Thus, to some degree life satisfaction is systematically related to inherited differences.

2.4 Predictions of Future Outcomes

Life satisfaction predicts relevant future behavior. For example, Chang and Sanna (2001) found that life satisfaction predicted suicidal ideation, $r = .44$. Low scores on life

satisfaction predicted suicide 20 years later in a large epidemiological sample from Finland (Koivumaa-Honkanen et al. 2001), controlling for other risk factors such as age, gender, and substance use. Moum (1996) also found that reports of subjective well-being predicted later suicide. Low levels of average national life satisfaction are related to higher suicide (DiTella et al. 1997; Helliwell 2007).

Life satisfaction scores predict health and longevity (Diener and Chan 2011). Wiest et al. (2011) found in a longitudinal study that life satisfaction and positive feelings both predicted mortality for older adults controlling for the other SWB variable, whereas negative feelings did not predict mortality. Shirom et al. (2011) found that even after controlling for SES, depressive symptoms, and known physiological and behavioral precursors, people low in life satisfaction were later more likely to have diabetes.

Luhmann et al. (2012) found that those high in life satisfaction were more likely during the next 5 years both to get married and become parents, and were less likely to become separated, relocate, or lose their job. These effects persisted controlling for personality and socioeconomic status, and replicated across three large nationally representative samples in three different nations. Using a multi-domain measure of life satisfaction, Frisch et al. (2005) found that life satisfaction predicted college retention, even after controlling for initial grade point average.

2.5 Amount of Reliable Variance

How much of the variance of life satisfaction scales is due to valid long-term factors, and how much is situational and due to temporary moods and other factors that are irrelevant? Using a latent-state, latent-trait analysis of repeated measures of mood and life satisfaction over time, Eid and Diener (2004) estimated that 74 % of the variance in life satisfaction is due to chronically accessible information, 16 % to temporarily accessible information, and 10 % to random error. The comparable figures found by Schimmack and Oishi (2005) based on their meta-analysis of reliability studies were 80, 10, and 10 %. Lucas and Donnellan (2007) found that in a long-term panel study that about 36 % of variance was due to stable trait differences and about 31 % additional variance was due to a moderately stable autoregressive component that changed slowly over years. The remainder of the variance would be due to random error and occasion-specific variance. Thus, it appears that about 60–80 % of the variability in repeatedly assessed life satisfaction scales is associated with long-term factors, some of which such as personality are quite stable and some of which change slowly over the years. The remaining 20–40 % of the variance is due to occasion-specific factors and error of measurement. For single administrations of the measures, about one-third of the variance is valid. As reviewed later, there are ways to assess and control occasion-specific factors so that they do not add constant error to the measures.

2.6 Discriminant Validity

Discriminant validity (or divergent validity) refers to the idea that a measure should not correlate with measures of other concepts. In actual practice many concepts in the behavioral sciences do correlate with each other, and it makes conceptual sense that they do so. Thus, discriminant validity in practice means that a measure correlates with other measures of the same concept at high levels and with measures of other concepts at lower levels than this. Furthermore, a measure should show a somewhat different pattern of correlations with external variables, for example socioeconomic status, than do measures

of other concepts. There is evidence that life satisfaction shows good discriminant validity when compared to related concepts such as positive feelings and self-esteem.

Lucas et al. (1996) found, using multiple measures of each concept, as well as longitudinal assessment, that life satisfaction showed clear discriminant validity from related concepts such as positive affect, negative affect, optimism, and self-esteem. Life satisfaction also shows a different pattern of associations with external variables. Diener et al. (2010b), for instance, found that the income of nations correlates much more strongly with life satisfaction than with positive or negative affect. In contrast, life satisfaction correlates less strongly than positive affect with the meeting of psychological needs such as social support. Luhmann et al. (2012) found using a multitrait-multimethod approach that affective and cognitive forms of subjective well-being are overlapping but somewhat distinct. Thus, life satisfaction shows discriminant validity from other related concepts. However, although Zou, Schimmack, and Gere (2012) find that life satisfaction is distinct from emotional well-being, they find that the two overlap 80 % when assessed by multiple indicators.

2.7 Sensitivity of the Measures to Changing Conditions

The differences between groups and nations reviewed above are complemented by evidence from panel studies on how the scale scores respond to changing conditions within individuals and nations. Atkinson (1982) found lower test–retest reliabilities for satisfaction scores in those who reported significant life changes. Schimmack et al. (2002) found that life satisfaction changes more for those who perceive that important areas in their lives have changed. Beyond perceived change, Yap et al. (2011a, b) found that life satisfaction changed significantly more for those undergoing specific life events such as widowhood and childbirth than for those not experiencing such events. Changing income can in some cases influence life evaluations (Diener et al. 2010a, 2011; Di Tella et al. 2005; Inglehart 1997; Stevenson and Wolfers 2008; Hagerty and Veenhoven 2003). Michalos and Kahlke (2010) found that the Satisfaction with Life Scale moved in the direction of the valence of life changes in the majority of samples and waves they examined.

Pavot and Diener (1993b) reported evidence showing that people who are in therapy increase in life satisfaction during the course of treatment (see also Rodrigue et al. 2005; Scogin et al. 2007). Vitaliano et al. (1991) found that the life satisfaction of spousal caregivers declined as the dementia of their partner grew worse over about an 18 month period. Clark et al. (2008) found that life satisfaction scores changed for people undergoing a number of events, from unemployment to widowhood. This was confirmed by a recent meta-analysis of longitudinal studies of life events and subjective well-being (Luhmann et al. 2012). Rodrigue et al. (2006) found "contagion" in life satisfaction, with scores of a caregiver increasing when the patient received a quality of life intervention.

Lucas and Donnellan (2007) analyzed the life satisfaction of people over time in large data sets from Germany (SOEP), the United Kingdom (BHPS), and Australia (HILDA; see also Lucas 2007; Lucas and Clark 2006; Lucas et al. 2003, 2004). Figures 5, 6, 7, 8 and 9 present changes in life satisfaction scores over time in response to changes in marital status (widowhood, divorce, and marriage), assault, disability, unemployment, and childbirth. As can be seen, people tend to react as expected to these conditions with increases or decreases in their life satisfaction, although they often slowly adapt back toward their former levels over time. For some conditions such as marriage adaptation was complete, whereas for other conditions such as unemployment and severe disability people did not

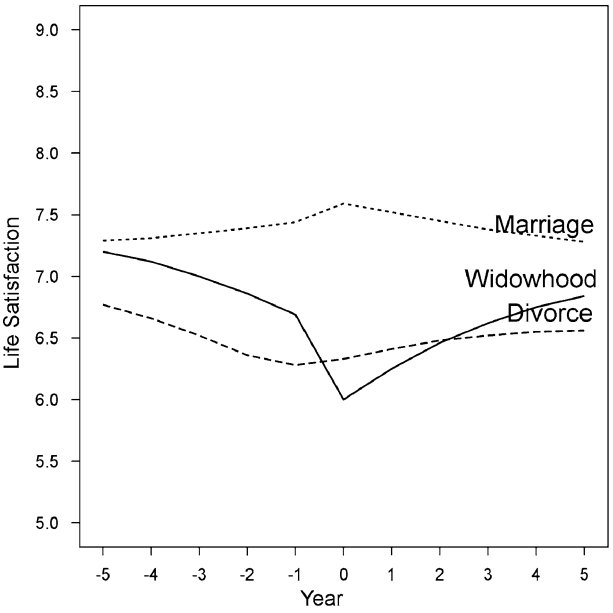


Fig. 5 Adaptation to changes in marital status

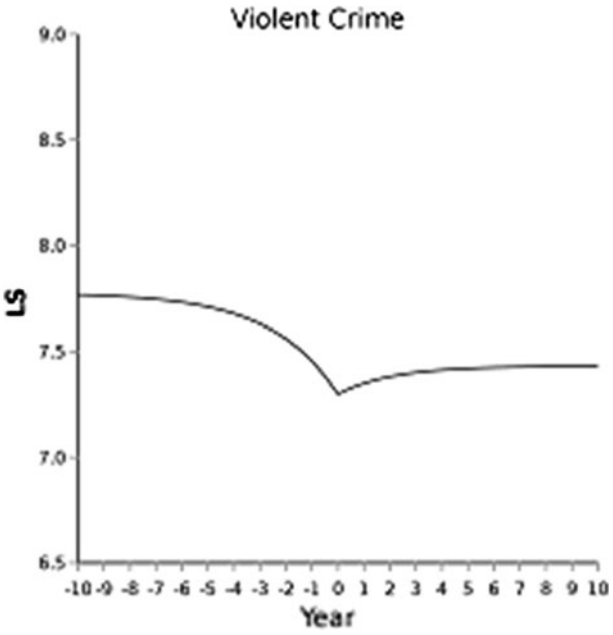


Fig. 6 Adaptation to victimization by violent crime

fully adapt even after many years. These patterns of life satisfaction scores show the sensitivity of the measures to change, as well as indicating the validity of the scales to mirror important life changes that would be expected to affect people's well-being.

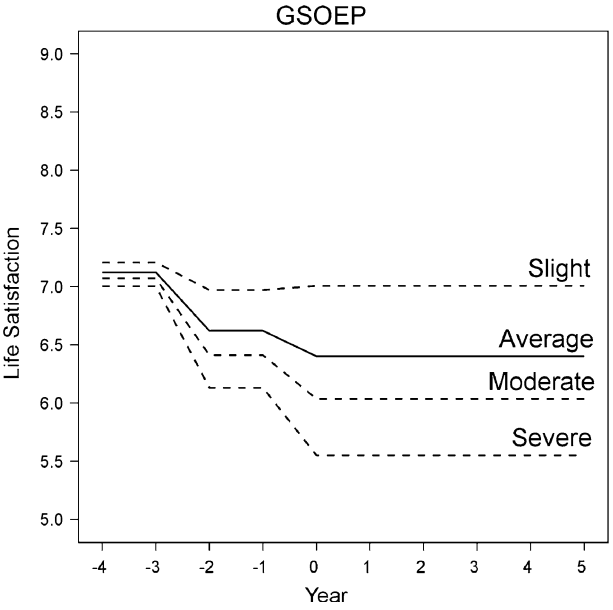


Fig. 7 Adaptation to varying levels of physical disability

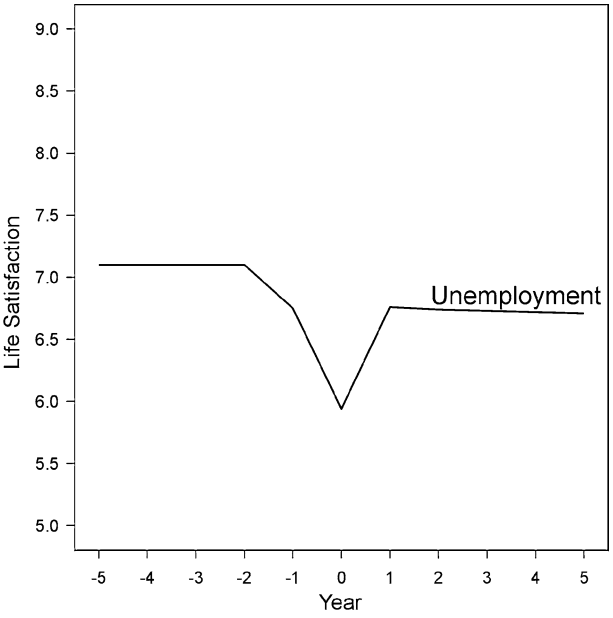


Fig. 8 Adaptation to unemployment

In sum, there is considerable evidence showing that life satisfaction scales reliably and validly reflect authentic differences in the ways people evaluate their lives, and the scores move in expected ways to changes in people's circumstances.

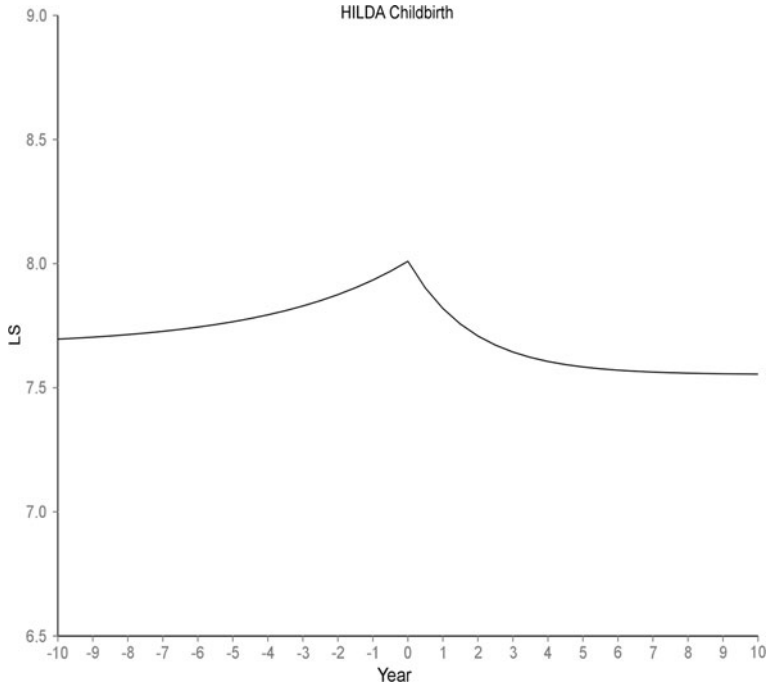


Fig. 9 Adaptation of parents to having a child

2.8 Conclusions on Reliability and Validity

The validity and reliability studies on life satisfaction indicate that the scales tap much more than random fluctuations or responses that are dependent only on immediate situational factors or mercurial attentional influences. The self-report scales correlate with each other and with other types of measures of well-being that do not depend on reports by the respondents. The scales also correlate with life circumstances and changes in those circumstances that should influence life evaluations.

3 Psychological Factors Affecting Life Satisfaction Judgments

The following factors are crucial to understanding life satisfaction judgments: (1) Attention and availability, (2). Values and the relevance of the information, (3) Judgment standards, and (4) Top down biases. In combination these variables explain much about the process and outcomes of life satisfaction judgments.

3.1 Attention and Availability

What information people attend to when responding to surveys can strongly affect life satisfaction judgments. The information attended to at the time of the survey response—whether it is chronically accessible or situationally primed—can have a substantial influence on reported life satisfaction. However, attention to specific information may not

completely determine judgments because respondents might be influenced by unconscious factors or simply recall previous life satisfaction judgments.

Life satisfaction scales capture chronically accessible information, which is information that readily comes to mind when people think of their lives. Chronically accessible domains tend to be facets of people's lives that they think are important and relevant to evaluations of their life, and are areas for which they often have a ready appraisal, such as marriage, health, and work. Zou, Schimmack, and Gere (2012) found that in typical testing situations that global life evaluations correlate highly with the average ratings of satisfaction with multiple domains of life. Furthermore, the two types of measures showed similar validity, suggesting that a focusing illusion was not significantly altering the global life satisfaction scores. Temporary information such as that made more accessible by preceding questions can also influence life satisfaction judgments if the person views them as relevant to the judgment.

Luhmann et al. (2012) found that people used broad life circumstances rather than specific events and activities when making life evaluations. Schimmack et al. (2002) found that college students frequently and consistently used information about their family, relationships with friends, romantic life, and academic success to assess their lives, and less frequently used information about their health and finances. When individuals placed greater importance on a domain there was greater change in life satisfaction in the same direction when this area changed over time.

Information can be "primed," or made salient, by situational factors occurring before or during the time the life satisfaction question is posed. For instance, Oishi, Schimmack, and Colcombe (2003) systematically primed "excitement" and "peace" and found that the prime shifted the basis of life satisfaction judgments. They also found that participants used "excitement" as a basis of life satisfaction judgment more on weekends than on weekdays.

Suh et al. (2008) also found that priming can change what influences life satisfaction judgments. Although those in a collectivist culture compared to those in an individualistic culture tended naturally to use social relationships more than emotional information in judging their life satisfaction, they could be made to look like individualists through priming information about why they were unique. Conversely, individualists could be made to give greater weight to their relationships when their commonality with family and friends was primed.

Situational priming can not only make certain life domains more salient, but also can make certain judgment standards more accessible. Dermer et al. (1979) found that respondents rated their lives as better or worse depending on whether they had previously read a very favorable or very unfavorable description of life in the past. Similarly, Strack et al. (1990) found that placing a handicapped person within the visual field of respondents led them to report higher life satisfaction, presumably because they compared their own situation to that of the person in the wheelchair.

Between the chronic very long-term effects that persist over many years (such as income levels and personality) and the short-term situational effects such as priming, life satisfaction can be influenced by medium-term factors that may continue for months or a few years. Luhmann et al. (2012) finding that life satisfaction predicts events more strongly in the immediately ensuing years than years later points to the likelihood that life dissatisfaction is due to dissatisfaction with specific aspects of life such as job or living location that are not fixed. Furthermore, it appears that the dissatisfaction can motivate people to change factors such as marital status, living location, and job. Thus, immediate situational factors, very long-term factors, and medium-range circumstances can all influence levels of life satisfaction.

One way that attention can be drawn to certain information is by previous questions in the survey. In a well-known study of item-order effects Strack, Martin, and Schwarz (1988) found that life satisfaction showed a much stronger association with dating satisfaction when it was asked second, and a smaller correlation when the dating question came second. Pavot and Diener (1993a) were able to replicate this effect, but it was nonsignificant and in the opposite direction when a multi-item life satisfaction scale was used rather than a single-item scale. The effect was also reversed when subjects had previously conducted a systematic memory search of the most important areas of their lives.

Schimmack and Oishi (2005) failed to replicate the item-order effect in five studies. In a meta-analysis of 16 studies they found small item-order effects ($d = .18$). In only three of 16 studies they reviewed was the item-order effect significant. Although the overall meta-analytic effect was significant, the authors concluded that it is often unimportant in actual survey settings because chronically accessible information is not raised in importance by priming because it is already highly accessible, and other information is often ignored because it is seen as not relevant.

Deaton (2011) reported an item-order effect in the Gallup Healthways Well-being Index, an ongoing daily telephone poll of the USA (see also Agrawal and Harter 2011). In this study political questions sometimes came before the life evaluation question. People's life evaluation scores were lower when they followed the political questions. Interspersing a buffer or transition question between the political questions and life evaluation largely eliminated the item-order effect. The transition question was, "Now thinking about your personal life, are you satisfied with your personal life today?" That this insertion could virtually eliminate the item-order effect that it might have been due to the way questions were interpreted rather than to the priming of certain information. The political questions at the beginning of the interview may have induced respondents to think the survey was about people's lives embedded in the context of societal and political affairs.

The fact that item order effects are often small and appear to be eliminated with a single buffer item, as well as when multi-item scales of life satisfaction are used, suggests that these effects, when they do occur, might be due to altering respondents' interpretation of the questions. Schwarz and Strack (1999) suggest a "Gricean" communication model to understand such effects. Respondents use all the information in a survey, not just the initial instructions, to understand what is being asked of them. Thus, previous items can serve as a cue to the meaning of later questions, and influence answers to them.

Schimmack et al. (2002) found that people place greater importance on excitement when making life satisfaction judgments on the weekends than on weekdays, and thus situational factors can cause unwanted variability in life satisfaction judgments. Although attention to specific information can influence life satisfaction judgments, this does not mean that responses are serendipitous or unrelated to the important domains in a person's life. Indeed, the findings on the validity of the scales—such as longitudinal studies and differences between groups—indicate that the scales usually validly reflect circumstances that are quite relevant to quality of life. People's health, neighborhood, and quality of social relationships, for example, all influence life satisfaction. The research of Deaton (2011) also reveals that temporarily accessible information can in some cases influence life satisfaction. However, information primed by the situation often has little influence, perhaps because it is not seen as relevant.

It is a mistake to think of life satisfaction as a value frozen in people's minds. It is a judgment they construct in order to evaluate their life and consider changes, or in order to respond to a survey. The score can change to some degree depending on the exact question about life satisfaction and factors that are salient at the moment. At the same time it would

also be an error to think of life satisfaction as a mercurial judgment that depends only on chance factors at the moment; there is too much evidence showing that long-term factors affect life satisfaction judgments for this to be an accurate depiction. The challenge is to maximize in life satisfaction scores the influence of long-term factors that are of interest to researchers and policy makers, and to reduce the influence of short-term irrelevant factors.

3.2 Relevance and Values

In Schimmack et al. (2002) research, people did not seem to heavily weight conditions that they believed were unimportant to their life conditions. If people believe that their mood, sports team performance, and health are irrelevant to their life satisfaction, they give these factors little weight. If they believe their life is to be broadly considered, for example because of the preceding questions, respondents can include a set of factors in making their life satisfaction judgment, such as satisfaction with their society. There are many variables, however, that will be considered important by some and less important by others. Thus, in addition to attention and relevance that are stimulated by the current situation, there are individual and cultural differences in values that influence what information enters into life satisfaction judgments and is chronically accessible for life evaluation judgments.

Due to personality, cultural values, and other factors, people place different importance on various aspects of life, and this affects what is included in their life satisfaction judgments. For instance, high sensation-seekers weight amount of excitement in their lives more than low sensation-seekers when making life satisfaction judgments (Oishi et al. 2003). There are many instances in which people in different cultures weight different variables when making life satisfaction judgments, and these are often related to person-culture fit or congruence. For instance, Diener and Diener (1995) found that self-esteem is a much stronger correlate of life satisfaction in individualistic than in collectivist cultures. Fulmer et al. (2010) found that the difference in happiness between extraverts and introverts is amplified in extraverted societies. Suh and his colleagues found that people in individualistic societies seem to weight emotions more when making life satisfaction judgments (Suh et al. 1998). Suh (2002) discovered that personality consistency was more highly associated with life satisfaction in individualistic societies, where it is more highly valued. Diener, Tay, and Myers (2011) found that people in religious societies give greater weight to religiosity in making life satisfaction judgments, compared to people in less religious societies.

Oishi et al. (2007) found that Asians experienced fewer positive events, but weighted them more heavily in daily satisfaction judgments, compared to European Americans. Along the same lines, Kuppens et al. (2008) found that negative emotional experiences were weighted more heavily in life satisfaction judgments in individualistic nations compared to collectivist cultures. Positive emotional experiences showed a stronger association with life satisfaction in nations that stress self-expression rather than survival.

Inglehart and Welzel (2005, 2010) found clear evidence of shifts in the variables related to life satisfaction as societies develop. Their conclusions converge with those of Diener and Diener (1995), who found decreasing importance of financial satisfaction for life satisfaction in individualistic nations, and with Schimmack et al. (2002), who found greater effects of hedonic balance on life satisfaction in individualistic than collectivistic nations (see also Suh et al. 1998).

The theory of Evolutionary Modernization developed by Inglehart (1997) and his colleagues (Norris and Inglehart 2004; Inglehart and Welzel 2005) argues that people's values and life strategies change as they move from subsistence-level scarcity to high

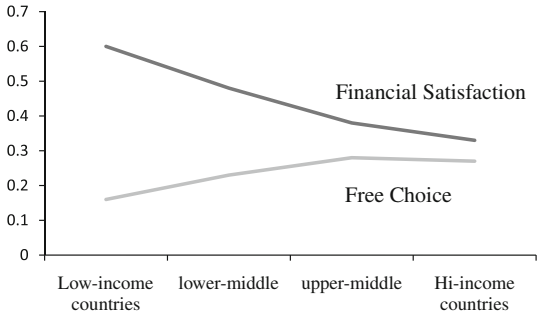


Fig. 10 Predictors of life satisfaction, by level of economic development (*vertical axis* shows unstandardized regression coefficients). Source is surveys carried out by the World Values Survey and European Values Study, 1995–2011. The respective numbers of cases for each level of economic development were: low-income countries, 28,418; lower-middle income countries, 90,814; upper-middle income countries, 42,956; high-income countries, 90,641

levels of economic and physical security. At low levels of development, sheer survival tends to be the dominant goal and happiness is closely linked with whether one has enough of life's basic necessities. As people attain higher levels of economic and physical security they attach greater importance to having free choice in how to live their lives. For women this manifests itself in increasing emphasis on gender equality, for members of minority groups and gays it focuses on emancipation from discrimination, and in the political realm greater importance is placed on democratization.

We tested the hypothesis that economic development changes the way in which people attain subjective well-being, using data from hundreds of surveys carried out from 1995 to 2011 by the World Values Survey and European Values Study groups. The data are shown in Fig. 10, presenting the relation of life satisfaction and both financial satisfaction and free choice as a function of national economic development.

Separate regression analyses were conducted using each respondent's overall life satisfaction as the dependent variable, and their level of financial satisfaction and sense of having free choice in their lives as independent variables, among respondents in 85 countries classified by the World Bank (2005) as low-income, lower-middle income, upper-middle income, and high-income. The results indicated that, among people living in low-income countries, financial satisfaction had a much more powerful impact on life satisfaction than did a sense of free choice (the respective regression coefficients being .60 and .16). But financial satisfaction became progressively less important as one moved from low-income countries to high-income countries—while having a sense of free choice over one's life became more important, so that among the publics of high-income countries free choice was almost as important as financial satisfaction in shaping people's overall life satisfaction.

Why is subjective well-being shaped by different factors in high-income societies versus low-income societies? It reflects a value change. When a society attains sufficiently high levels of economic development so that people grow up taking survival for granted, a shift in values occurs in which an emphasis on survival gives way to a growing emphasis on self-expression or emancipative values.

Taking survival for granted leads people to place a greater value on being free in terms of how to live their lives. This implies that with the shift from Survival Values to Emancipative Values financial satisfaction becomes a less important determinant of one's

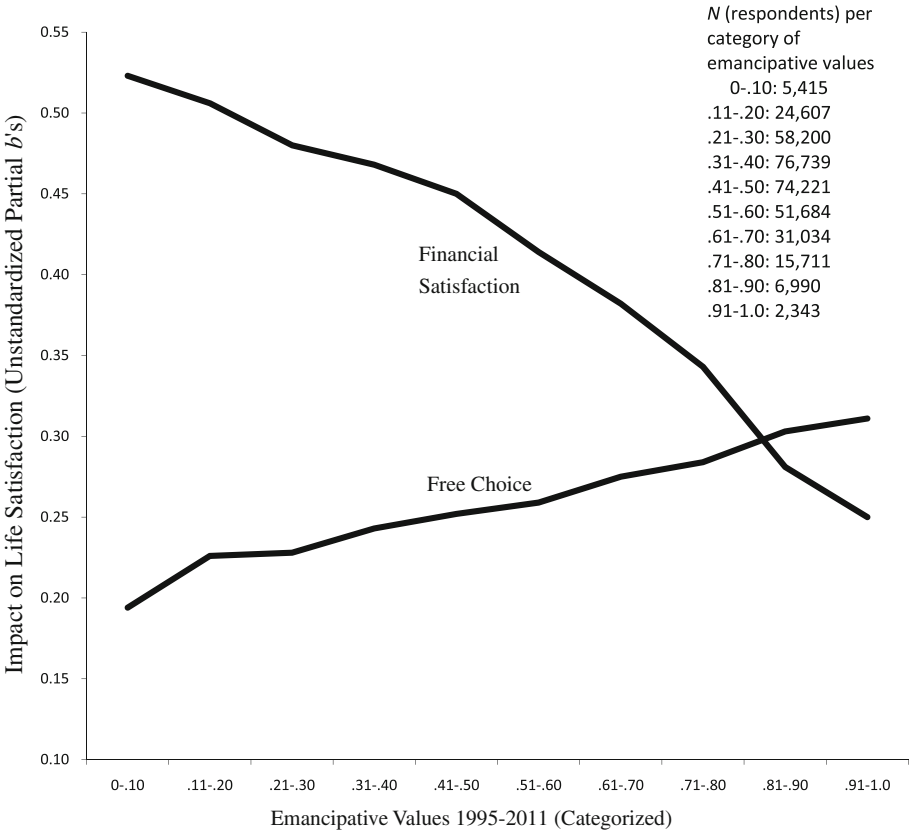


Fig. 11 The shift from survival to emancipative values and changing determinants of life satisfaction. Emancipative values are defined by valuing gender equality, freedom and democracy, independence and imagination more than obedience in childrearing, unimportance of religion, and acceptance of personal freedoms such as divorce and homosexuality. A low score on emancipative values represents importance being placed on survival values. Number of respondents per category of emancipative values: 0 to .10, 5,415; .11 to .20, 24,607; .21 to .30, 58,200; .31 to .40, 76,739; .41 to .50, 74,221; .51 to .60, 51,684; .61 to .70, 31,034; .71 to .80, 15,711; .81 to .90, 6,990, and .91 to 1.00, 2,343

overall life satisfaction and free choice becomes more important. Figure 11 shows this shift in more than 80 countries. Hundreds of thousands of respondents were assigned scores on the Survival/Emancipative values dimension, and were then grouped into ten categories according to these scores. Welzel (2013) provides a detailed description of how these values are scored.

As Fig. 11 reveals, the shift from Survival values to Emancipative Values is closely linked with a change in what shapes subjective well-being. Among those who emphasize Survival Values most strongly the individual's level of financial satisfaction is the dominant influence on SWB, completely overshadowing the impact of a sense of Free choice. But as we move across the graph toward increasing emphasis on Emancipative values the relative importance of Free Choice rises. Among the two groups that emphasize Emancipative values most strongly, Free Choice is a stronger predictor of Life Satisfaction than is Financial Satisfaction. This interpretation is reinforced by the fact that although both Free Choice and Financial Satisfaction predicted life satisfaction across nations, they also

both interacted significantly with Emancipative Values in predicting it. Because different variables predict life satisfaction in different cultures and for different individuals, one cannot gain a complete picture of quality of life by measuring objective factors alone.

3.3 Standards

People use judgment standards when making even simple judgments such as of weight, brightness, or pain. It is unsurprising then that life satisfaction depends on comparing aspects of life to standards, which may depend on social comparison, aspirations and goals, one's past circumstances, and one's needs. For instance, Graham (2009) reported that people with rising incomes may nonetheless be dissatisfied if their aspirations outstrip reality. It appears that people are now using a world standard based on lifestyles in the richest nations in evaluating their own income (see also Becchetti et al. 2011; Diener et al. 2012). Thus, social comparison at a distance—facilitated by television—influences people's satisfaction with their standard of living. An important issue is the extent to which universal human attributes and needs provide standards for judgments.

Various standards for evaluation and have been proposed, and are summarized in the Multiple Discrepancies Theory of Michalos (1985). In addition to these moveable standards, Hsee & Zhang (2010) proposed that there are some inherently valuable goods, which little or no comparison to standards because they are based on human universal needs and values. Therefore, inherent human needs and desires might also serve as standards, and provide more universal anchors for judgments. For instance, Tay and Diener (2011) found that basic need fulfillment accounted for substantial portions of variability in life satisfaction scores across the world.

3.4 Top-Down Effects: Biases Are Not Always Mistakes

Mistakes in thinking depend on cognitive processes that depart from reality and are often harmful to adaptation and successful living. Biases are cognitive processes that depart from reality in some way, but in some instances can be helpful to adaptive functioning. For example, if a person estimates the danger of attack when walking down a certain dark alley is 1 in 3, but in fact it is 1 in 10, this represents a bias. However, if the costs of avoiding the alley are low, the error might be a bias that is in fact adaptive and beneficial. It might be helpful to somewhat overestimate the danger involved in situations that can be readily avoided.

Global reports of subjective well-being are often seen as biased when compared to on-line reports of experience. However, these biases are not necessarily maladaptive, and in some cases lead to better outcomes for the individual. For instance, dating couples who overestimate their hedonic well-being with their partner in comparison to their average moods recorded on-line when with their partner were more likely to still be dating 6 months later (Oishi and Sullivan 2006). Perhaps the belief that you are happy with your partner is helpful in maintaining the relationships, and reflects a more positive view of the partner. Similarly, people can be misled into misremembering a colonoscopy as being less unpleasant, despite it actually entailing more pain, with the result that the person is more likely to get another colonoscopy in the future (Redelmeier et al. 2003). Because colonoscopies, especially for older persons, are important in preventing a serious form of cancer, having future colonoscopies was beneficial. In this instance misremembering the on-line experience is adaptive.

Wirtz et al. (2003) found that people's memory of their vacation was a better predictor than on-line recorded experience in predicting the desire to take a future vacation to the same location. It might be that this bias helps people to take vacations to places where the overall

appraisal is good, and where future memories will be more positive, rather than overweight small bad experiences encountered. A parallel to the cinema can be drawn. The best movies often are not those in which each moment is exciting, but rather where the pacing and narrative vary. The overall impact of the movie is not simply the sum of momentary parts, but includes the entire narrative and character development. In the same way, the best vacations or episodes in life are not invariably those where each moment is exciting.

In 1984 Diener described influences on subjective well-being as being either "bottom-up" or "top-down." For example, Brief et al. (1993) found both top-down and bottom-up influences when people evaluate their health. There are now known to be substantial top-down influences on life satisfaction—effects that emanate from the individual's personality and outlook rather than from life circumstances. Many top-down effects might be labeled biases. For instance, Diener et al. (2000) found that people with higher life satisfaction showed a greater discrepancy between satisfaction with broad and vague categories (e.g., one's education) versus concrete and specific categories (e.g., textbooks). Oishi and Diener (2001) replicated this finding, and found that those in high life satisfaction rated only broad categories as more satisfying, not more specific and concrete categories (where the constraints of reality are greater). Diener et al. (2002) found that when people report life satisfaction, less satisfied people give more weight to the worst area in their lives, and more satisfied give greater weight to the best area in their lives.

Life satisfaction derives both from a person's general outlook on life, including cultural orientations, and from life circumstances. We need much more research on which types of biases might be detrimental versus beneficial in various types of life circumstances. However, it is not clear that these biases are inevitably detrimental, and there is some evidence to suggest that they can be salutary at times.

4 Scale Response Issues

4.1 Social Desirability

Social desirability refers to the tendency of respondents in surveys to give responses that are socially approved. One method for testing for social desirability is to administer the survey face-to-face to some respondents and anonymously to others, based on the assumption that people are more likely to respond in a desirable manner when interacting directly with another person. People sometimes report greater SWB when interviewed in a face-to-face survey rather than in an anonymous interview (King and Buchwald 1982; Smith 1979; Sudman et al. 1967).

Schwarz et al. (1991) review the literature related to modes of administration of surveys and conclude that face-to-face compared to self-administered surveys can induce people to answer in a more socially desirable way. Whether social desirability influences respondents' life satisfaction responses probably depends on the norms in that sample about life satisfaction, the status of the interviewer, and other situational factors.

Because of social desirability concerns it is desirable that all respondents in a survey be interviewed using the same method. If not, an analysis can be conducted for mode of administration. Also, the mode of administration can be experimentally manipulated so that social desirability in responding can be assessed.

4.2 Number Use

Respondents usually report their life satisfaction on a numerical scale, and questions have been raised about the reliability of these numbers. One concern is whether the scale

intervals are truly equal-interval in nature, as is assumed by many common statistical tests. However, Ferrer-i-Carbonell and Frijters (2004) and Frey and Stutzer (2000) found that treating data as cardinal (equal-interval) or ordinal made little difference in estimating the determinants of subjective well-being.

Another issue is that different groups of respondents might use the number scale differently. There are examples where number-use appears to have created differences in life satisfaction between cultural groups. For instance, Vitterso et al. (2005) found that Greenlanders and Norwegians were about equally satisfied with their lives, although the former were much poorer. However, when item-response-theory corrections were applied to the data in order to correct for differences in scale use, the Greenlanders were significantly less satisfied. A similar correction applied by Oishi (2006) in a comparison of Chinese and American respondents did not lead to different conclusions.

Finally, some respondents may use simple responding such as choosing either extremes or the midpoint of the scale. For instance, people who are quite satisfied might say they are a "10" on the scale rather than differentiating between "8," "9," or "10." The reliability of the life satisfaction scores seems to increase in panels over time in early waves as the scales are answered at successive periods (Schimmack et al. 2010), suggesting that respondents became more sophisticated in scale use over time.

Differential number use between respondents may produce effects that can influence conclusions. A simple approach is to categorize all responses as either positive, neutral, or negative (thereby avoiding the issue of whether some people use extreme responding more) and analyze whether this makes a difference to the conclusions (e.g., Oishi 2010). More sophisticated statistical methods such as mixture item-response models are now available for analyzing whether groups or individuals use the scale numbers differently (Eid 2008; Eid and Zuckar 2007; Tay et al. 2011), and correcting for this. In sum, number use can be a concern, but often seems to produce small differences, and there are ways to analyze and correct for it.

This review suggests that the life satisfaction measures contain a substantial amount of valid variance, but there are instances where measurement error contaminated scores to some extent. However, we understand how to control many errors of measurement in life satisfaction research, for example by using consistent framing of the life satisfaction question, using a consistent item order and preferably placing the life satisfaction questions at the beginning of the survey, and employing a consistent mode of presentation of the survey.

Whether error of measurement is an influence in a particular survey must be answered on a case-by-case basis. However, using consistent methods throughout the entire survey for all respondents who are to be compared with each other will substantially help in reducing measurement error. Also, the impact of measurement error can be assessed by systematically varying aspects of the survey (e.g., see Agrawal and Harter 2011; Deaton 2011), as well as by assessing factors such as current mood that might influence the scores. Sophisticated statistical approaches such as structural equation modeling can also help evaluate and control measurement error.

4.3 Current Mood Influences

A shortcut for answering well-being questions might be to use one's current mood. Schwarz et al. (1987) found that the outcome of German soccer game influenced people's life satisfaction after the game, and also that people completing the life satisfaction survey in a

pleasant room scored higher than those who completed it in an unpleasant setting, suggesting that people may use their mood as information in judging their life satisfaction.

In a highly-cited study Schwarz and Clore (1983) found that weather influences on mood affected people's life satisfaction judgments. However, the sample size of the critical cell was only 14 and weather effects on mood often are tiny or nonexistent (Denissen et al. 2008; Watson 2000). In a large-scale study of over 1.5 million people over 5 years, Lucas and Lawless (2011) found only very small weather effects on life satisfaction. Rain, temperature, and other meteorological parameters generally did not influence evaluations of life. Thus, it may be that only in unusual circumstances does weather influence life satisfaction.

What of the concern that life satisfaction is strongly affected by a person's moods? It is important to note that the overlap of mood and life satisfaction is substantial for long-term average moods of the person, but usually there is a relatively weak effect for current mood predicting life satisfaction beyond the influence of long-term mood. Pavot and Diener (1993a) found that current moods added little to the prediction of life satisfaction after the person's long-term mood was controlled. Eid and Diener (2004) found that on two occasions occasion-specific mood and life satisfaction were associated at trivial levels, but on one occasion they were significantly associated. However, long-term average mood and life satisfaction were strongly associated (.74), suggesting that similar factors influence both. Thus, although long-term mood and life satisfaction have some of the same antecedents and are substantially associated, short-term moods influence life satisfaction beyond long-term moods only under specific conditions, and current mood effects on life satisfaction are often not found.

A critical issue is whether or not current mood should be irrelevant to life satisfaction. Schimmack et al. (2002) found that some respondents report using their current mood, and see it as relevant. Current mood and life satisfaction were more associated for these participants than for those who reported not using it. Robinson (2000) found that mood provides a hedonic summary of recent life experiences as well as a prospective index that informs the individual about progress in important life domains. Thus, individuals may access their moods in addition to important life domains when making life satisfaction judgments. Thus, it might make sense to individuals to include their moods in satisfaction judgments. The goal for survey researchers is to avoid collecting life satisfaction scores in such a way that momentary mood could change average scores across respondents, such as after an important media-worthy event that might influence the whole society, but instead should collect mood on average days over time so that moods will at most add random error. In those instances where a large number of people in a nation are influenced by the same event—such as a national tragedy—will current mood influence scores in a non-random way that could affect the conclusions drawn from the survey. Thus, researchers should be aware of society-wide influences that could influence life satisfaction scores, but that are irrelevant to the policy questions under consideration.

4.4 Cultural Differences in Life Satisfaction

It is known that there are cultural differences in life satisfaction that remain after controlling for objective conditions such as income (e.g., Diener 2009). For instance, Latin American societies score higher and Asian Confucian cultures lower on life satisfaction than would be expected based on income. To parse these differences into artifactual response tendencies that are unrelated to true life satisfaction versus real differences in life satisfaction is challenging, in part because the response tendencies in part reflect differences in how people feel and think about the world and themselves. Furthermore, cultural

differences may in some cases be relevant to policy and in some cases irrelevant. For example, people's satisfaction with leisure opportunities might be relevant to policy deliberations, regardless of the objective conditions. Conversely, policy makers might weight objective health importantly in policy deliberations, regardless of whether certain groups are satisfied with their health.

The cultural differences in life satisfaction across societies are often not relevant to policy deliberations, which typically involve deliberations about issues within nations and states. However, there also can be cultural differences within society due to ethnicity. Thus, scientists and policy makers need to be aware of possible ethnic differences when considering life satisfaction scores within heterogeneous societies.

4.5 Controlling Measurement Artifacts

Measurement artifacts are factors that introduce random or systematic error into the measures and produce variability in responding that is not relevant to life satisfaction per se. Standardizing the order of questions and asking life satisfaction questions early in the interview are helpful in avoiding spurious measurement effects. Clearly spelling out the nature of the life satisfaction question in terms of what is being asked may also be helpful. Some of the strongest cases of item-order effects appear to be those where the ordering of questions leads respondents to interpret the question about life satisfaction in a different way. Nonrandom current mood effects can be greatly reduced by insuring that the questions are asked over a period of time, and not just at a single time when some large-scale societal event could affect most people's moods.

A question in need of more research is how differing life satisfaction questions reflect somewhat different types of information. For instance, a satisfaction question asking about "these days" suggests that the question is about the very recent past rather than one's life as a whole. Which are more appropriate for policy purposes may depend in part on the type of policy being discussed, but thus far there has been little discussion or research of this issue. The findings on item-order and framing effects suggests that respondents might define their "life" narrowly in terms of personal domains such as marriage and work, or more broadly to include community and societal factors with which they interact. Again, more research on how life satisfaction framing influences scores, and which is more valuable for policy, are questions in need of more research.

4.6 Measurement Error and Science

Error of measurement occurs in all fields, including advanced sciences such as particle physics. For example, the characteristics of elementary particles such as their masses are based on averages across readings because of the error inherent in single measurements, and "standard uncertainty analysis" is applied to individual measurements (Shlyakhter et al. 1993). Similarly, measurements of important constants such as the speed of light and Avogadro's number fluctuate, although growing more precise over time (Hedges 1987). In fields ranging from physics to epidemiology to biochemistry to economics, measurement error is unavoidable. Thus, scientists must work consistently to reduce measurement error, and also must take such error into consideration in their conclusions. We cannot, however, automatically dismiss findings or fields because of measurement error because science would halt if we did so.

In the behavioral sciences there are two traditions. The first tradition emphasizes experimentation and change. In this tradition it is important to show what factors can be

manipulated to change life satisfaction judgments. The second tradition focuses on stability and validity. In this tradition researchers study how life satisfaction reflects long-term factors and changes slowly over time as these factors change. Both traditions are important, and are needed both for theoretical understanding and for accurate measurement. The experimental work on altering life satisfaction reports reveals some of the psychological processes involved in these judgments, as well as alerting us to factors that must be controlled to reduce the effects of extraneous influences. The correlational and long-term change approach reveals factors that influence the scales in the long-term, including chronic differences in what is included in life satisfaction judgments. The experimental approach focuses on instability and change, whereas the temporal correlational approach highlights stabilities and long-term influences.

If one measures physical parameters such as the boiling temperature of water, it must be done under similar conditions or adjustments must be made. Altitude and air pressure can alter the boiling point of water away from 100 °C, and changing the conditions under which life satisfaction scales are administered likewise can change scores on them. Thus, life satisfaction scales—as with all survey measures—must be administered in the same way if scores are to be compared.

5 Policy Use of the Scales

5.1 Societal Versus Personal Information

People's life satisfaction includes factors over which policy makers have little influence, such as personality or the quality of an individual's marriage. Do community and societal factors influence life satisfaction enough that measures of it can be used to inform policy? The differences between the lowest and highest nations in life satisfaction cover about half of the range of the scale. The effect size here is 2.16, meaning that the nations differ by over two standard deviations of total variability across the world. This indicates that society-wide conditions can have an enormous impact on life satisfaction. The difference between street sex workers and college students covers over a third of the range of the scales, suggesting that if the former group could be helped it could have very large improvements on their lives. Thus, the scales do not just reflect aspects of the personal quality of life of respondents.

5.2 Information Added Beyond Objective Indicators

What do life satisfaction scores add to current indicators? Some societal circumstances are known to affect life satisfaction but are not captured well by economic indicators. Environmental factors such as noise, commuting, green space, and air pollution have all been shown to be associated with levels of life satisfaction. For instance, Luechinger (2009) found in a quasi-experimental study that respondents' life satisfaction improved when smokestack pollution in their area decreased. Economic indicators often omit environmental factors, and therefore the life satisfaction data can aid in giving a more complete picture of economic development and the desirability of ecological interventions.

Life satisfaction scores also reflect the quality of people's social lives, not just income (Helliwell 2007). In the health area, life satisfaction scores can help estimate the burden of illnesses and quality adjusted life years (Dolan and White 2007). Further, they can help estimate caregiver burden and the resources that are reasonable to alleviate this. Thus, life

satisfaction scores of illness groups and their caregivers can help in the allocation of health and research resources. Although the willingness-to-pay method has often been used in the past to value nonmarket goods and services in the health, environmental, and other areas, the method has well-known drawbacks and life satisfaction scores represent a viable alternative for the valuation of quality of life variable.

Even if the life satisfaction scales were to overlap strongly or completely with other measures, there are good reasons to employ them. First, they show that certain conditions do indeed affect well-being. For instance, some economists might assume that unemployment is voluntary because people could find a job if they truly wanted to and were willing to accept any employment. Thus, it could be assumed that in the current situation unemployment maximizes people's utility compared to their other available choices. However, we find that unemployment often has a strong negative effect on people's life satisfaction. We also know that in terms of the tradeoff that is often seen between unemployment and inflation that unemployment is probably more deleterious to life satisfaction, in particular if it occurs repeatedly (Luhmann and Eid 2009). Thus, at the very least the life satisfaction scores add weight to the importance of measures designed to reduce unemployment.

Another reason to use life satisfaction scores is that they reveal the weights that people give to various circumstances and aspects of life. Although there are hundreds of social indicators, there are often tradeoffs between them. Life satisfaction scores can reveal which of the circumstances is more and less important in how people experience the quality of their lives.

The life satisfaction scores also can provide information to the public and to policy makers that might not be clear to them. For instance, long and difficult commuting appears to lead to lower life satisfaction (see Diener et al. 2009, for a review). People might think of commuting as an opportunity that allows them and their families to live in a more desirable location. What might not be self-evident to them is that commuting has a substantial social cost—less time with family and friends. Long commuting can increase the risk of divorce (Sandow 2011) and can lower life satisfaction, as well as increase stress and loneliness, but these effects might not be readily apparent to people as they think of the decision to move to the suburbs or take a job farther away from home because it pays more. Importantly, long commutes by public transportation might not be that much better in terms of life satisfaction. Thus, life satisfaction scores can serve an educational purpose.

The global scales of life satisfaction are not equally useful for all purposes. They might not provide much useful information on a day-to-day basis within a nation (Deaton 2011). Factors such as holidays might produce changes, but circumstances that affect most people's life satisfaction are unlikely to change on a day-to-day basis. The life satisfaction measures might be most useful in comparing scores of groups of individuals living in varying circumstances, and in comparing scores over longer periods of time when important conditions change significantly. Measures of satisfaction with specific domains of life are likely to yield additional useful information. Just as no single economic or other social indicator gives us complete information, the life satisfaction scales will not tell us everything we need to know. Other types of indicators and other types of subjective measures are needed as well.

In sum, the life satisfaction scores add information that other measures do not provide. They do not replace other indicators, but usefully supplement them.

5.3 Issues Regarding the Use of Life Satisfaction Scores in Policy Deliberations

A number of important topics deserve more research attention:

1. How can we best use and integrate information from different types of subjective well-being such as emotions versus life satisfaction?
2. What types of questions are most helpful for policy deliberations? Are domain-specific satisfaction measures helpful to policy discussions by supplementing the more general life satisfaction scores? What about satisfaction questions that explicitly use varying time frames or comparison standards? How can life satisfaction measures be designed to most reflect societal influences that are amenable to policy interventions? What other information is needed about respondents to make their life satisfaction responses meaningful to policy?
3. How does wording and context influence life satisfaction scores? Do cultural differences produce artifactual variation in scores? How large are cultural differences in scores after objective factors are taken into account?
4. What impact do adaptation, social comparison, and aspirations and other relative standards have on the policy relevance of the scale scores?
5. What are the causal effects in both directions between life satisfaction and societal circumstances? Does high life satisfaction have effects that produce a better society? What are the optimal levels of satisfaction in different circumstances?

6 Conclusions

Interest in using life satisfaction measures for policy has increased in recent years. The United Kingdom, for example, is collecting national life satisfaction statistics for possible policy use, and other nations such as Japan and Chile are considering such measures. Other nations such as Germany and Australia have ongoing large longitudinal panel studies ongoing in which life satisfaction is tracked over time. International agencies such as the Organization of Economic Cooperation and Development and the United Nations are examining the measures in order to make recommendations to nations about adopting the scales. The Center for Disease Control and Prevention in the USA is measuring life satisfaction in certain of its large health surveys. Thus, interest in assessing life satisfaction has become widespread, and the issue of using these measures for policy deliberations is a timely one.

Some argue that life satisfaction measures should be at the very heart of policy, but most advocates for the scales argue that they can supplement and complement other indicators such as economic ones, but not replace them. There is now a large literature pointing to the validity of life satisfaction measures and the fact that they contain substantial information about how respondents evaluate their lives. Although there are instances of artifacts that create error of measurement in life satisfaction scales, these can usually be controlled in well-conducted surveys.

Life satisfaction scores are influenced both by personal factors in people's lives such as their marriage and work, as well as by community and societal circumstances. Thus, life satisfaction can provide an added window on what is going well or badly in a society, as experienced by the citizens themselves. There are specific instances where life satisfaction measures can help illuminate current policy debates, but being able to tie the scores to factors that bear on policy is essential. Given their low cost and ease of administration it is desirable that societies adopt measures of life satisfaction to supplement current economic and social indicators. At the same time it must be recognized that life satisfaction measures

have clear limits, and provide only one type of information to policy makers. Thus, additional types of objective and subjective indicators are needed.

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References

Agrawal, S., & Harter, J. K. (2011). *Context effects on life evaluation items: Forming new estimates for data prior to January 6, 2009*. Washington, DC: Gallup Technical Report.

Atkinson, T. (1982). The stability and validity of quality of life measures. *Social Indicators Research, 10*, 113–132.

Baker, L. M., Wilson, F. L., & Winebarger, A. (2004). An exploratory study of the health problems, stigmatization, life satisfaction, and literacy skills of urban, street-level sex workers. *Women and Health, 39*, 83–96.

Becchetti, L., Castriota, S., & Giachin, E. (2011). Beyond the joneses: Inter-country income comparisons and happiness. *Society for the Study of Economic Inequality*, Working Paper 189.

Biswas-Diener, R., & Diener, E. (2006). The subjective well-being of the homeless, and lessons for happiness. *Social Indicators Research, 76*, 185–205.

Blanchflower, D. G., & Oswald, A. J. (2012). *Antidepressants and age in 27 European countries: Evidence of a U-shape in human well-being through life*. Unpublished paper, Dartmouth College.

Brief, A. P., Butcher, A. H., George, J. M., & Link, K. E. (1993). Integrating bottom-up and top-down theories of subjective well-being: The case of health. *Journal of Personality and Social Psychology, 64*, 646–653.

Bryant, R. A., Marosszeky, J. E., Crooks, J., Baguley, I. J., & Gurka, J. A. (2001). Posttraumatic stress disorder and psychosocial functioning after severe traumatic brain injury. *The Journal of Nervous and Mental Disorders, 189*, 109–113.

Chang, E. C., & Sanna, L. J. (2001). Optimism, pessimism, and positive and negative affectivity in middle-aged adults: A test of a cognitive-affective model of psychological adjustment. *Psychology and Aging, 16*, 524–531.

Clark, A. E., Diener, E., Georgellis, Y., & Lucas, R. E. (2008). Lags and leads in life satisfaction: A test of the baseline hypothesis. *The Economic Journal, 118*, F222–F243.

Deaton, A. (2011). *The financial crisis and the well-being of America*. Unpublished manuscript, Princeton University.

DeNeve, J. E. (2011). Functional polymorphism (5-HTTLPR) in the serotonin transporter gene is associated with subjective well-being: Evidence from a US nationally representative sample. *Journal of Human Genetics, 56*, 456–459.

Denissen, J. J. A., Butalid, L., Penke, L., & van Aken, M. A. G. (2008). The effects of weather on daily mood: A multilevel approach. *Emotion, 8*, 662–667.

Dermer, M., Cohen, S. J., Jacobsen, E., & Anderson, E. A. (1979). Evaluative judgments of aspects of life as a function of vicarious exposure to hedonic extremes. *Journal of Personality and Social Psychology, 37*, 247–260.

Di Tella, R., Haisken-De New, J., & MacCulloch, R. (2005). *Happiness adaptation to income and to status in an individual panel*. NBER working paper no. 13159.

Diener, E. (2009). *Culture and well-being: The collected works of Ed Diener*. Dordrecht: Springer.

Diener, E., & Chan, M. Y. (2011). Happy people live longer: Subjective well-being contributes to health and longevity. *Applied Psychology: Health and Well-Being, 3*, 1–43.

Diener, E., & Diener, M. (1995). Cross-cultural correlates of life satisfaction and self-esteem. *Journal of Personality and Social Psychology, 68*, 653–663.

Diener, E., Diener, M., & Diener, C. (1995). Factors predicting the subjective well-being of nations. *Journal of Personality and Social Psychology, 69*, 851–864.

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985a). The satisfaction with life scale. *Journal of Personality Assessment, 49*, 71–75.

Diener, E., Horwitz, J., & Emmons, R. A. (1985b). Happiness of the very wealthy. *Social Indicators Research, 16*, 263–274.

Diener, E., Kahneman, D., Tov, W., & Arora, R. (2010a). Income's association with judgments of life versus feelings. In E. Diener, J. Helliwell, & D. Kahneman (Eds.), *International differences in well-being* (pp. 3–15). New York: Oxford University Press.

Diener, E., & Larsen, R. J. (1984). Temporal stability and cross-situational consistency of affective, behavioral, and cognitive responses. *Journal of Personality and Social Psychology, 47*, 871–883.

Diener, E., Lucas, R. E., Oishi, S., & Eunkook, S. M. (2002). Looking up and down: Weighting good and bad information in life satisfaction judgments. *Personality and Social Psychology Bulletin, 28*, 437–445.

Diener, E., Lucas, R., Schimmack, U., & Helliwell, J. (2009). *Well-being for public policy*. New York: Oxford University Press.

Diener, E., Ng, W., Harter, J., & Arora, R. (2010b). Wealth and happiness across the world: Material prosperity predicts life evaluation, while psychosocial prosperity predicts positive feeling. *Journal of Personality and Social Psychology, 97*, 143–156.

Diener, E., Scollon, C. K., Oishi, S., Dzokoto, V., & Suh, E. M. (2000). Positivity and the construction of life satisfaction judgments: Global happiness is not the sum of its parts. *Journal of Happiness Studies: An Interdisciplinary Periodical on Subjective Well-Being, 1*, 159–176.

Diener, E., Tay, L., & Myers, D. G. (2011). The religion paradox: If religion makes people happy, why are so many dropping out? *Journal of Personality and Social Psychology, 101*, 1278–1290.

Diener, E., Tay, L., & Oishi, S. (2012). *Easterlin was wrong and right: Income and psychosocial changes, and the changing happiness of nations*. Manuscript submitted for publication, University of Illinois.

DiTella, R., MacCulloch, R., & Oswald, A. (1997). *The macroeconomics of happiness*. CEP Working Paper 19.

Dolan, P., & White, M. P. (2007). How can measures of subjective well-being be used to inform public policy. *Perspective on Psychological Science, 2*, 171–185.

Economist Intelligence Unit. (2004). *The economist intelligence unit's quality-of-life index*. Retrieved from November 17, 2012 from http://www.economist.com/media.

Eid, M. (2008). Measuring the immeasurable: Psychometric modeling of subjective well-being data. In M. Eid & R. J. Larsen (Eds.), *The science of subjective well-being*. New York: Guilford.

Eid, M., & Diener, E. (2004). Global judgments of subjective well-being: Situational variability and long-term stability. *Social Indicators Research, 65*, 245–277.

Eid, M., & Zuckar, M. (2007). Detecting response styles and faking in personality and organizational assessments by Mixed Rasch Models. In M. von Davier & C. H. Carstensen (Eds.), *Multivariate and mixture distribution Rasch models* (pp. 255–270). New York: Springer.

Ferrer-i-Carbonell, P., & Frijters, P. (2004). How important is methodology for the estimates of the determinants of happiness? *Economic Journal, 114*, 641–659.

Frey, B., & Stutzer, A. (2000). Happiness, economy, and institutions. *Economic Journal, 110*, 118–138.

Frisch, M. B., Clark, M. P., Rouse, S. V., Rudd, M. D., Paweleck, J., Greenstone, A., et al. (2005). Predictive and treatment validity of life satisfaction and the Quality of Life Inventory. *Assessment, 12*, 66–78.

Frisch, M. B., Cornell, J., Villanueva, M., & Retzlaff, P. (1992). Clinical validation of the Quality of Life Inventory: A measure of life satisfaction for use in treatment planning and outcome assessment. *Psychological Assessment, 4*, 92–101.

Fujita, F., & Diener, E. (2005). Life satisfaction set point: Stability and change. *Journal of Personality and Social Psychology, 88*, 158–164.

Fulmer, A., Gelfand, M. J., Kruglanski, A., Kim-Prieto, C., Diener, E., Pierro, A., et al. (2010). On "feeling right" in cultural contexts: How person-culture match affects self-esteem and subjective well-being. *Psychological Science, 21*, 1563–1569.

Graham, C. (2009). *Happiness around the world: The paradox of happy peasants and miserable millionaires*. Oxford: Oxford University Press.

Hagerty, M., & Veenhoven, R. (2003). Wealth and happiness revisited—Growing national income does go with greater happiness. *Social Indicators Research, 64*, 1–27.

Hedges, L. V. (1987). How hard is hard science, how soft is soft science? *American Psychologist, 42*, 443–455.

Helliwell, J. F. (2007). Well-being and social capital: Does suicide pose a puzzle? *Social Indicators Research, 81*, 455–496.

Hsee, C. K., & Zhang, J. (2010). General evaluability theory. *Perspectives on Psychological Science, 5*, 343–355.

Inglehart, R. (1990). *Culture shift in advanced industrial societies*. Princeton: Princeton University Press.

Inglehart, R. (1997). *Modernization and postmodernization: Cultural, economic and political change in 43 societies*. Princeton, NJ: Princeton University Press.

Inglehart, R., & Klingemann, H. D. (2000). Genes, culture, democracy and happiness. In E. Diener & E. Suh (Eds.), *Subjective well-being across cultures* (pp. 165–183). Cambridge, MA: MIT Press.
Inglehart, R., & Welzel, C. (2005). *Modernization, cultural change, and democracy*. New York: Cambridge University Press.
Inglehart, R., & Welzel, C. (2010). Changing mass priorities: The link between modernization and democracy. *Perspectives on Politics, 8*, 551–567.
Joy, R. H. (1990). *Path analytic investigation of stress-symptom relationships: Physical and psychological symptom models*. Unpublished doctoral dissertation, University of Illinois at Champaign-Urbana.
King, D. A., & Buchwald, A. M. (1982). Sex differences in subclinical depression: Administration of the Beck Depression Inventory in public and private disclosure situations. *Journal of Personality and Social Psychology, 42*, 963–996.
Koivumaa-Honkanen, H., Honkanen, R., Viinamaeki, H., Heikkilae, K., Kaprio, J., & Koskenvuo, M. (2001). Life satisfaction and suicide: A 20-year follow-up study. *American Journal of Psychiatry, 158*, 433–439.
Krueger, A. B., & Schkade, D. (2008). The reliability of subjective well-being measures. *Journal of Public Economics, 92*, 1833–1845.
Kuppens, P., Realo, A., & Diener, E. (2008). The role of positive and negative emotions in life satisfaction judgments across nations. *Journal of Personality and Social Psychology, 95*, 66–75.
Lawless, N. M., & Lucas, R. E. (2011). Prediction of regional well-being: A county level analysis. *Social Indicators Research, 101*, 341–357.
Lucas, R. E. (2007). Long-term disability is associated with lasting changes in subjective well-being: Evidence from two nationally representative longitudinal studies. *Journal of Personality and Social Psychology, 92*, 717–730.
Lucas, R. E., & Clark, A. E. (2006). Do people really adapt to marriage? *Journal of Happiness Studies, 7*, 405–426.
Lucas, R. E., Clark, A. E., Georgellis, Y., & Diener, E. (2003). Reexamining adaptation and the set point model of happiness: Reactions to changes in marital status. *Journal of Personality and Social Psychology, 84*, 527–539.
Lucas, R. E., Clark, A. E., Georgellis, Y., & Diener, E. (2004). Unemployment alters the set-point for life satisfaction. *Psychological Science, 15*, 8–13.
Lucas, R. E., Diener, E., & Suh, E. (1996). Discriminant validity of well-being measures. *Journal of Personality and Social Psychology, 71*, 616–628.
Lucas, R. E., & Donnellan, M. B. (2007). How stable is happiness? Using the STARTS model to estimate the stability of life satisfaction. *Journal of Research in Personality, 41*, 1091–1098.
Lucas, R. E., & Donnellan, M. B. (2011). Estimating the reliability of single-item life satisfaction measures: Results from four national panel studies. *Social Indicators Research, 105*, 323–331.
Lucas, R. E., & Lawless, N. M. (2011). *Weather conditions are unrelated to life satisfaction judgments: Evidence from a large representative sample in the U.S*. Manuscript submitted for publication, Michigan State University.
Luechinger, S. (2009). Valuing air quality using the life satisfaction approach. *Economic Journal, 119*, 482–515.
Luhmann, M., & Eid, M. (2009). Does it really feel the same? Changes in life satisfaction following repeated life events. *Journal of Personality and Social Psychology, 97*, 363–381.
Luhmann, M., Hawkley, L. C., Eid, M., & Cacioppo, J. T. (2012). Time frames and the distinction between affective and cognitive well-being. *Journal of Research in Personality* (in press).
Luhmann, M., Hoffmann, W., Eid, M., & Lucas, R. E. (2012). Subjective well-being and adaptation to life events: A meta-analysis. *Journal of Personality and Social Psychology, 102*(3), 592–615.
Luhmann, M., Lucas, R. E., Eid, M., & Diener, E. (2012). The prospective effect of life satisfaction on life events. *Social Psychological and Personality Science*. doi:10.1177/1948550612440105 (advanced online publication).
Lykken, D., & Tellegen, A. (1996). Happiness is a stochastic phenomenon. *Psychological Science, 7*, 186–189.
Michalos, A. C. (1985). Multiple discrepancies theory (MDT). *Social Indicators Research, 16*, 347–413.
Michalos, A. C., & Kahlke, P. M. (2010). Stability and sensitivity in perceived quality of life measures: Some panel results. *Social Indicators Research, 98*, 403–434.
Moum, T. (1996). *Subjective well-being as a short- and long-term predictor of suicide in the general population*. Paper presented at the world conference in quality of life, University of Northern British Columbia, Prince George, Canada. August 22–25.
Norris, P., & Inglehart, R. (2004). *Sacred and secular: Religion and politics worldwide*. New York: Cambridge University Press.

Oishi, S. (2006). The concept of life satisfaction across cultures: An IRT analysis. *Journal of Research in Personality, 41*, 411–423.
Oishi, S. (2010). Culture and well-being: Conceptual and methodological issues. In E. Diener, D. Kahneman, & J. F. Helliwell (Eds.), *International differences in well-being* (pp. 34–69). New York: Oxford University Press.
Oishi, S. (2012). *The psychological wealth of nations: Do happy people make a happy society?*. Hoboken, NJ: Wiley.
Oishi, S., & Diener, E. (2001). Re-examining the general positivity model of subjective well-being: The discrepancy between specific and global domain satisfaction. *Journal of Personality, 69*, 641–666.
Oishi, S., Diener, E., Choi, D. W., Kim-Prieto, C., & Choi, I. (2007). The dynamics of daily events and well-being across cultures: When less is more. *Journal of Personality and Social Psychology, 93*, 685–698.
Oishi, S., & Roth, D. P. (2009). The role of self-reports in culture and personality research: It is too early to give up on self-reports. *Journal of Research in Personality, 43*, 107–109.
Oishi, S., Schimmack, U., & Colcombe, S. J. (2003). The contextual and systematic nature of life satisfaction judgments. *Journal of Experimental Social Psychology, 39*, 232–247.
Oishi, S., & Sullivan, H. W. (2006). The predictive value of daily vs. retrospective well-being judgments in relationship stability. *Journal of Experimental Social Psychology, 42*, 460–470.
Oswald, A. J., & Wu, S. (2010). Objective confirmation of subjective measures of human well-being: Evidence of the U.S.A. *Science, 327*, 576–579.
Pavot, W., & Diener, E. (1993a). The affective and cognitive context of self-reported measures of subjective well-being. *Social Indicators Research, 28*, 1–20.
Pavot, W., & Diener, E. (1993b). Review of the Satisfaction with Life Scale. *Psychological Assessment, 5*, 164–172.
Pavot, W., Diener, E., Colvin, C. R., & Sadvik, E. (1991). Further validation of the Satisfaction with Life Scale: Evidence for the cross-method convergence of well-being measures. *Journal of Personality Assessment, 57*, 149–161.
Redelmeier, D. A., Katz, J., & Kahneman, D. (2003). Memories of colonoscopy: A randomized trial. *Pain, 104*, 187–194.
Robinson, M. D. (2000). The reactive and prospective functions of mood: Its role in linking daily experiences and cognitive well-being. *Cognition and Emotion, 14*, 145–176.
Rodrigue, J. R., Baz, M. A., Widows, M. R., & Ehlers, S. L. (2005). A randomized evaluation of Quality of Life Therapy with patients awaiting lung transplantation. *American Journal of Transplantation, 5*, 2425–2432.
Rodrigue, J. R., Widows, M. R., & Baz, M. A. (2006). Caregivers of lung transplant candidates: Do they benefit when the patient is receiving psychological services? *Progress in Transplantation, 16*, 336–342.
Roysamb, E., Harris, J. R., Magnus, P., Vitterso, J., & Tambs, K. (2002). Subjective well-being: Sex-specific effects of genetic and environmental factors. *Personality and Individual Differences, 32*, 211–223.
Sandow, E. (2011). *On the road: Social aspects of commuting long distances to work*. Unpublished doctoral dissertation, Umea University, Sweden.
Sandvik, E., Diener, E., & Seidlitz, L. (1993). Subjective well-being: The convergence and stability of self-report and non-self-report measures. *Journal of Personality, 61*, 317–342.
Schimmack, U., Diener, E., & Oishi, S. (2002a). Life satisfaction is a momentary judgment and a stable personality characteristic: The use of chronically accessible and stable sources. *Journal of Personality, 70*, 345–384.
Schimmack, U., Krause, P., Wagner, G. G., & Schupp, J. (2010). Stability and change of well being: An experimentally enhanced latent state-trait-error analysis. *Social Indicators Research, 95*, 19–31.
Schimmack, U., & Oishi, S. (2005). The influence of chronically and temporarily accessible information on life satisfaction judgments. *Journal of Personality and Social Psychology, 89*, 395–406.
Schimmack, U., Radhakrishnan, P., Oishi, S., Dzokoto, V., & Ahadi, S. (2002b). Culture, personality, and subjective well-being: Integrating process models of life satisfaction. *Journal of Personality and Social Psychology, 82*, 582–593.
Schneider, L., & Schimmack, U. (2009). Self-informant agreement in well-being ratings: A meta-analysis. *Social Indicators Research, 94*, 363–376.
Schwarz, N., & Clore, G. L. (1983). Mood, misattribution, and judgments of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology, 45*, 513–523.
Schwarz, N., & Strack, F. (1999). Reports of subjective well-being: Judgmental processes and their methodological implications. In D. Kahneman, E. Diener, & N. Schwarz (Eds.), *Well-being: The foundations of hedonic psychology* (pp. 61–84). New York: Russell-Sage.

Schwarz, N., Strack, F., Hippler, H. J., & Bishop, G. (1991). The impact of administration mode on response effects in survey measurement. *Applied Cognitive Psychology, 5*, 193–212.
Schwarz, N., Strack, F., Kommer, D., & Wagner, D. (1987). Soccer, rooms, and the quality of your life: Mood effects on judgments of satisfaction with life in general and with specific domains. *European Journal of Social Psychology, 17*, 69–79.
Scogin, F., Morthland, M., Kaufman, A., Burgio, L., Chaplin, W., & Kong, G. (2007). Improving quality of life in diverse rural older adults: A randomized trial of a psychological treatment. *Psychology and Aging, 22*, 657–665.
Scollon, C. N., Kim-Prieto, C., & Diener, E. (2003). Experience sampling: Promises and pitfalls, strengths and weaknesses. *Journal of Happiness Studies, 4*, 5–34.
Seder, J. P., & Oishi, S. (in press). Intensity of smiling in Facebook photos predicts future life satisfaction. *Social Psychological and Personality Science*. doi:10.1177/1948550611424968 (advanced online publication).
Shirom, A., Toker, S., Melamed, S., Berliner, S., & Shapira, I. (2011). Life and job satisfaction as predictors of the incidence of diabetes. *Applied Psychology: Health and Well-Being, 4*, 31–48.
Shlyakhter, A., Shlyakhter, I., Broido, C., & Wilson, R. (1993). Estimating uncertainty in physical measurements, observational and environmental studies: Lessons from trends in nuclear data. In: *Proceedings from the second international symposium on uncertainty modeling and analysis* (pp. 310–317). College Park, MA.
Slocum-Gori, S., Zumbo, B., Michalos, A., & Diener, E. (2009). A note on the dimensionality of quality of life scales: An illustration with the Satisfaction with Life Scale. *Social Indicators Research, 92*, 489–496.
Smith, T. W. (1979). Happiness: Time trends, seasonal variations, intersurvey differences, and other mysteries. *Social Psychology Quarterly, 42*, 18–30.
Steger, M. F., Frazier, P., Oishi, S., & Kaler, M. (2006). The Meaning in Life Questionnaire: Assessing the presence of and search for meaning in life. *Journal of Counseling Psychology, 53*, 80–93.
Steptoe, A., Wardle, J., Marmot, M., & McEwen, B. S. (2005). Positive affect and health-related neuroendocrine, cardiovascular, and inflammatory processes. *Proceedings of the National academy of Sciences of the United States of America, 102*, 6508–6512.
Stevenson, B., & Wolfers, S. (2008). *Economic growth and subjective well-being: Reassessing the Easterlin Paradox*. National Bureau of Economic Research, working paper, no. 14282, August.
Strack, F., Martin, L. L., & Schwarz, N. (1988). Priming and communication: Social determinants of information use in judgments of life satisfaction. *European Journal of Social Psychology, 18*, 429–442.
Strack, F., Schwarz, N., Chassein, B., Kern, D., & Wagner, D. (1990). Salience of comparison standards and the activation of social norms: Consequences for judgments of happiness and their communication. *The British Journal of Social Psychology, 29*, 303–314.
Stubbe, J. H., Posthuma, D., Boomsma, D. I., & De Geus, E. J. C. (2005). Heritability of life satisfaction in adults: A twin-family study. *Psychological Medicine, 35*, 1581–1588.
Sudman, S., Greely, A. M., & Pinto, L. J. (1967). The use of self-administered questionnaires. In S. Sudman (Ed.), *Reducing the cost of surveys* (pp. 46–57). Chicago: Aldine.
Suh, E. M. (2002). Culture, identity, consistency, and subjective well-being. *Journal of Personality and Social Psychology, 83*, 1378–1391.
Suh, E. M., Diener, E., Oishi, S., & Triandis, H. (1998). The shifting basis of life satisfaction judgments across cultures: Emotions versus norms. *Journal of Personality and Social Psychology, 74*, 482–493.
Suh, E. M., Diener, E., & Updegraff, J. A. (2008). From culture to priming conditions: Self-construal influences on life satisfaction judgments. *Journal of Cross-Cultural Psychology, 39*, 3–15.
Tay, L., & Diener, E. (2011). Needs and subjective well-being around the world. *Journal of Personality and Social Psychology, 101*, 354–365.
Tay, L., & Diener, E. (2012). *The strengths and weaknesses of the Day Reconstruction Method (DRM)*. Paper in preparation, University of Illinois.
Tay, L., Diener, E., Drasgow, F., & Vermunt, J. K. (2011). Multilevel mixed-measurement IRT analysis: An explication and application to self-reported emotions around the world. *Organizational Research Methods, 14*, 177–207.
Urry, H. L., Nitschke, J. B., Dolski, I., Jackson, D. C., Dalton, K. M., Mueller, C. J., et al. (2004). Making a life worth living: Neural correlates of well-being. *Psychological Science, 15*, 367–372.
Veenhoven, R. (2005). Apparent quality-of-life in nations: How long and happy people live. *Social Indicators Research, 71*, 61–86.
Vitaliano, P. P., Russo, J., Young, H. M., Becker, J., & Maiuro, R. D. (1991). The screen for caregiver burden. *The Gerontologist, 31*, 76–83.

Vitterso, J., Biswas-Diener, R., & Diener, E. (2005). The divergent meanings of life satisfaction: Item response modelling of the Satisfaction with Life Scale in Greenland and Norway. *Social Indicators Research, 74*, 327–348.

Watson, D. (2000). *Mood and temperament*. New York, NY: Guilford Press.

Welzel, C. (2013, forthcoming). *Breaking free: People power and the human quest for emancipation*. New York: Cambridge University Press.

Wiest, M., Schuz, B., Webster, N., & Wurm, S. (2011). Subjective well-being and mortality revisited: Differential effects of cognitive and emotional facets of well-being on mortality. *Health Psychology, 30*, 728–735.

Wirtz, D., Kruger, J., Scollon, C. N., & Diener, E. (2003). What to do on spring break? The role of predicted, on-line and remembered experience in future choice. *Psychological Science, 14*, 520–524.

Yap, S. C. Y., Anusic, I., & Lucas,. R. E. (2011a). Does personality moderate the reaction and adaptation to major life events? Evidence from the British Household Panel Study. Michigan State University.

Yap, S. C. Y., Anusic, I., & Lucas, R. E. (2011b). *Testing set-point theory in a Swiss national sample: Reaction and adaptation to major life events*. Michigan State University.

Zou, C., Schimmack, U., & Gere, J. (2012). *Towards an integrated theory of the nature and measurement of well-being: A multiple-indicator-multiple-rater model*. Paper submitted for publication, University of Toronto Mississauga.