UNRAVELING OVERALL QUALITY OF LIFE

by

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**ABSTRACT**

Whether the stated goal of a program is to improve health, reduce crime, or to increase standard of living, the ultimate goal of social programs is to improve overall quality of life. An adequate measure of this outcome would help determine whether achievement of these more specific goals (e.g., health, education) really leads to improvements in overall life quality, and would allow trade-offs to be made in terms of funding across programs. However, an understanding of the determinants of life quality (i.e., the mechanism by which a program did or did not have its intended effect) is also essential to program evaluation and the design of future programs.

This study constitutes the analysis of an existing dataset of individual traits, life circumstances, satisfaction with a list of 30 life domains, and overall quality of life for 193 healthy elders to test a hypothesized model of the determinants of life quality. As expected, domain satisfaction appears to be a function of life circumstances. Individuals' traits (e.g., age, sex, personality) modify this relationship, but neither they, nor respondents' reports of domain importance, appear to have any direct effect on quality of life. Instead, domain satisfactions alone are the most proximal determinants of overall quality of life. It also appears that individuals respond differently in terms of overall quality of life to reductions in satisfaction with certain domains than to increases. These findings should be evaluated further as they could affect the design of future successful programs. Because individuals' traits and individuals' ratings of domain importance seem to have no effect on the relationship between domain satisfaction and overall quality of life, it may not be essential to measure these in future studies. Finally, although the data

on life domains available to this study were sufficient to generate these results, the first

step in the development of adequate measures of overall quality of life and of domain

satisfactions will be the construction of a comprehensive, fully-representative list of the

life domains that comprise life as a whole.

# INTRODUCTION AND BACKGROUND

It can be argued that the ultimate goal of all human endeavors is to improve quality of life of someone or other. Whether the stated intent is to reduce the incidence and severity of disease, reduce crime, improve education, or raise the standard of living, the ultimate goal of social programs is to improve overall quality of life. At present, measures are available to determine, for example, the incidence and severity of disease, and similarly, whether a program targeting these has had an impact. Measures are also available to determine the overall levels of and particular programs' impacts on crime, education, the standard of living, and other specific goals. However, no adequate measure is available to determine the overall level of life quality in a population and the impact these programs have on it. To have this type of measure would not only help determine whether achievement of these more specific goals (e.g., health, education) really leads to improvements in overall life quality, but would also allow trade-offs to be made across the funding of these efforts given limited resource availability.

## Defining Quality of Life

Being the ultimate goal, quality of life brings with it many challenges in terms of both its definition and its measurement. The definition of what constitutes a high quality life (the essence of a "good" life) has been debated for centuries by philosophers and theologians (Diener & Suh, 1997). Aristotle defined happiness as the supreme good and declared it to be the only value that is final and sufficient (McMahon, 2005). Over the years, every religion has offered its own answers to what is a good or high-quality life,

most of which emphasize the need to act according to duty instead of desire, and the power to change one's own attitudes in an unchangeable world (Nesse, 2005). More recently several different disciplines have proposed their own definitions with an eye toward measurement. These definitions break down into two general categories: objective and subjective measures. The subjective definitions break down further into three types: 1) mental state or mood, 2) desire or preference-based, 3) and retrospective life-evaluative accounts.

Objective measures are those that describe events, behaviors, or characteristics of individuals that do not depend on the individual's description of his own life (Campbell, 1976). When viewed through the lens of an objective measure, the definition of quality of life tends to center on the criteria of the good life that are observable by an impartial outsider—e.g., income, neighborhood safety, education (Veenhoven, 1996). These measures have been promoted primarily by sociologists, political scientists, and city planners.

The realm of the subjective, on the other hand, in its philosophically primary sense, begins with experience, moves on to appearance, and ends with mind-dependent reality. If quality of life is subjective it is by virtue of being mind-dependent (Sumner, 1996). Thus, a subjective-measure definition of quality of life depends on those aspects of the individuals' conscious states or processes not shared by an external observer (Sumner, 1996; Veenhoven, 1996).

Mental state accounts, the first of the three types of subjective life quality definitions, are without reference to some state of the world. They are non-evaluative in

the sense that they are not states of mind specifically about some external influence. The classic example of a mental state account of quality of life is that espoused by early economists (the "utilitarians" of the 18th and 19th centuries) (Hausman & McPherson, 2006). They defined happiness as intended pleasure and the absence of pain (agreeable feelings) and thought that hedonistic happiness was desirable and the only thing desirable as an end (Sumner, 1996). Other mental state definitions of quality of life include the "happiness" research presently ongoing in psychology and sociology, Ralph Siu's definition of quality of life as the minimization of suffering or *dukkha* (Galtung, 2005; International Society for Panetics, 1993), and the positive and negative affect components of Diener's subjective well-being (SWB) (Diener, Oishi, & Lucas, 2003; Diener & Suh, 1997; Diener, Suh, Lucas, & Smith, 1999)—although Diener argues that affect represents people's evaluations of their lives and circumstances (Diener et al., 2003; Diener & Suh, 1997).

The second type of subjective definition of quality of life is a desire or preference-based account. The general principle behind desire theory is that a condition or state of affairs makes me better off by virtue of satisfying some desire on my part. In other words, my life is going well to the extent that I am succeeding in getting what I want (Sumner, 1996). The classic desire account centers on the notion of preference revealed by actual market choices—i.e., the contribution a thing makes to my well-being or quality of life is a function of the amount I am willing to pay to get (or keep) it. This is the version of quality of life adopted by 'new welfare economics'. Stated preference is a modification of this approach that accounts for the fact that markets do not exist for all goods in life.

Here, the contribution a thing makes to my well-being is a function of the amount I say I prefer it over its alternative. Stated preference is commonly used in applied economics. However, it is more widely used in medical and health services research as the underlying basis for the calculation of quality-adjusted life-years (QALYs), a common metric used to compare the benefits across healthcare interventions with various types of outcomes.

The third type of subjective definition of quality of life is that of retrospective life self-evaluation or life satisfaction. From this perspective a high quality life is defined by a positive evaluation of the conditions of one's own life; a judgment that, at least on balance, it measures up favorably against personal standards or expectations (Sumner, 1996). Therefore, it is a subjective evaluation of a state of the world (one's own life).

After a broad review of the literature (Herman, 2007), this last definition of quality of life (a retrospective life evaluation also known as life satisfaction) was chosen as the best to represent the type of quality of life that is appropriate to be the "good" (the construct) whose pursuit and promotion is "worthy" to be the point of an ethical enterprise (Sumner, 1996). Life satisfaction was chosen for a number of reasons, including that it is dependent on our own attitudes (subjective) but also dependent on a state of the world (one's experienced circumstances). Being dependent on a state of the world results in the measure of quality of life being taken from those who actually experienced the life they are judging rather than from individuals who are only predicting what they would prefer (e.g., preferences). This definition was also argued to be general enough to capture all individuals' perceptions of life quality, be formal enough to not mix

the sources of life quality with the thing itself, and be neutral enough to not bias towards favored lists of goods or ways of life. Several others who have reviewed the literature regarding the definition of quality of life have also chosen life satisfaction as the most appropriate to use in the evaluation of social programs (Browne, O'Boyle, McGee, & Joyce, 1994; Haas, 1999; Moons, Budts, & De Geest, 2006; Sumner, 1996). Note also that Diener and others have espoused measuring life satisfaction as a component of SWB (Diener, 1984; Diener et al., 2003; Diener & Suh, 1997; Diener et al., 1999; Lucas, Diener, & Suh, 1996).

**Challenges in obtaining a life satisfaction-type measure of quality of life**

Given that life satisfaction is the appropriate measure of quality of life, a number of issues and difficulties must be addressed in its measurement due to its subjective nature and the challenges individuals face in their recall and evaluation of life experiences. These challenges are briefly reviewed below.

The human sensory system may ceaselessly perceive the world we live in, but in general, it seems that our memories of our lives will differ from our actual lived experience, as shown by a number of researchers (Kahneman, 1999; Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004; Wirtz, Kruger, Scollon, & Diener, 2003). Even if all relevant memories of past life experience have been safely stored, humans face a number of problems in retrieving appropriate experiences, evaluating them, and in generating an internal overall measure of life satisfaction. Daniel Kahneman has found that the memories and evaluative processes that humans tend to bring to the task of evaluating overall life satisfaction are dependent on the aspects of memory and the rules of judgment

that are most salient or accessible at the time of evaluation (Kahneman, 1999; Kahneman, 2003). For example, framing effects arise when different descriptions of the same problem (e.g., the way the life satisfaction item is worded) highlight or make accessible different aspects of the key elements of the problem (Kahneman, 2003). Although the intent may be to request a report of overall satisfaction, the way the question is framed (e.g., its wording or its context in relation to other questions—i.e., context effect (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2006; Schwarz & Strack, 1999)) can have a significant effect on the resulting response. Also, when attention is focused on any aspect of well-being (no matter how the attention is focused there), its impact on life quality is likely to be overestimated—i.e., a focusing effect (Kahneman, 1999; Kahneman et al., 2006). Mood can also affect what information is stored in and retrieved from memory (Ajzen, 2001; Levine & Pizarro, 2004; Schwarz & Strack, 1999). It can also have an effect on judgments of life satisfaction as some people in some situations assume that their momentary affective state is a reasonable and parsimonious indicator of their overall life satisfaction (Ajzen, 2001; Kahneman, 2003). Finally, judgments almost always involve a comparison, either explicit or implicit, between the target (what is being evaluated—e.g., one's life as a whole) and the standard to which the target is compared (Diener & Lucas, 2000). The information used to construct the target and the standard is also highly susceptible to accessibility bias (Schwarz & Strack, 1999).

These challenges can for the most part be minimized through robust instrument design. However, the limitations on measurement caused by other challenges may have to be accepted as inevitable. For example, a number of studies have shown that

retrospective evaluative accounts of an experience are highly influenced by its peak and final moments (Fredrickson & Kahneman, 1993; Hsee, Hastie, & Chen, 2008; Kahneman, 1999; Redelmeier, Katz, & Kahneman, 2003; Varey & Kahneman, 1992; Wirtz et al., 2003). The duration, total online effect, and average effect of the experience have little or no impact. This could be because the peak and end effects are more accessible to memory, but it could also be that peak and end effects are more "inherently evaluable" than duration (Hsee et al., 2008). That is, we have an innate, psychophysical scale by which to judge the intensity of an event in terms of sensations and emotions, but we don't have a similar scale for duration—i.e., no internal clock.

Adaptation is the term used for the process by which individuals tend to eventually return to their baseline levels of life satisfaction (or happiness) after a significant life event such as marriage, winning the lottery, or severe disability (this last is called the disability paradox in medicine (Moons et al., 2006)). The term "hedonic treadmill" has been used to emphasize the troubling aspect of adaptation that if people adapt to improved life circumstances to the point that they return to baseline, life improvement offers no real benefit (Kahneman, 1999; Kahneman & Varey, 1991). The determinants of adaptation include psychophysical habituation (becoming less sensitive to a stimulus the longer one is exposed to it), attention dilution (we focus our attention where there has been recent change, but with the passage of time other changes elsewhere draw our attention), and ordinization (as time passes we tend to rationalize an event and view it as ordinary) (Hsee et al., 2008). The term "response shift" describes the process by which adaptation becomes apparent in quality of life measurement. Response shift can

manifest as: changes in scale calibration, changes in the conceptualization of quality of life, and changes in the prioritization of individual life domains when assessing quality of life (Ring, Hofer, Heuston, Harris, & O'Boyle, 2005). In general, the life events or conditions most resistant to adaptation are those that remain uncertain and those that are inherently evaluable (Hsee et al., 2008).

One additional challenge is the fact that individuals tend to react to a negative life event with a reduction in life satisfaction that is larger than the gain that would have ensued if that event was positive and of the same magnitude. This tendency is called *loss aversion* and is an essential component of Kahneman and Tversky's prospect theory (Kahneman, Snell, & Hogarth, 1990; Kahneman & Tversky, 1979; Tversky & Kahneman, 1992). Loss aversion reflects the fact that losses tend to loom larger than gains, possibly because we have evolved to see losses as holding more danger than gains. More recent work has shown that for some losses (i.e., those considered "small" and easily discounted cognitively) the reduction in life satisfaction may be smaller than the gain that would have ensued if the event was positive and of the same magnitude (Harinck, Van Dijk, Van Beest, & Mersmann, 2007).

The focus on peak and end effects (and the neglect of duration), adaptation, and loss aversion may present insurmountable challenges in obtaining accurate retrospective evaluations of the quality of individuals' lives. However, it is remembered satisfaction with past experiences that people (literally) remember, and it is this satisfaction upon which we seem to base our future decisions (Kahneman, 1999; Redelmeier et al., 2003; Wirtz et al., 2003). Also, as shown later in this study, it may be that loss aversion can be

accounted for analytically in measurement studies. However, adaptation seems inevitable.

Therefore, it may be most appropriate to acknowledge and accept this tendency in the

measurement of overall life satisfaction.

**The need to capture data on the determinants of quality of life**

Whereas quality of life measured as life satisfaction is the main outcome of

interest, an understanding of the connection between life satisfaction and its determinants

(i.e., satisfaction with individual life domains) is also essential to the evaluation of

interventions and to future program planning. Any intervention will have its influence on

life quality through its impact on underlying determinants—i.e., through its impact on the

areas of life (life domains) most important to an individual's quality of life. In order to

understand the mechanism by which a social program either did or did not affect overall

quality of life—and thus, be able to improve an existing program, predict its impact,

and/or plan for better future programs—its impact on these important areas of life must

be tracked. There are several reasons for this. First, it may be that improvements in some

areas or domains in life add more to overall quality of life than others. If so, those

domains should be favored in social efforts to improve life quality. Second, it may be that

an intervention targeting one life domain also has effects on other domains. These other

effects can be intended or unintended and positive or negative. In any case, it is only with

useful information to better understand these effects that existing programs can be

properly evaluated and future programs can be improved. Finally, given that adaptation

seems inevitable, especially for a change that has now become a state (Hsee et al., 2008),

if the impact of a program on individual underlying domains is not captured, it will be

impossible to separate the effect of adaptation in the targeted domain from that of a possible offsetting life quality influence in another domain.

It is also important to note that measurement of life domain satisfaction is key to obtaining a valid measure of life satisfaction from respondents. To ensure that life satisfaction is not just a mental state measure, an informed response is required (Sumner, 1996). Obtaining statements of satisfaction across all life domains helps individuals review and evaluate the components their lives so as to then give a response regarding overall life satisfaction that is subjective, but also based on a state of the world (their lives).

## Proposed model of the relationship between life circumstances, individual traits, satisfaction with life domains, and overall quality of life

The hypothesized model of the relationship between domain satisfaction and overall quality of life is shown as Figure 1. Note that stated satisfaction with each life domain is assumed to be the most proximal determinant of overall quality of life. Life circumstances, modified by individuals' traits, are assumed to determine satisfaction with each life domain. Here, life circumstances are those aspects of individuals' lives that can be changed by social programs—e.g., income, health, education, living conditions, etc. Individuals' traits are those aspects of the individual that are not changeable (at least not to any significant degree)—e.g., personality traits such as optimism and extraversion, as well as sex, age, race, ethnicity, etc. Life circumstances and individual traits are not assumed to have any direct influence on overall quality of life; only an indirect effect through life domain satisfaction.
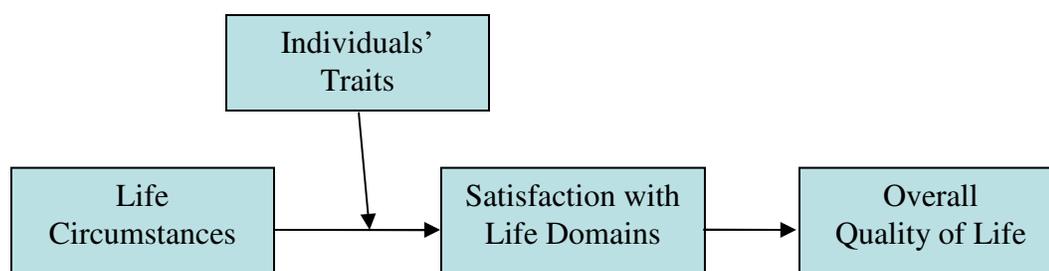
Figure 1. Hypothesized model of the determinants of overall quality of life**.**

A number of different authors have proposed and have estimated various models to explain and/or predict overall quality of life. Most of these models seem to include a mixture of traits, satisfaction with life domains, and life circumstances, all as direct influences on quality of life. See Evans (1997), Frey and Stutzer (2002), and Helliwell (2003) for examples.

In contrast, an early, extensive study by Andrews and Withey (1974; 1976) used data on over 5,000 Americans in six datasets to specifically test several models and concluded that a model of "affective evaluations" of life domains (measured as "how do you feel about…") explained "perceived quality of life" (measured as the average of responses to the item "how do you feel about your life as a whole?" asked twice during the interview) sufficiently. In fact, the model predicted between 50 and 62 percent of the variance depending on the database used. The addition of "social characteristic" variables (sex, race, age, education, income) did not add significantly to the explanatory power.

Unfortunately a review of the literature revealed that whereas 1,700 later works cited Andrews and Withey's work, only one measurement instrument was built using it.

Headey (1976; 1981) used Andrews and Withey's methodology for a series of measurements on quality of life and its determinants in Australia. As discussed below, this dissertation builds upon Andrews and Withey's work.

As shown in Figure 1, it is proposed that although sizable correlations have been shown, for example, between personality and life satisfaction (see, for example, Evans, 1997), the actual causal pathway is indirect via personality's influence on satisfaction with life domains. Basically, if people with different characteristics, such as different personalities, but identical life circumstances report higher or lower life satisfaction or overall quality of life, these same people are expected to also report higher or lower satisfaction with each of their life domains. This distinction is important to future studies because if the influence of individuals' traits is not direct, their influence on overall quality of life does not have to be measured in every program evaluation. Satisfaction with life domains becomes the most proximal determinant of overall quality of life.

Successful social programs are assumed to improve life circumstances, but have little, if any, impact on individuals' traits. If the proposed model is true, then evaluations of various social programs would measure satisfaction with the targeted domain(s) in some detail, satisfaction with all other life domains more generally, and overall life satisfaction. The impact of the program on its targeted domain would be determined by changes in satisfaction with that domain, as well as by other measures specific to and appropriate for that intervention. Any intended or unintended impacts on other life domains would be determined by changes in satisfaction seen in these other domains. And the program's impact on overall quality of life would be determined by the change

in overall life satisfaction. Information as to how to improve the program would then come from these measured impacts as well as what is known (based on a growing data availability) about the relative influence of each life domain on overall quality of life. Future programs could then aim to increase overall quality of life by maximizing satisfaction (and minimizing any reductions in satisfaction) across life domains, but with an emphasis on those domains with the largest influence on life quality.

Of course, the relationship between stated satisfaction with life domains and overall quality of life is not expected to be exactly the same across individuals. This is due to both measurement error and the fact that individuals may be in various states of adaptation regarding recent changes to one or more life domains. However, it is believed that basic relationships will be observable.

## The goal of this dissertation

The goal of this dissertation is to examine the relationship between a life satisfaction-type measure of overall quality of life and stated satisfaction with individual life domains for the purpose of future parallel measurement. The main research question is: Are the satisfaction ratings given each life domain the most proximal, and only, determinants of overall life quality?

This study replicates, validates, and expands upon Andrews and Withey's (1974; 1976) work in a number of ways that will each be discussed in its appropriate section. As a preliminary test of the proposed model, an existing dataset containing a measure of life satisfaction-type quality of life as well as satisfaction with individual life domains will be used to explore:

- The life domains to be included as determinants of overall quality of life

- The prevalence of response shift—i.e., changes in priorities or changes in the conceptualization of domain satisfaction and overall quality of life (possibly due to adaptation) that prevent repeated measures from measuring the same construct

- Whether life circumstances and individual traits determine domain satisfaction

- Whether domain satisfaction predicts overall quality of life

- Whether reported or likely domain importance is important to this relationship

- Whether there is evidence of loss aversion (i.e., a bigger reaction in overall quality of life to decreases in domain satisfaction than to increases) in this relationship

- Whether the effect of individual traits on overall quality of life is fully mediated by domain satisfaction

# THE WANDSWORTH DATASET

The dataset used in this study (hereafter called the Wandsworth dataset) was gathered via a series of three two-to-three hour, in-person interviews from a group of 193 healthy elders (aged 65 years or older) living in the London borough of Wandsworth. The age of respondents ranged from 65 to 98 years (mean 77 years), and about two-thirds of the sample was female. All but three respondents were White (only 8% of the borough is non-White), about one-third had been in lower-managerial and professional occupations or higher, one-third had been in mid-level skilled positions, and one-third had been in semi-routine or lower occupations. The original authors' results, which focus on comparison strategies used by these individuals in their determination of overall quality of life, can be found in Beaumont and Kenealy (2004). Measurements were taken from this population at four points in time during the years 2000 through 2002: screening, first interview, second interview 8 months later, and third interview at 16 months. The instruments used and the timing of each are shown in Appendix A as Table A.1.

This dataset is not overly large and is not a nationally representative sample, but it may be well suited to the purposes of this study for a number of reasons. First, it contains a number of relevant other variables. In particular, it includes several measures of quality of life, including that of the Schedule for the Evaluation of Individual Quality of Life (SEIQoL) discussed below. It also contains several measures of health status and social support (life circumstances that are likely to predict several key life domains). Second, it contains more than one measurement for almost all variables so that changes over time can be tracked. Change over time is needed for analyses of response shift and loss

aversion. Third, it is taken from a healthy population and so will be less biased toward

health issues than one drawn from a population subject to a health intervention. Fourth, it

is of an older population, who may have given more thought to overall quality of life.

Fifth, it is a large enough sample to provide some answers, but yet is not so large as to be

cumbersome to explore. And finally, it is from a well-defined, fairly homogeneous

population. Although specific findings regarding their quality of life may not be fully

generalizable to other populations, it is likely that a good many of the relationships

discovered will be.

**The Schedule for the Evaluation of Individual Quality of Life (SEIQoL)**

A thorough review of the literature indicates that at present no instrument exists

that addresses all the challenges to the measurement of life satisfaction discussed above

as manageable by good instrument design. However, one instrument comes close. The

Schedule for the Evaluation of Individual Quality of Life (SEIQoL) (C. O'Boyle, 1994;

C. O'Boyle, Browne, Hickey, McGee, & Joyce, 1993) has been used in over 200 studies

involving a wide variety of populations, including the healthy, the young and old, those

with various diseases, and those facing the end of their lives (Joyce, Hickey, McGee, &

O'Boyle, 2003). Administration of this instrument is by semi-structured interview and

consists of three steps. First, the respondent is asked to name five areas of his or her life

that most determine or are most important to his or her quality of life. Second, a rating of

the present level of satisfaction with each life domain is elicited. Finally, the respondent

indicates the relative importance of each area. Many applications of this instrument also

ask the respondent to rate his or her overall quality of life at the end, after the satisfaction

and importance levels of each life domain are determined. Although the instrument does

not contain an ideal set of instructions regarding judgment heuristics, its administration

manual does provide the following guidance to respondents (C. O'Boyle et al., 1993):

> "For each of us, happiness and satisfaction in life depends on those parts or areas of life which are important to us. When these important areas are present or are going well, we are generally happy but when they are absent or going badly we feel worried or unhappy. In other words, these important areas of life determine the quality of our lives. What is considered important varies from person to person. That which is most important to you may not be so important to me or to your husband/wife/children/parents/friends [mention one or two of these groups as appropriate] … and visa versa.

> I am interested in knowing what the most important areas of your life are at the moment. Most of us don't usually spend a lot of time thinking about these things. Indeed, we often only notice that certain things are important when something happens to change them. Sometimes it is easier to identify what is important by thinking about the areas of life that would (or do) cause us most concern when they are missing or going badly." (Page 4)

These instructions do three things to help respondents with the cognitive

challenges involved in judging their life satisfaction. First, they encourage an

individualized rating by indicating that it is likely and allowed that the respondent's

answers will differ from that of others. They give instructions as to how to identify

important life domains—e.g., "the areas of life that would (or do) cause us most concern

when they are missing or going badly." And they indicate that this will take some thought

in two ways: 1) by the fact that personal rather than group consensus answers are

expected, and 2) through the statement: "Most of us don't usually spend a lot of time

thinking about these things."

Respondents have the ability to nominate and rate any life domain that their life

experience has shown to be important to their quality of life. The nominated life domains

are then rated for "how each of these areas are for you at the moment" using a visual analog scale (VAS) that goes from "worst possible" to "best possible." Then "how important" the five areas of life "are in relation to each other" is indicated by "moving the [set of stacked] disks around until their relative size represents your view of their importance." The sum of the products of the satisfaction ratings (0-100) and importance weights (constrained to sum to 100) across the five areas is then calculated and taken as one measure of overall life satisfaction for that individual—the SEIQoL Index.

Through this process the respondent has now had the opportunity to review his or her overall quality of life and its determinants. After these steps are completed, two additional questions are posed. The first is: How would you rate your quality of life today? And the second is: How would you rate your quality of life in general? Asking these two questions in succession separates the effect of current mood or affect on the measure of overall quality of life, especially since similar wording is used. The use of similar wording invokes the conversational norm of non-redundancy (Schwarz & Strack, 1999; Schwarz, Strack, & Mai, 1991; Strack, Martin, & Schwarz, 1988). In daily conversations, speakers are supposed to provide information that is new to the recipient, rather than to reiterate information that the recipient already has. Having just answered a question about her marriage, for example, a respondent may therefore assume that a subsequent question about her life in general pertains to new aspect of her life, much as if it were worded "aside from your marriage, how's the rest of your life?" Whether the general question is interpreted in this way or not depends on whether it is assigned to the same conversational context as the more specific question. Respondents tend to treat to

sequential questions as addressing different topics (as invoking non-redundancy) if both questions have similar wording. Similarly worded questions invoke non-redundancy because respondents assume that the researcher wouldn't have asked both questions if they weren't supposed to have different answers.

Responses to the last question (How would you rate your quality of life in general?) are assumed to be the best measure of overall quality of life available. Although this question does not specifically ask for a rating of life satisfaction, it is a reasonable measure of life satisfaction-type quality of life. This is because it is asking for a retrospective "how are you doing" rating across a person's experienced life. Respondents have just been asked to rate how each of their nominated important areas of life "are for them at the moment." Thus, it is reasonable to expect that they will also tie this rating to their life experience—at least to the life experience reviewed to this point. It is also a life satisfaction-type measure since it is not an objective measure, not a state of mind measure (e.g., not just are you happy), and not a desire/preference measure (e.g., not a prediction of what they would like or prefer). Finally, according to Rossiter (2002) and Bergkvist and Rossiter (2007) a single item may be most appropriate for the measure of overall quality of life. This point will be discussed in more detail in later sections, but if nearly everyone can agree on what the object of the evaluation (life) is, and nearly everyone describes the attribute of interest (quality or satisfaction) identically, then Rossiter argues that one well-worded item provides the most valid measure.

**THE DOMAINS MOST LIKELY TO DETERMINE OVERALL QUALITY OF**

**LIFE**

This chapter presents a series of analyses of the life domains contained in the Wandsworth dataset and available to include in the estimation of overall quality of life. This chapter presents the characteristics of the list of life domains whose satisfaction ratings are assumed to be the most proximal determinants of overall quality of life (see Figure 1).

In the first section the strengths and limitations of the list of life domains available are discussed, and issues are presented regarding better lists for future studies. The second section presents data on domain nomination, satisfaction levels, and importance weights, including trends in these variables across interviews. Also included are several brief analyses intended to give some idea of respondents' thinking with regard to the domains they nominated and the satisfaction levels given. The third section presents the results of an analysis of response shift—i.e., the tendency for respondents to subjective inquiries (e.g., questions regarding their quality of life) to use different reference points and concepts when answering the same question at two different points in timer (Ring et al., 2005). The fourth section presents the results of several analyses comparing the life domains used in this study to those observed in other studies. The chapter ends with a summary.

**The strengths and limitations of the life domains available in the dataset**

A number of researchers have theorized as to the identity of the life domains of interest to life satisfaction and overall quality of life. In fact, the objective measures of life quality mentioned above are made up of sets of these domains, such as the lists of basic needs developed by the philosopher Garrett Thomson (Wellman, 1989), the founder of the peace studies discipline Johan Galtung (Galtung, 2005), and psychologists Warner Wilson (Diener & Lucas, 2000; Wilson, 1967), and Abraham Maslow (Maslow, 1982; Sirgy, 1986). Other efforts to develop complete lists of the life domains involved in overall quality of life have been proposed by healthcare researchers in an attempt to move beyond health-related quality of life (Schipper, Clinch, & Olweny, 1996; Spilker, 1996; Spilker & Revicki, 1996). Other studies have examined the life domains that have been found to be correlated with life satisfaction—for a review see Argyle (1999); Diener (1984); Lyubomirsky, King, & Diener (2005); Sirgy et al. (2006); and/or Veenhoven (1996). Finally, Andrews and Withey (1976) used a combination of existing lists and a small number of structured interviews (twelve) to generate their list of 123 life domains. However, no all-inclusive list of life domains important to individuals' quality of life has been otherwise empirically determined.

Individuals' nominations of the life domains important to their overall quality of life in the SEIQoL come close to comprising a complete, empirically determined list for the population at hand. In the first step of the SEIQoL, the respondent is asked to name five areas of his or her life that are the most important in determining his or her overall quality of life. If the individual gives a one-word or short response that could have more

than one interpretation, more clarification is requested. For example, if the respondent names "golf" as important to his or her overall quality of life, further questions are asked to determine what it is about golf that contributes to overall life satisfaction. Is it the social aspect, is it being outdoors, is it the ability to play golf, or is it something else? Unfortunately, in the database used here, the actual statements made by respondents regarding the five areas of their life most important to their quality of life were categorized into 31 terms, one being "other." These domain name labels are shown in Table 1. According to one of the authors of the original study, the scheme of categories was drawn up by the research workers and then the actual statements were categorized independently by the two workers, with the few disagreements resolved by discussion [J.G. Beaumont, Personal communication via electronic mail, March 26, 2008].

Table 1. Life domains available in the Beaumont and Kenealy (2004) (Wandsworth) dataset roughly grouped by general domain areas

| Attitudes/beliefs | Activities |
|---|---|
| Acceptance of old age | Hobbies/interests |
| Emotional wellbeing/self esteem | Holidays/travel |
| Feeling valued | Physical activity |
| Independence (freedom of choice) | Pleasurable pursuits |
| Independence (looking after oneself) | Voluntary work |
| Self efficacy | Lunch club |
| Current affairs | Social life/events |
| Keeping busy | Environment |
| Learning | Financial security |
| Creativity | Personal safety and security |
| Social support | Home |
| Church | Transport |
| Companionship | Health-related |
| Family | Health |
| Friends | Mental agility |
| Partner | Mobility |
| Preventing isolation | |

Several of the researchers who have used the SEIQoL were contacted in an attempt to obtain the actual statements from the datasets. These attempts were, however, unsuccessful. For the five that responded to my inquiries, the reason given for not providing the information was that the consent form did not allow the sharing of these data. Future attempts to compile a comprehensive list of life domains may benefit from obtaining and compiling the actual statements made by individuals regarding what is important to their quality of life across a large representative sample with a goal of developing an appropriate taxonomy of quality of life determinants. This taxonomy can then become the basis for the lists of life domains for which individuals state their satisfaction. Having a complete (or at least completely representative) list of life domains for which to state satisfaction would improve the SEIQoL's (or any future instrument's) ability to measure overall quality of life because it would ensure that individuals review and evaluate a complete list of possible domains (and thus can make a fully informed evaluation of overall quality of life) rather than to address only those domains that are most salient (accessible) at the time.

The Andrews and Withey study (1976) included two types of "life concerns" that they called domains (aspects of life that can be evaluated in light of one's values) and criteria (values that can be used to evaluate domains). Domains were defined as places, things, activities, people, and roles, and they noted that not all people share these. For example,, not all people  included in the Wandsworth data set  participate in volunteer activities or have a partner. Examples of criteria include amount of challenge, privacy, comfort, fun, variety and diversity, independence and freedom, responsibility, and so

forth. Andrews and Withey assert that, in general, all people have these criteria, but that they mainly differ in the standards they set for each. "Affective evaluations" (asked as "how do you feel about _____?") are obtained for both types of life concerns. These affective evaluations (or, in some cases, indices created across related groups of these responses) are assumed to predict their measure of overall quality of life.

Andrews and Withey's goals regarding a set of life concerns were that they be sufficiently broad to contain all the most important concerns, relevant for all groups, valid, and flexible so that tradeoffs in resource input, accuracy of output and specificity or detail can be accommodated. They noted that individual concerns can vary in their degree of specificity or scope. For example, house is a concern with a narrower scope than life as a whole, but a broader scope than kitchen. They had the idea that future researchers could choose concerns with the level of scope appropriate for their needs— i.e., more specific levels in the area of interest (e.g., the concerns targeted by a program) and less specific elsewhere. Also, they recommended that the set of concerns included in any study be a sample of those representing all major areas of the full perceptual space that could be considered life-as-a-whole.

Andrews and Withey's basic model involved a matrix with rows representing domains and columns representing criteria. They hypothesized that each cell in this matrix represented an individual's affective evaluation of that domain using that criterion, or alternately, that criterion in the case of that domain. The "sums" of each row or column would then represent the evaluation of that life concern. Affective evaluation of life-as-a-whole was then considered to be a combination of the domain evaluations or the

column evaluations—even though in actuality (and likely because of data limitations) they did include some of each in almost all of the models tested. In the end it turned out that models including mostly domains did as well as those including mostly criteria. However, the authors note that they would prefer to include domains because they were more likely to be social indicators that could be targeted by social programs.

The list of life domains contained in the Wandsworth dataset seems to include both domains and criteria according to Andrews and Withey's terminology. In fact, most of the life domains listed in Table 1 under attitudes/beliefs might be defined as criteria and many of the remaining items could be domains. Andrews and Withey found that certain criteria only related to some of the domains and that they often clustered with their related domains in life-as-a-whole perceptual space. For example, in the Wandsworth dataset, preventing isolation may be considered a criterion that only applies to social activities. The differentiation between domains and criteria is interesting and important to note. This distinction may be significant when considering the ideal set of life domains to include in a model of overall quality of life, and thus, should be included in future studies with this purpose. However, for the purposes of this study, all life domains included in the dataset will be treated equally because those that are likely criteria may actually (at least partially due to overlap in the perceptual space) represent related domains of interest, and visa versa. Also, for most of the rest of this study, the life domain category labels are analyzed and discussed as if they are adequate representations of the actual statements made (nominated) by respondents regarding the areas of their life most important to their overall quality of life.

**The life domains nominated as most important to overall quality of life**

This section discusses three different aspects of the data available in the Wandsworth dataset on life domains. The first portion contains data on the frequency by which each life domain was nominated, and the average satisfaction levels and importance weights for each. The second contains graphs of the trends seen across interviews in some of the domains most often nominated. The third presents a series of analyses intended to give evidence of how respondents were thinking about the domains they nominated, the satisfaction levels given for each, and the importance weights assigned.

**Frequency of domain nomination and average satisfaction levels and importance weights for each**

Tables A.2 through A.5 (Appendix A) present data on the life domains nominated by the individuals in the Wandsworth dataset at each interview (Tables A.2 through A.4) and for all interviews combined (Table A.5). Subject retention was high in the study: 82 percent of those who completed the first interview also completed the second, and a respectable 73 percent also completed the third. As can be seen in Table 2, which contains data on the domains nominated most often, statements having to do with family were nominated most often across the three interviews. Approximately 60 percent of respondents reported at each interview that some aspect of their family was important to their overall quality of life. Statements pertaining to friends, health, and hobbies/interests were in the top five for all three interviews with between one-third to one-half of respondents reporting these as important to their quality of life. No domain had less than

five nominations across all three interviews with the exception of acceptance of old age

with no apparent nominations.

Table 2. Frequency of nomination and average satisfaction levels and importance weights
for the life domains most often nominated

| Domain name | Nominations | | Number of times nominated more than once by same person | Satisfaction levels (0-100) | | Importance Weights (0-100) | |
|---|---|---|---|---|---|---|---|
| | No. | % | | M | SD | M | SD |
| Family | 296 | 60% | 8 | 84.5 | 15.10 | 29.9 | 9.97 |
| Friends | 223 | 45% | 1 | 80.6 | 14.37 | 21.8 | 9.03 |
| Hobbies/interests | 215 | 44% | 35 | 75.3 | 17.63 | 17.9 | 6.90 |
| Health | 177 | 36% | 5 | 68.5 | 19.48 | 27.3 | 10.12 |
| Home | 119 | 24% | 2 | 79.9 | 19.13 | 22.2 | 7.72 |
| Mobility | 109 | 22% | 2 | 71.0 | 20.83 | 24.3 | 9.73 |
| Companionship | 101 | 20% | 8 | 77.4 | 17.22 | 21.3 | 9.93 |
| Church | 84 | 17% | 0 | 80.7 | 13.02 | 25.7 | 11.20 |
| Creativity | 82 | 17% | 11 | 71.4 | 19.32 | 17.4 | 7.61 |
| Independence (freedom of choice) | 71 | 14% | 0 | 78.1 | 16.95 | 22.7 | 8.31 |
| Social life/events | 70 | 14% | 3 | 73.5 | 15.87 | 18.3 | 8.22 |
| Financial security | 67 | 14% | 0 | 67.8 | 18.70 | 21.0 | 10.59 |
| Mental agility | 51 | 10% | 3 | 76.5 | 15.99 | 16.7 | 7.72 |
| Partner | 49 | 10% | 0 | 85.7 | 10.69 | 30.6 | 8.47 |
| Physical activity | 49 | 10% | 3 | 78.6 | 21.01 | 19.3 | 7.51 |
| Weighted average | | | | 77.2 | | 22.6 | |

It should be noted that although the percentages shown in the second column of

Table 2 (and Tables A.2 through A.5) can be roughly interpreted as the percent of

respondents reporting each life domain, they are actually that domain's percent of all

reported life domain nominations. Two issues make this clarification necessary. First,

although each respondent was given the opportunity, and was encouraged to nominate

five areas of life as important to his or her overall quality of life, as noted at the bottom of

Tables A.2 through A.5 not all respondents were able to name five domains. Second, some respondents made more than one statement regarding the important areas of their life that were later categorized under the same domain name. For example, one respondent could make two statements about two different hobbies, say making model ships and collecting stamps, and these would both be categorized under hobbies/interests resulting in one respondent accounting for two cases of hobbies/interests being nominated. This did not happen often, but as can be seen in the third column in the tables, this occurred most often for hobbies/interests.

The fourth and fifth columns of Table 2 (and Tables A.2 through A.5) give the average and standard deviation of the satisfaction levels reported for each domain area. As can be seen, average reported satisfaction levels for the nominated domains (based on a 0-100 scale) tend to be fairly high. The averages reported in these tables do, however, mask wide ranges of reported satisfaction levels for some domain areas. Across all interviews, all domains except voluntary work had maximum satisfaction levels reported of 97 to 100 (out of 100) and the minimum values reported for eight domains were 5 or less (out of 100). These domains are family, health, home, mobility, physical activity, holidays/travel, current affairs, and emotional well being/self-esteem [data not shown].

The last two columns of Table 2 (and Tables A.2 through A.5) give the average and standard deviation of the importance weights reported for each domain area. Since the sum of the importance weights was constrained to be 100 (for each respondent for each interview) and since most respondents reported five life domains per interview, the averages shown in these tables should be compared to 20 (100 divided by 5). If a

respondent nominated fewer than five domains, their 100 points of importance were all allocated to the four or fewer domains nominated. As would be expected intuitively, the domain most nominated (family) is also generally the domain with the highest average importance weight. However, although the domain "partner" was only nominated 10 percent of the time across all interviews, it had the highest average weight across all interviews. It seems that on average to those who had a partner (and who nominated "partner" as important to their quality of life) having their partner was very important. As seen with satisfaction levels, the importance weight averages mask the variation actually seen in these values. The maximum weight given by individuals to twelve of the domains across all interviews was 50 or above, and the minimum weight given to eleven of the domains was 5 or lower [data not shown].

**Trends in nominated domains across all interviews**

Figure 2 is a graph of the top ten domains in terms of frequency of nomination and how that frequency changed across interviews for those respondents that completed all three interviews. No dramatic change in nomination frequency is seen. The biggest absolute change between interviews 1 and 3 is seen in mobility and hobbies/interests. Mobility increased by 13 percentage points and hobbies/interests decreased by 13 percentage points. The biggest proportional change is seen in mobility, which almost doubles in the number of times it is nominated between interviews 1 and 3. In general, the trends seem to track the path expected as this elder population ages—awareness of health and mobility increases, and other less-important domains are dropped from nomination to make room for these.
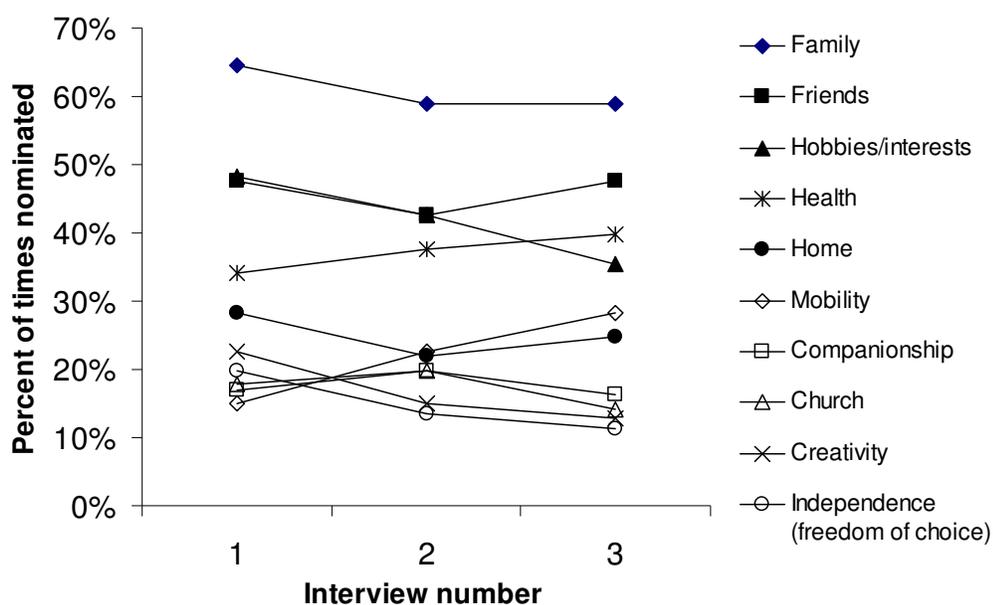
Figure 2. Change in domain nomination across interviews for the domains most nominated

Figure 3 shows the change in average importance weights over time for the same 10 domains shown in Figure 2. Because importance weights are only reported across nominated domains, and are not affected by domains that are not nominated or have lost nomination, the trends seen in Figure 3 can differ in direction from those shown in Figure 2. For example, the nomination of hobbies/interests decreased by 13 percentage points, but the average importance weight for this domain went up. As would be expected intuitively, this domain, hobbies/interests, tended to be dropped from nomination by those who gave it a lower importance weight. Friends and creativity gained the most both in absolute points and in proportional increase.
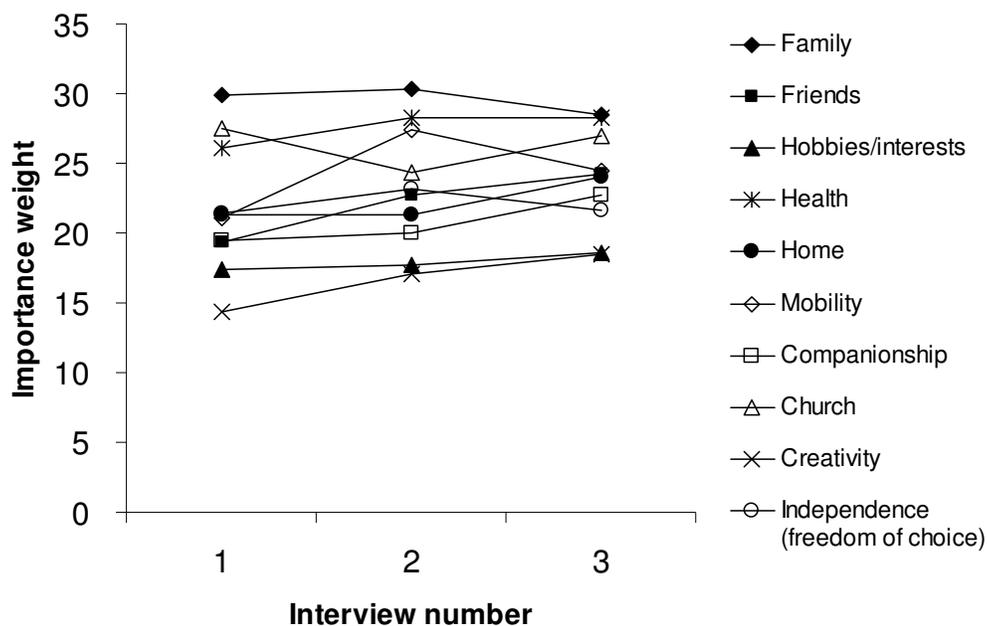
Figure 3. Change in average importance weights across interviews for the domains most often nominated

## Evidence of respondents' thinking regarding domain nomination and stated satisfaction

The relationship between order of nomination and the importance weight. A separate analysis was used to answer the question: was the domain that was later given the highest importance weight nominated first, second, or later? When asked to name the areas most important to one's overall quality of life, what comes to mind first (i.e., is most salient) may not always be that which, upon later reflection, is weighted as the most important domain. It is possible that the higher the order number, the more the person needed to think to come up with a domain that ultimately was weighted as most

important. Most domains later determined to be most important were nominated either first or second. The domains that seem to have been on average nominated later include: home, independence (freedom of choice), creativity, emotional wellbeing/self esteem, and feeling valued—all concepts that may require more contemplation to come to mind [data not shown].

Nomination of domains doing well or doing poorly. Another analysis looked at the tendency for individuals to nominate mainly domains in which they are doing well, mainly domains in which they are doing poorly, or a balance of the two as a way of gaining more insight into the manner in which individuals approach the nomination of life domains (Moons et al., 2006). A perfectly rational reporting of quality of life would tend to include a balance of life domains with higher than normal and lower than normal satisfaction. The instructions given at the beginning of the SEIQoL ("Sometimes it is easier to identify what is important by thinking about the areas of life that would (or do) cause us most concern when they are missing or going badly"(C. O'Boyle et al., 1993)) might result in more reporting of life domains that are going badly. However, healthy response shift and a tendency for high reports of quality of life might indicate that it is more common for individuals to focus on those domains that are going well.

Since satisfaction levels were recorded on a 0-100 scale with 0 representing "worst possible" and 100 representing "best possible," 50 was chosen as the cut off point between domains that are going poorly and those that are going well. Only about a quarter (49) of respondents in the first interview nominated at least one domain that was doing poorly. This proportion dropped to 20 percent in the second interview and 16

percent in the third interview. Most of these nominated only one domain that was given a satisfaction level of 50 or less, and only one nominated five domains that were doing poorly. Therefore, across all individuals, nominations, and interviews, the proportion of satisfaction levels below 50 was about 6 percent [data not shown]. It looks like respondents tended to focus on domains that were going well—or at least to give positive (above 50) satisfaction ratings to the domains they nominated.

Preliminary evidence of response shift. Finally, between interviews 1 and 2 and between interviews 2 and 3, essentially all (98%) respondents changed at least one of the domains they nominated. This evidence of response shift will be analyzed in more detail below.

## Evidence of response shift and adaptation

*"I know who I was when I got up this morning, but I've changed several times since then." (Alice in Wonderland by Lewis Carroll)*

As discussed above, adaptation is the term used for the process by which individuals tend to return to their baseline levels of life satisfaction some period after a significant life event (e.g., marriage, winning the lottery, severe disability, losing a spouse). The determinants of adaptation include psychophysical habituation (becoming less sensitive to a stimulus the longer one is exposed to it), attention dilution (we focus our attention where there has been recent change, but with the passage of time changes elsewhere draw our attention), and ordinization (as time passes we tend to rationalize an event and view it as ordinary) (Hsee et al., 2008). The concept of adaptation is frustrating

to life quality researchers because it implies that no real change in reported overall quality of life is possible even in the face of significant life changes.

Response shift refers to the fact that respondents to subjective inquiries (e.g., questions regarding their quality of life) at two different points in time may not use the same reference points and concepts when answering, even when the questions are asked in exactly the same manner (Ring et al., 2005). The theory of response shift tries to explain the underlying mechanisms by which changes in life circumstances fail to translate directly into changes in reported overall quality of life. Response shift may reflect the process of adaptation as well as the initial reaction to a life event to which the individual may later become adapted. According to this theory a one-to-one relationship between changes in life circumstances and reported quality of life may not happen for one or more of the following three reasons: changes in scale calibration, changes in the conceptualization of quality of life, and changes in the prioritization of individual life domains when assessing quality of life. In the data used here, changes in the importance weightings given may be evidence of re-prioritization, and changes in the domains nominated may be evidence of re-conceptualization or re-prioritization.

Two tables in Appendix A report on the number of individuals who changed their nominated life domains over time (Table A.6), and the number of those who changed their importance weights when nominating the same domains across interviews (Table A.7). Both are evidence of response shift.

**Adding or dropping domains between interviews**

As can be seen in Table A.6 a considerable proportion of the nominations for each domain were dropped by individuals after interviews 1 and 2 (about 40 percent on average), and a similar proportion added by different individuals in the following interviews (interviews 2 and 3). Because the proportions added and dropped are so similar for each domain, the amount of domain shifting by individuals across interviews was not obvious in Tables A.2 through A.4, which showed the proportions nominating each domain across interviews as remaining fairly constant. For each individual it was most typical to add two new domains and drop two old domains between interviews and almost all added and/or dropped one, two, or three domains. Only three respondents kept the same domains for all three interviews, and three changed all five domains between interviews 1 and 2 [data not shown]. Note that these changes only capture movement from one domain label to another. Respondents' actual statements may have changed more often, but those statements may still have been considered to be within the same domain category.

Several possible reasons may explain why someone would add a new domain between one interview and the next. First, something "good" (or "bad") may have happened in that area of that person's life and it now becomes salient and perceived as important to quality of life when it had not been before. This reason for a change in domains may be evident by the new added domain having a higher (or lower) satisfaction rating than the average for that domain before. It is also possible that a life domain is added simply because another has been dropped, and there is now room to consider a new

domain that has always been marginally important even when no real change has happened in that domain. Similarly, a domain could be dropped simply because another now more salient domain was added. These types of domain additions are most likely to have average satisfaction levels. The satisfaction levels of the added or dropped domains did not differ greatly from those not added or dropped. However, the average importance weights for the dropped domains were, in general, lower than the average weights for all nominations of each domain in the interview before dropping indicating a tendency for less important domains to be dropped [data not shown].

**Changing importance weights between interviews**

Table A.7 shows the number and proportion of each domain for which the importance weight assigned increased or decreased between each interview. To be counted, a change in importance weight had to be larger than 0.2 standard deviations of the importance weights given across all nominations for that domain (Cohen's definition of a small change (Cohen, 1988)). Of course, a change in importance weight can only be tracked if the same domain was nominated for more than one consecutive interview. The large number of added and dropped domains discussed above significantly lowers the number for which an importance weight change was possible. Also, as was mentioned above, although the domain labels remained the same, respondents' actual statements may have changed since different statements may still have been considered to be within the same domain category. Given these limitations, the percents demonstrating a change in importance weights tend to be lower than the percents added and dropped (Table A.6). However, between Tables A.6 and A.7 it is evident that essentially all domain

nominations were susceptible to some type of response shift. Across interviews and individuals it was most common to increase the importance weight of one domain and decrease the weight of another, and almost all shifts in importance were of only one or two domains.

In general, two primary explanations for a change in importance weights between interviews come to mind: 1) if something "good" ("bad") happens in a domain and satisfaction levels increase (decrease), it is likely that the importance weight for that domain increases (decreases); and 2) since the sum across an individual's importance weights is constrained to equal 100, a domain's importance weight could also increase (decrease) simply because the importance weight for one or more of the other domains decreases (increases). Although no relationship between increases in importance weights and increases in satisfaction appears to exist, most domains with reduction in importance weights do display a reduction in satisfaction levels (although many are small reductions) [data not shown].

**Summary**

Changes in the domains nominated over time can be evidence of either the re-conceptualization or re-prioritization mechanisms of response shift—i.e., an individuals re-conceptualization or re-prioritization of what is important to overall quality of life—and changes in importance weights may be evidence of re-prioritization. The data gathered from this population shows a high percent of both, indicating that almost all domain nominations made were susceptible to one of these types of response shift. The

underlying reasons for these shifts will be addressed later, but for now it seems that response shift may be a much more fluid concept than previously thought.

**Comparison to theorized domain lists and to domains nominated in other studies**

As discussed above, a number of researchers have theorized as to the identity of the life domains of interest to life satisfaction and overall quality of life. But no all-inclusive list of life domains important to individuals' quality of life has been empirically determined. Because the SEIQoL allows (and encourages) respondents to nominate domains important possibly only to themselves, it provides a view into the domains that might be included in a full, empirically determined list. Of course, this preview of a possible future list is constrained by the fact that the actual statements made by respondents were categorized into domain labels without attention to the specificity that might be needed to provide adequate detail to future evaluations of programs targeting each domain area. It is also possible that statements whose satisfaction levels later may have had dramatically different effects on overall quality of life were inadvertently combined. Further, the list of domain labels also all exist at one level, whereas, ideally, a multi-level taxonomy would be desired with higher level classifications defining broader areas of the life-as-a-whole perceptual space. These higher-order classifications would be useful to keep the length of the domain lists, for which satisfaction must be rated in future studies, reasonable. Instead of presenting respondents with all possible domains, according to Andrews and Withey's work (1976), it is sufficient for satisfaction to be obtained for one or two representative domains from each of a set of these broader domain areas.

**Use of multi-dimensional scaling (MDS) to create higher-order classifications for domain labels**

In order to determine what these higher-level groupings might look like, the results of a sorting task performed by a sample of volunteers were subjected to multi-dimensional scaling (MDS).

Volunteer sort panel. A panel of 20 volunteers (11 females and 9 males) each sorted the list of 30 life domain labels into between 3 and 10 overarching general life domain categories. The volunteers were instructed to think about which labels seem to refer to the same general area of life. Each domain label was to go into one and only one overarching category group, and a group could have as few as one label in it. After the general domain categories were created, the volunteers were asked to give each a descriptive label indicating the general theme of that category.

Application of MDS. The results of this sorting task were then analyzed using MDS. MDS is a data reduction technique similar to that of cluster analysis, factor analysis, and principal components (Shepard, 1972). However, it differs from these in its focus on low dimensionality (most analyses are confined to 1- to 3-dimensions) and the resulting possible visualization of the relationships found in the data (Kemmler et al., 2002; Shepard, 1972). MDS uses various measures of similarity (or dissimilarity) between objects in order to best represent the relationships between a set of objects in terms of Euclidean distances in low-dimensional space (Kemmler et al., 2002). In this study the measure of similarity used is the number of volunteers that sorted any two life domains into the same group. In most other studies, similarity is based upon the similarity

of responses to items addressing each domain. This representation of similarity was not possible in this study because satisfaction levels were only available for the domains nominated, and each respondent was limited to nominating five or fewer domains.

The results of the sorting task performed by each volunteer were entered into a 30 by 30 matrix with each row and column representing a life domain and each cell representing the relationship between the row and column domains. If two life domains were sorted into the same general domain category, a "1" was entered in the cell at the intersection of the row of one life domain and the column of the other. The matrices were then summed to create a similarity matrix. Two life domains were considered more similar the more often the volunteer panel sorted them into the same general domain groups—i.e., two domains were considered more similar the higher the sum in the cell at the intersection of the row of one domain and the column of the other. MDS was then used to generate a perceptual map (a scatterplot of the life domains, also called a Euclidean distance model) from which general domain categories could be inferred. The MDS analysis was performed using the alternating least-squares algorithm (ALSCAL) for interval data in SPSS 15.0 for Windows.

Perceptual maps were calculated for 1-, 2-, 3-, and 4-dimensional solutions. The 2-dimensional perceptual map was chosen as the best because it was the most easily and reasonably interpreted. The amount of variance across volunteers in their sorting captured by the 2-dimensional solution (the $R^2$) was .71. The stress (a measure of lack-of-fit) was .27. This value for stress is a bit high—some authors have said that a configuration whose stress is above .20 is "unlikely to be of interest" (Kruskal, 1964) or that it "should be

checked with special diligence" (Kemmler et al., 2002). However, other authors (e.g., Shepard (1972)) indicate that the choice of dimensions should be a balance between stress, parsimony, visualizability, and the interpretability of the results. In addition, because these sorts had to be made by volunteers with only the domain labels (and no further information) available to them, a larger amount of unexplainable variation and a poorer model fit should be expected.

Figure 4 shows the resulting two dimensional perceptual map (Euclidean distance model or map of life-as-a-whole perceptual space) based on the sorts by volunteers of the life domain categories available in the database. Basically, the distance shown between each pair of individual domains on the map is a best-possible graphical interpretation of the number of times the volunteers sorted those domains into the same group. Therefore, two domains that are mapped almost on top of each other (e.g., friends and companionship) were almost always sorted into the same group, and two domains that are mapped a great distance from each other (e.g., mobility and church) were almost never sorted into the same group. Domains that are located by themselves (e.g., home, feeling valued, mental agility) are those that were sorted into widely different groups by different volunteers. It is likely that volunteers had a hard time interpreting these terms, they each interpreted them quite differently, and/or they did not feel that they were very similar to any other domains. However, the circular structure of the domain mapping indicates that although these isolated domains may have been sorted into different groups by different volunteers, they were at least sorted into somewhat-related groups. If domains are positioned near the center of a map, they are considered to be equally related (or

unrelated) to everything else (Kemmler et al., 2002). No domains are found in the center

of this map. Finally, the placement of the domains on the map seemed to define two

dimensions, which are labeled at the ends of each axis on the map.



Figure 4. Perceptual map (Euclidean distance mode) of the life domain categories
available in the database ($R^2$=.71; Stress=.27)

    Domain label groupings based on the perceptual map. The individual domain labels

were grouped into higher-order domain categories using their proximity on the map and

the interpretability of the grouping. Two levels of groups are shown in Figure 4

corresponding to two possible higher-order taxonomy levels. The first level up from the

domain labels is represented by the solid smaller circles plus the individual domains not

contained in those circles. This grouping results in 14 more general (higher-order) life

domains, starting from the upper left. This list is shown grouped by the second set of

general, highest-order life domains which are represented in Figure 4 by the three dashed larger circles.

- Activities
    - Physical activity
    - Attitudes about doing things (creativity, learning, keeping busy)
    - Things to do (pleasurable pursuits, hobbies/interests, holidays/travel, current affairs, voluntary work)
- Social network
    - Social things to do (social life/events, lunch club)
    - Relationships (family, friends, companionship, church, partner)
    - Preventing isolation
    - Feeling valued
- Health/Wellness
    - Home
    - Emotional health (acceptance of old age, emotional well being/self esteem)
    - Safety/security (financial security, personal safety and security)
    - Capability (health, independence-looking after oneself, independence-freedom of choice, self efficacy)
    - Transport
    - Mobility
    - Mental agility

The Andrews and Withey (1976) study also created a number of perceptual maps. They used a variation of MDS called smallest space analysis, which places all points in space so that plotted distances show the best agreement with the rank order of statistical relationships between items (Guttman, 1968). Instead of sorts by raters, they used the affective evaluations of each life concern as their measure of similarities. Despite the differences in life concerns/domains available in each case and the different basis for similarities, remarkable parallels are apparent between their map and the one presented above. In general, the dimensions and the placements of key domains/concerns were similar in both maps. One big difference between the maps, however, is that Andrews and Withey had a set of 123 life concerns to map, and their set included a number of psychologically more distant concerns (e.g., community, community services and facilities, local and national governments, media, weather, and taxes). Therefore, their map incorporated a much broader "life-as-a-whole area" than is shown in Figure 4 above. It should also be noted that the higher-order domain of "attitudes about doing things" may be an example of what Andrews and Withey would call criteria that are closely related to the domains included in "things to do."

**Comparison to other sets of general domain categories**

The two sets of higher-level domain categories created using MDS above were compared to three other sets—one purely theoretical and two generated using variations of factor analysis on large sets of possible items. These are shown in Table 3. These comparisons are made to illustrate how, depending on the life domains considered by the study and the method used, different sets of higher-order categories may result.

Table 3. Five of the possible groupings of life domains into general domain areas

| | MDS Highest-order categories | MDS Higher-order categories | WHOQOL-BREF | Pukrop et al | Spilker and Revicki |
|---|---|---|---|---|---|
| Transport | 1 | | 5 | | 5 |
| Mental agility | 1 | | 3 | | 1 |
| Mobility | 1 | | 2 | 1 | 1 |
| Health | 1 | 1 | 1 | 1 | 1 |
| Independence (freedom of choice) | 1 | 1 | | | |
| Independence (looking after one self) | 1 | 1 | 2 | 1 | 1 |
| Self efficacy | 1 | 1 | 2 | 1 | 2 |
| Financial security | 1 | 2 | 5 | 4 | 3 |
| Personal safety and security | 1 | 2 | 5 | 4 | 5 |
| Acceptance of old age | 1 | 3 | 3 | | 2 |
| Emotional well-being/self esteem | 1 | 3 | 3 | 5 | 1 |
| Home | 2 | | 5 | 4 | |
| Feeling valued | 2 | | 3 | 3 | 2 |
| Preventing isolation | 2 | | 4 | 3 | 3 |
| Church | 2 | 4 | | | 5 |
| Companionship | 2 | 4 | 4 | 3 | 3 |
| Family | 2 | 4 | 4 | 3 | 3 |
| Friends | 2 | 4 | 4 | 3 | 3 |
| Partner | 2 | 4 | 4 | 3 | 3 |
| Lunch club | 2 | 5 | 5 | 3 | 3 |
| Social life/events | 2 | 5 | 5 | 3 | 3 |
| Physical activity | 3 | | 2 | 1 | 5 |
| Current affairs | 3 | 6 | | | 5 |
| Hobbies/interests | 3 | 6 | 5 | 6 | |
| Holidays/travel | 3 | 6 | 5 | | 5 |
| Pleasurable pursuits | 3 | 6 | 5 | | 5 |
| Voluntary work | 3 | 6 | 3 | | 5 |
| Creativity | 3 | 7 | | | 2 |
| Keeping busy | 3 | 7 | 2 | 2 | 2 |
| Learning | 3 | 7 | | | 2 |

MDS Highest-order categories: 1 = Health/wellness; 2 = Social network; 3 = Activities

MDS Higher-order categories: 1 = Capability; 2 = Safety/security; 3 = Emotional health; 4 = relationships; 5 = Social life; 6 = Things to do; 7 = Attitudes about things to do

WHOQOL-BREF: 1 = General health; 2 = Physical health; 3 = Psychological domain; 4 = Social relationships; 5 = Environment domain

Pukrop et al: 1 = Health; 2 = Vitality; 3 = Psychosocial; 4 = Material; 5 = Emotional; 6 = Spare time

Spilker and Revicki: 1 = Health-related quality of life; 2 = Personal – internal; 3 = Personal – external; 4 = External – natural environment; 5 = External – Societal environment

Perceptual maps were not available for these other studies. However, Table 3 presents a tabular attempt to show how the domain labels used in this study may have been categorized or grouped if they had been part of the domain lists used in these studies.

In all cases, the domain categories espoused by each study are listed at the bottom of the table and the best match for the categorization of each domain label from the database is indicated in the main part of the table. Blanks in the last three columns indicate cases for which the domain label could not be reasonably placed into any of that column's domain categories based on the descriptions available for each. The two sets of general life domain groupings based on MDS and the domain labels available in the Wandsworth dataset, and listed above, are shown in the first and second columns. Blanks in the second column refer to domain labels that are themselves considered higher-order categories because they were not included in any of the solid-line circles in Figure 4.

The third column contains the life domain categories used in the short form of the World Health Organization's Quality of Life instrument (WHOQOL-BREF). The WHOQOL-BREF domains were developed by an international team to represent the WHO's broader view of health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (Katz & Gurland, 1991; The WHOQOL Group, 1996). The database used in this study also contains data from this instrument. Each of the WHOQOL-BREF domains were developed from the more detailed WHOQOL-100 (100 items in 24 "facets") using confirmatory factor analysis (The WHOQOL Group, 1998). The fourth column shows the life domain categories that were developed by Pukrop, Möller, and Steinmeyer (2000) using a selected set of 49

items from eight internationally validated health-related quality of life questionnaires and MDS. Here, similarity was based on the item responses in a sample of 479 "mentally healthy" individuals. The fifth and last column contains a theoretical list of life domains, developed by Spilker and Revicki (Spilker & Revicki, 1996). This list was not empirically-derived, and it was chosen because it was the best match, of the theoretical lists available, to the domain labels.

The Pukrop et al. scheme did not contain a match for eleven domain labels. That is, that study did not offer any domain categorizations that could reasonably contain those domain labels. More than half of the non-matches were in the general activities domain. This may be due to the fact that this scheme was developed from health-related quality of life questionnaires which tend not to address social life and activities. The WHOQOL-BREF scheme was able to allow a match for all but four domains and the Spilker and Revicki scheme matched all but two. Matching to the Spilker and Revicki scheme was enhanced by the detailed description of each category given by the authors. On the other hand, the Spilker and Revicki scheme includes a general category (external – natural environment, mainly made up of characteristics of the environment such as air, water, and land quality) into which no domain labels were placed. That is, no respondent in this database nominated an area of their life relating to these aspects of the natural environment—at least not as was evident from the domain labels. Thus, evidence of a mismatch exists both in terms of too many categories offered (Spilker and Revicki) and too few (Pukrop et al.) between the categories available and what people, at least in this database, actually nominate.

As can be seen in Table 3, in general, each group agreed on which domain labels should go into the general social network category, and with the exception of Pukrop et al, the general activities category (called environment or societal environment by the others). However, there was much variation regarding the domain labels included in the general health/wellness category. This variation probably arises because the other domain categorization schemes all started from a health perspective. It would be expected that these schemes would have a more detailed breakdown of domains in this area and would resist combining health with much else. Table 3 also revealed significant inconsistency in how the domain labels that did not get grouped in the MDS higher-order categories (the blanks in column 2) were assigned. This inconsistency may be an indication of a domain label needing more clarification than is available, or containing components that may belong in more than one category. It is interesting to note that Andrews and Withey's mapping, referred to above, also showed "house" (possibly related to home), and "car" (possibly related to transport) were less related to the other domains available.

Note that although the groupings of the domain labels available in the Wandsworth dataset (and shown in the first two columns of Table 3) are useful for the general comparisons made above, they are not carried forward in this study for use in the prediction of overall quality of life for two reasons. First, these groupings are based on the volunteer panel's sorts of the domain labels, and not on some measure relevant to overall quality of life, such as reported satisfaction for each domain. Also, as discussed above, these domain labels may or may not be valid representations of the actual statements made by respondents. Therefore, these groupings were not considered to have

sufficient validity for use in later model testing. Second, one of the goals of this study is to examine which life domains are most important to the prediction of overall quality of life. Since only 30 domains are available for this analysis (actually, as shown below, only 25 of these had sufficient data to be used), the use of aggregations of domains was not of interest.

Table 3 demonstrates considerable variation across datasets and methods in how lower-level domains (as exampled by the domain labels) might be categorized into higher-order groups. A review of the items included in the Andrews and Withey study, the WHOQOL-BREF, and the Pukrop et al. study also indicates substantial differences in the lower-level domains considered. Once again, this suggests that a more complete accounting of the domains (or in Andrews and Withey's terminology the domains and criteria) to consider, to adequately define the perceptual space of life-as-a-whole, is much needed. Researchers will face a number of challenges in defining the full list of domains. One challenge, as discussed above, involves the definition (in Andrews and Withey's terminology) of domains and criteria, and when one type, the other, or both are needed. Another challenge comes from the need to carefully draw from individuals the full meaning of the statements they make with regard to areas of their lives important to their overall quality of life.

Insight from local interviews. A series of 16 interviews were conducted locally (Tucson, Arizona) on healthy White males and females 65 years of age or older to obtain information on, and hopefully some additional insight into, the Wandsworth dataset's respondents' thought processes with regard to their responses to the SEIQoL. In general,

it seems that the categorization into domain labels of statements made by respondents

regarding the areas of their life most important to their overall quality of life, and the

actual statements themselves, may mask some unexpected personal constructs. In several

local interviews, statements were made that, on the surface, seemed straightforward, but

further questioning revealed them to not be so. For example, one local interviewee named

"horses" as one area of her life most important to her overall quality of life. Further

discussion revealed that "horses," which lacking further information could have easily

have been classified into the domain label of physical activity or of hobbies/interests,

were actually her business and a source of emotional comfort, making financial security

or emotional well-being more appropriate classifications. Another named "travel" which

should have obviously been categorized as holidays/travel. However, when shown a list

of typical categories people choose, he went on to say that "travel" contained the concept

of financial security for him because he couldn't travel if he did not have financial

security. Yet another interviewee named "working out" as an area of life important to

him (an obvious match to the physical activity domain label) and later pointed out that for

him that category also contained "health." It seems that individuals' self-proclaimed

important areas of life are chosen in a type of "top down" manner (going from their

concept of overall quality of life to the main areas they see as determining it). Whereas,

the other categorization schemes, such as those shown in Table 3, are more "bottom

up"—i.e., starting from what would be expected to be determinants of overall quality of

life. Based on this, a compilation of the statements made by respondents to the SEIQoL

may not be the best source of a full list of life domains, especially if interviewers failed to probe behind respondents' initial statements to discover their true meaning.

**Comparison to domains nominated in other studies**

A number of studies have been published that include measures of individual overall quality of life. Table 4 shows the life domain categories reported in those that used the SEIQoL (or used interviews that were very similar) for other older, generally healthy populations (Bowling, 1995; Gabriel & Bowling, 2004; Gribbin et al., 2004; Lhussier, Watson, Reed, & Clarke, 2005; C. A. O'Boyle, McGee, Hickey, O'Malley, & Joyce, 1992). The first column repeats a subset of the results seen in the Wandsworth dataset (Beaumont & Kenealy, 2004), and shown in Table A.2, for comparison. The last column is also provided for comparison and contains the results for the younger (less than 65 year old) portion of a large (n=1970) nationally representative sample of healthy adults of all ages (Bowling, 1995).

As can be seen, the same general types of life domain categories were identified in each sample. However, it is difficult to identify any real differences in the determinants of life quality for the populations represented due to the lack of a consistent, agreed upon taxonomy of these determinants. Ideally, with regard to comparing the results of different studies, taxonomy would both clearly define which concepts are included under which labels, and specify the appropriate aggregation of concepts at each order level. For example, it would specify whether "independence" should be divided into two domains such as was done in Beaumont and Kenealy (2004)—independence (freedom of choice) and independence (looking after oneself)—or

Table 4. Comparison of life domain categories important to overall quality of life across studies, shown in descending frequency of nomination. If more than 10 life domain categories were reported only the first 10 are shown.

| Beaumont & Kenealy, 2004 London Avg age 77.1 N=193 Healthy | Lhussier et al.,2005 Britain Avg age 80.6 N=168 Healthy | Gabriel & Bowling, 2004 Britain Aged 65-80 N=80 Healthy | O'Boyle et al., 1992 Dublin Avg age 63.4 N=20 Healthy | Gribbin et al., 2004 Britian Avg age 76.2 N=73 Pacemaker | Bowling, 1995 Britain Age >65yo N=410 Healthy | Bowling, 1995 Britain Aged 16-64 N=1560 Healthy |
|---|---|---|---|---|---|---|
| Family | Social network | Home and neighborhood | Family* | Leisure | Own health | Finances/ housing/ standard of living |
| Hobbies and interests | Hobbies | Social relationships* | Social/leisure activities* | Family | Relationship with family/relatives | Relationship with family/relatives |
| Friends | Independence | Psychological well being* | Personal health | Health | Finances/ housing/ standard of living | Own health |
| Health | Health | Health* | Relationships | Friends | Health of someone close/ responsible for | Health of someone close/ responsible for |
| Home | Home | Other activities done alone | Religion | Finances | Social life/ leisure activities | Social life/ leisure activities |
| Companion-ship | Holidays | Financial circumstances | Work | Marriage | Relationships with other people | Availability of work/able to work |
| Creativity | Inner self | Independence | Finances | Home | Environment | Relationships with other people |
| Independence – freedom of choice | Work/study | Social roles and activities | Family health* | Independence | Religion/ spiritual | Conditions at work/job satisfaction |
| Social life and events | | Society politics | Independence * | Religion | Availability of work/able to work | Environment |
| Mobility | | | Living conditions | Holidays | Education | Education |

* Those domains next to each other in order and with an asterisk (*) are nominated the same number of times

kept as one category (Lhussier et al., 2005), which has an impact on frequency of nomination. However, even with the lack of taxonomy, Table 4 reveals some remarkable consistencies across these studies. Health is generally found among the top four of the most frequently nominated domains, but, here, it is only first in one study (Bowling, 1995). The domain of home or "living conditions" tends to be in the top ten, but not in the top five, except for when it is combined as home and neighborhood (Gabriel & Bowling, 2004). And the domain of family regularly shows up as one of the first in nomination frequency, especially if it is believed to be incorporated into the categories of social network in Lhussier et al. (2005) and in home and neighborhood in Gabriel and Bowling (2004).

Finally, comparison to the last column (adults up to age 65) indicates that finances, and availability and satisfaction with work seem to be of less importance to older than younger populations.

## Summary of the analysis of life domains

Because of the importance of measuring not only overall quality of life, but its determinants, the purpose of this chapter is to examine the data on the 30 life domains available in the Wandsworth dataset. It is noted that these domains represent categorizations made by the original researchers and not the actual statements made by respondents. Although they do not represent a true taxonomy of the determinants of overall quality of life, they are treated as such in this study. Also, it is possible that some domains that may be important to overall quality of life are not included in this analysis because they were not salient to respondents.

With just under two-thirds of respondents making statements that were categorized under this life domain, family was most often nominated as one of the five most important areas of life with regard to overall quality of life. Friends, health, and hobbies/interests were consistently the next most often nominated with somewhere between one-third to one-half of respondents reporting these as important to their quality of life. Satisfaction levels for all domains were high with a weighted average across domains and interviews of 77.2 on a 0-100 scale. In fact, only 25% of respondents in the first interview gave a nominated domain a satisfaction rating of less than 50, and then in most cases they gave a low rating to only one domain. By the third interview only 5 percent of all domains nominated were rated as less than 50 in satisfaction. Trends across interviews in nominations and domains deemed most important followed expected trends in an older, aging population with mobility increasing the most in nominations and health increasing the most as the domain deemed most important. Averages for importance weights varied across domains only slightly from their expected value of 20, and in most cases the domain later given the highest importance weight tended to be nominated first or second in the interviews.

Changes in the domains nominated over time can be evidence of either the re-conceptualization or re-prioritization mechanisms of response shift, and changes in importance weights may be evidence of re-prioritization. The data gathered from this population shows a high percent of both, indicating that almost all domain nominations made were susceptible to one of these types of response shift. The reasons why respondents changed the domains nominated or importance weights are not clear from the

data analyzed so far, but will be explored in more detail through attempts to predict domain nomination and satisfaction levels from life circumstances and respondent characteristics in the next chapter. However, at this point it seems that response shift may be much more prevalent and a much more fluid concept than previously thought.

When comparing general domain categories developed from the domains nominated in this database with those theorized or developed from other data, considerable variation is found in how lower-level domains might be categorized. There also seems to be a mismatch between the categories defined in various studies and what people, at least in this database, actually nominate, both in terms of too many categories offered and too few. Finally, considerable variability appears to exist in the definition and breadth of the lower-level domains included in various studies. A full accounting of the domains that should be considered—one that would adequately define the perceptual space of life-as-a-whole—is sorely needed.

Finally, even in the absence of a consistent taxonomy of life domains, remarkable similarities are seen in the results across studies of quality of life in older healthy populations. Family, health, home, and some measure of hobbies or leisure activities consistently ranked high in all studies reviewed.

# IS SATISFACTION WITH LIFE DOMAINS RELATED TO ACTUAL LIFE CIRCUMSTANCES?

According to the left-hand section of the proposed model of the determinants of overall quality of life (Figure 1), life circumstances modified by individual traits determine satisfaction with life domains. In the first part of this chapter the veracity of this part of the model is tested. In the second half of the chapter domain nomination is again examined in terms of whether it can be predicted from changes in life circumstances variables.

The focus in this chapter is on the satisfaction ratings given by respondents, and later on domain nomination, and not on the importance weights assigned. Importance weights are ignored in the remainder of this study for several reasons. First, respondents have nominated five areas of their life as most important to their overall quality of life. This designation of "importance" will be examined and is believed to be more indicative of the effect of a domain being important to life quality than the weights assigned. Second, the weights assigned only indicate the relative importance of the nominated domains against each other. Therefore, it is not possible to compare the importance of, say, health across individuals because only some respondents nominated health as an important life domain, and for those that did the importance weight assigned is entirely dependent on the other domains nominated and their importance weights. Therefore, all we know from an importance weight is that a domain will not be the least important of those nominated if its weight is above .20 (and the respondent nominated five domains). Similarly, a weight of less than .20 can mean anything from second most important to

least important depending on the magnitude of the weights assigned to other nominated domains. Third, the interviews conducted locally revealed that the disk device used to allocate importance weights is difficult to operate. It is possible that certain respondents may have reported weights of near .20 for each domain (the disk is set to start at .20 for each) simply due to frustration and/or an inability to manipulate the disk. Finally, a number of studies (including Andrews and Withey study, 1976) have now shown that weighting domain-level data by the importance assigned by respondents adds little or nothing to the prediction of overall quality of life (Evans, 1997; Hsieh, 2003; Russell, Hubley, Palepu, & Zumbo, 2006; Trauer & Mackinnon, 2001).

## The relationship between life circumstances, individual traits and domain satisfaction for health, family and friends

The test of the relationship between satisfaction with life domains and life circumstances and individual traits is limited by the variables available in the database. However, as can be seen in Table A.1 above, a number of variables that measure life circumstances that may be related to satisfaction with the domains of health, family and friends are available. Therefore, models for these three domains will be tested. The number of individual traits contained in the database is also limited, but several are available to test as to whether their impact on satisfaction is direct, a modifier of the effect of life circumstances, or both. The individual traits included are sex, age, dispositional optimism (measured by the Life Orientation Test or LOT (Scheier & Carver, 1987)) and generalized self-esteem (measured by the Rosenberg Self-Esteem questionnaire or RSE (Rosenberg, 1965)). The database also contains data on race and

ethnicity. However, since only three of the respondents in the sample were non-White

and the information available on the White population only included whether their

cultural background was "UK" (from the United Kingdom) or "other," race and ethnicity

are not included in this analysis.

Table 5 shows the variables included in each of the models. The same set of

individual traits was used for each model. Traits were allowed to enter as either (or both)

main effects or interactions with (modifiers of) each of the life circumstance variables.

Because of the exploratory nature of this analysis, the limits on data availability, and

inevitable multicollinearity, stepwise regression was used to select the variables included

in each model. The analyses were run on SPSS 15.0 for Windows.

Table 5. Life circumstances variables used in the models explaining satisfaction with health, family, and friends

| Life circumstances variables | Health | Family and Friends |
|---|---|---|
| Physical and general health-related variables | | |
| Health status (1 item) | X | |
| Health status from WHOQOL-BREF | X | |
| Physical health from WHOQOL-BREF | X | |
| Total number of health problems | X | |
| Number of rheumatological problems | X | |
| Number of physical problems not otherwise classified | X | |
| Expanded disability status scale (EDSS) | X | |
| Whether have a physical disability (Y/N) | X | |
| Whether can walk at least 500 yards w/out help (Y/N) | X | |
| Whether can carry out normal daily activities (Y/N) | X | |
| Psychological health-related variables | | |
| Psychological health from WHOQOL-BREF | X | X |
| Number of psychiatric problems | X | X |
| Geriatric depression scale (GDS) | X | X |
| Social support-related variables | | |
| Social relationships domain from WHOQOL-BREF | | X |
| Attend group for older people and how often | | X |
| Attend group for all ages and how often | | X |
| Someone to turn to in times of trouble (Y/N) | | X |
| Someone to turn to if upset (Y/N) | | X |
| Someone to turn to if need help (Y/N) | | X |
| Marital status | | X |
| Could be indicative of either set of life circumstances | | |
| Generalized self-efficacy scale (GSES) | X | X |
| Living status | X | X |
| Significant life changes since last seen (Pos or Neg) | X | X |
| Significant events in past few days (Pos or Neg) | X | X |

The results of these analyses are shown in Table 6. As can be seen, a substantial portion of the variance in reported satisfaction for health was explained by the model shown ($R^2$=.56). The proportion of the variance in satisfaction explained by the models for family and friends was lower, but still substantial. The signs of the coefficients for the variables that entered each model seem reasonable. All but one of the variables entering

Table 6. Results of the regressions to estimate satisfaction with each life domain

| | Health (n=166) | | Family (n=232) | | Friends (n=196) | |
|---|---|---|---|---|---|---|
| | Coeff. | SE | Coeff. | SE | Coeff. | SE |
| Intercept | 25.62 | 6.57 | 66.74 | 8.20 | 75.67 | 2.31 |
| Health status (one item) | 5.94 | 1.57 | | | | |
| Health status from WHOQOL | 6.91 | 1.36 | | | | |
| Psychological health from WHOQOL | | | 1.08 | 0.42 | | |
| Rosenberg self-esteem questionnaire (RSE) | | | 0.58 | 0.16 | | |
| # of rheumatological problems * RSE | 0.88 | 0.28 | | | | |
| # of physical problems not otherwise classified * age | 0.56 | 0.20 | | | | |
| Expanded disability status scale * RSE | 0.20 | 0.06 | | | | |
| # of psychiatric problems * sex | | | | | -2.73 | 0.48 |
| # of psychiatric problems * LOT | | | | | 2.03 | 0.95 |
| Social relationships from WHOQOL * sex | | | | | 0.49 | 0.13 |
| How often attend a group for older people * sex | | | 1.82 | 0.87 | | |
| How often attend a group for older people * RSE | | | | | 0.16 | 0.04 |
| Widowed * sex (F=1) | | | -15.12 | 3.41 | -3.96 | 1.92 |
| Widowed * LOT | | | 0.74 | 0.13 | | |
| Married * sex (F=1) | | | -9.55 | 3.79 | | |
| Married * age | | | 0.13 | 0.04 | | |
| Married * LOT | | | | | | |
| Divorced/separated * RSE | | | | | 0.38 | 0.13 |
| Generalized self-efficacy scale * sex | | | 0.30 | 0.09 | | |
| Living alone <10 years * LOT | 0.26 | 0.11 | | | 0.50 | 0.10 |
| Living alone >10 years * RSE | | | | | -0.45 | 0.11 |
| Living in sheltered housing * sex (F=1) | | | 4.13 | 2.02 | | |
| Living in sheltered housing * age | | | | | 0.20 | 0.03 |
| Whether there was a recent negative event * LOT | | | -0.31 | 0.09 | | |
| R2 | 0.56 | | 0.41 | | 0.45 | |
| R2 Adjusted | 0.54 | | 0.38 | | 0.42 | |

LOT=Life Orientation Test; RSE = Rosenberg Self-Esteem questionnaire

the health model were measures of physical health status—i.e., measures of the circumstances seen in the health domain. The psychological health variables only entered the family and friends models. Of the social support variables entering the family model, all but one related to marital status. Living status variables entered all three models. It is interesting to note that although the variables allowed for the friends and family domain models were identical, the variables entering each were quite different. It seems that these two domains are unique in what they represent.

With regard to the proposed model (Figure 1), note that two life circumstance variables entered the model as main effects for health and one for family, but in all other cases life circumstance variables were modified by individual traits. Only one individual trait entered one model (self esteem entered the family model) as a main effect. In all other cases, individual traits entered only as modifiers.

**A test of whether including stated satisfaction for domains dropped from nomination changed model results**

The models varied in the number of observations available because satisfaction ratings for the most part were only available for those domains that were nominated by each individual. In some cases data were also available on satisfaction after a domain was dropped. These observations added between 13 (family) and 29 (health) percent to the total number available for each model. In order to determine the effect of including these observations and to see if any difference could be detected in the satisfaction ratings given to domains that had been dropped from nomination, the models were also run for each domain only including those satisfaction ratings given for nominated domains. For

health and family the results were similar to those shown in Table 6, and the average

predicted "after dropped" satisfaction levels using these models differed from average

actual values by 3 and 6 percent, respectively. However, the friends model run on the

smaller dataset demonstrated more changes—psychological variables no longer entered

the model, self-esteem entered as a main effect, the $R^2$ dropped by over half to .21, and

the model over-predicted the average "after dropped" satisfaction levels by 13 percent.

Because of the substantially reduced $R^{2,}$ it is unclear whether the tendency of this model

to over-predict satisfaction levels of dropped domains is a real effect or the result of poor

model fit. Therefore, only the models including all available observations are reported.

This analysis, of course, is limited by the variables available in the database and

by the fact that satisfaction levels are for the most part only available for nominated

domains. However, it seems that some evidence exists for stated satisfaction, with at least

these life domains, to be a function of life circumstances and that this relationship is

modified in most cases by individual traits.

**Prediction of satisfaction levels for all domains**

Satisfaction levels are needed in the next chapter for all individuals for all

domains. Therefore, the methodology above was applied to all domains with at least 30

observations on satisfaction levels (including, when available, data for domains that were

dropped) over the three interviews. Table A.8 contains information on the resulting

sample size and $R^2$ fit statistics for each of these models. As can be seen, some of the

sample sizes dropped below 30 due to missing data on one particular variable that was

only measured in the last interview (self esteem). In general, since variables were not

available regarding the life circumstances underlying most of these domains, the variables entering the models seem to say more about who is satisfied with each domain than why they are satisfied. However, for the models for which at least some appropriate life circumstance variables were available they did seem to enter as expected. For example, being able to walk at least 500 yards is associated with 32 additional satisfaction points (out of 100) for the physical activity domain. Satisfaction with home is higher in people with a higher environment domain score on the WHOQOL-BREF, which includes items on feeling safe, the health of your physical environment, and satisfaction with the conditions of your living space. Satisfaction with the freedom of choice aspect of independence is almost 10 points higher in women who are divorced or separated. Finally, a higher score on the physical health domain of the WHOQOL-BREF is associated with higher satisfaction in mobility, and this increase in satisfaction decreases with age.

**The relationship between changes in life circumstances and domain nomination**

Whether an individual nominates a domain is assumed to reflect a combination of that domain's actual importance to that individual's overall quality of life and whether it is salient or accessible to recall. A domain may be salient because something significant happened there recently that affected or threatened life quality, or simply because one's attention is there. In the next chapter whether domain nomination is an important element in the estimation of overall quality of life is tested. Here the analyses test whether changes in life circumstances between interviews can predict domain nomination in the next interview.

Again, because there are more variables available in the database that might predict nomination of health, family and friends, these are the three models that are presented. In general, the same variables shown in Table 5 for each model are used again here. However, instead of interactions with individual traits, these models include variables on changes in life circumstances from one interview to another (to see if it is a change that predicts nomination), as well as variables indicating only negative changes (to see if only negative changes predict nomination). The number of observations are the same for each model (n=236) since full data are available on nomination and because only nomination in interviews 2 and 3 is being considered. Again, because of the exploratory nature of this analysis, the limits on data availability, and the presence of multicollinearity, a forward stepwise logistic regression based on likelihood ratios was used to select the variables included in each model. The analyses were run on SPSS 15.0 for Windows.

The results are shown in Table 7. The amount of variance in nomination explained by each model (shown by the $R^2$ estimates) tends to be lower than seen in the models predicting satisfaction, especially for the model predicting health nomination. The Nagelkerke $R^2$ corrects the Cox and Snell estimate's inability to reach 1.0, and thus, is always the higher of the two. The models' ability to correctly predict nomination is also shown by the sensitivity, specificity and overall correct prediction percents at the bottom of the table. The low sensitivity of the model predicting health nomination (39 percent) indicates that a model prediction of a health nomination will be correct less than half the

time—i.e., will be correct less often than chance. In the other cases, the models were able

to predict better than chance.

Table 7. Results of the models predicting nomination of each domain using logistic regression

| | Health | | Family | | Friends | |
|---|---|---|---|---|---|---|
| | Coeff. | SE | Coeff. | SE | Coeff. | SE |
| Intercept | -3.68 | 0.86 | -1.33 | 0.35 | -2.46 | 0.69 |
| Health status from WHOQOL | 0.67 | 0.19 | | | | |
| Change in Psychological domain from WHOQOL | 0.25 | 0.11 | | | | |
| Negative change (decrease) in Psychological domain from WHOQOL | | | -0.48 | 0.21 | | |
| Geriatric depression scale (GDS) | 0.14 | 0.07 | | | | |
| Negative change (increase) in Geriatric depression scale (GDS) | | | -0.35 | 0.15 | -0.43 | 0.17 |
| Change in whether have someone to turn to in times of trouble | | | | | -1.86 | 0.71 |
| Negative change (decrease) in whether have someone to turn to if need help | | | | | 2.72 | 1.33 |
| Widowed | | | 1.67 | 0.35 | | |
| Married | | | 0.85 | 0.43 | -1.64 | 0.53 |
| Living alone >10 years | | | | | 0.93 | 0.35 |
| Whether there was a significant negative life change | 0.98 | 0.31 | | | | |
| Sex (Female=1) | | | 1.31 | 0.33 | 0.90 | 0.33 |
| Rosenberg self-esteem questionnaire (RSE) | | | | | -0.10 | 0.03 |
| Cox & Snell R Square | 0.11 | | 0.24 | | 0.23 | |
| Nagelkerke R Square | 0.15 | | 0.31 | | 0.31 | |
| Sensitivity | 39% | | 72% | | 66% | |
| Specificity | 84% | | 69% | | 77% | |
| Overall correct predictions | 67% | | 70% | | 72% | |

The health model contains only one calculated change variable. An increase in the WHOQOL-BREF psychological domain variable from one interview to the next is associated with an increase in the likelihood that health will be nominated, and conversely, a decrease is associated with a decreased likelihood. This model also includes the variable that measures whether there was a negative "significant life change" since the last interview. Although no information was available as to the nature of the change other than that it was negative, this life change is associated with an increased likelihood of health being nominated. However, no variables indicating change in physical or general health status entered the model as predictive of health nomination even when the significant life change variable was blocked from entering [data not shown].

In the model predicting the nomination of family, two of the six variables that entered the model were calculated change variables and specifically negative change variables. A decrease in the WHOQOL-BREF psychological domain (but not an increase or improvement) was associated with an increased likelihood of nominating family (an increase because two negatives are being multiplied together), and an increase in the GDS (but not a decrease or improvement) is associated with a decreased likelihood of nominating family. However, no change in social support variables entered the model predicting family nomination. Therefore, negative changes in the two psychological measures each seem to be related to nomination of family, but in different directions. The ranges of scores for each are almost identical and the estimated coefficients are similar, so it is unclear what these results actually mean.

Finally, in the model predicting nomination of friends, three of seven variables are calculated change variables and two of these are changes in social support variables. As seen in the family model, an increase in the GDS (but not a decrease or improvement) is associated with a decreased likelihood of nominating friends. A loss of having someone to turn to in times of trouble is associated with an increased likelihood of the nomination of friends and a gain of someone to turn to is associated with a decreased likelihood. Conversely, a loss of someone to turn to for help is associated with a decreased likelihood of the nomination of friends as an important domain for overall quality of life. Again, it is unclear what these opposing results indicate.

Respondents were asked to nominate those domains that were most important to their overall quality of life. The expectation was that the domains nominated are actually important to (read: are determinants of) the respondents' stated overall life quality. However, as mentioned above, because the respondents were asked to come up with their five most important life domains without any prompts, it is possible that at least some of the domains were nominated simply because they came to mind at the time. Domains can come to mind because they are important to the respondent (or to most people), and they can come to mind because they are important "at the margin"—i.e., important mainly because they are in flux and may threaten life quality. But they can also be salient for some non-quality of life-related reason—e.g., simply because the respondent read an article about the topic that morning or just had gone shopping for some hobby supplies.

The models in this section examined whether domain nomination was related to actual changes in life circumstances that would be expected to be important—health and

social support. Of the three models estimated, only the friends model included expected change variables—changes in social support. However, in that model changes in having someone to turn to in times of trouble and for help were predictive of nomination in opposite ways. No evidence of nomination of health due to changes in health was found for health, nor was there evidence of nomination of family due to changes in social support. Therefore, whereas these models give some indication of the types of individuals (by health, marital, and living status and by changes in psychological variables) that tend to nominate these domains, they do not elucidate why the domains were nominated.

### Summary

In this chapter it was determined that satisfaction levels seem to be related to expected life circumstances variables and these relationships are for the most part moderated by individual traits. Also, domain nomination does not appear to be related to changes in the life circumstances underlying the domain.

# PREDICTING OVERALL QUALITY OF LIFE FROM DOMAIN SATISFACTION

As discussed above, understanding the connection between life satisfaction and its determinants (i.e., satisfaction with individual life domains) is essential to the evaluation of interventions and to future program planning. This is because any intervention will have its impact on life quality through its impact on underlying determinants—i.e., through its impact on reported satisfaction with the areas of life (life domains) that have the largest effect on individuals' quality of life. The relationship between domain satisfaction and overall quality of life can identify those domains that have the largest impact on quality of life so they can be targeted, can indicate whether programs have impacts on other than the targeted domain, and can help separate the effect of adaptation in the targeted domain from that of a possible offsetting life quality influence in another domain.

This chapter presents several analyses that examine the right-hand side of the model shown in Figure 1—i.e., domain satisfaction as the most proximal and only determinant of overall quality of life:

- Whether satisfaction with individual life domains can reasonably predict reported overall quality of life;
- Which life domains should be included: only those nominated as important by respondents, only those considered "intrinsically important," some combination of these, or all available domains;

- Whether recent large changes, in particular, losses, in domain satisfaction affect overall quality of life in a different manner than gains ; and

- Whether stated satisfaction with individual domains captures all the variance in overall quality of life otherwise explainable by individual traits.

**Determination of whether domain nomination or intrinsic importance is important to the relationship between domain satisfaction and overall quality of life**

Because satisfaction ratings are only available in the database for those domains nominated by respondents, the values of satisfaction predicted in the last chapter for all domains will be used in these analyses. A comparison of model results using actual satisfaction versus predicted satisfaction will be reported for two cases for which the use of actual values was possible; both involve the estimation of quality of life assuming only nominated domains are important.

For the models assuming only nominated domains to be important, all other domains are given mid-point satisfaction levels—50 on a 0-100 scale. The idea here is to give these domains a satisfaction level that represents the fact that they were not on respondents' "radar screens." That is, these domains were not doing so well, or so poorly, that they became important to respondents' overall quality of life perceptions. Several values were tested as alternatives to 50, including using respondents' average satisfaction with nominated domains. In fact, intuitively it seems that the appropriate value should be somewhere between 50 and this average. It should be above 50 because average reported satisfaction levels tended to be well above that number, making 50 a fairly low satisfaction rating. On the other hand, it should be below the average satisfaction levels

reported for nominated domains because it could be argued that non-nominated domains, as evidenced by their lack of nomination, are not doing as well. Lacking any information by which to determine a better number, and given that the models using 50 fit the data best, 50 is used for the satisfaction rating for non-nominated domains in tests of the importance of nomination. Because the database has data available on whether someone was doing voluntary work and whether they have a partner, satisfaction for those domains was also set to 50 in all datasets for those individuals for which these domains would not likely apply—i.e., for those not doing volunteer work and those without a partner.

For a domain to be intrinsically important implies that it is likely to be important to (i.e., its satisfaction would be a significant determinant of) quality of life for essentially all individuals whether they nominate it or not. If a domain is not nominated, it could be that its importance to that individual's quality of life is zero, but it is also possible that it is important, just "not important now." Some domains not nominated may truly be of zero importance (e.g., volunteer work for someone not interested). However, other intrinsically important domains may have missed nomination simply because things are satisfactory there, or they have been accepted (e.g., having adapted to a chronic health condition), or there is just more "action" in (and attention on) other areas of our lives.

One source of evidence for these beliefs is provided by Westerman, Hak, The, Groen, and van der Wal (2006). They reported that in their study 'health' was nominated as a life domain by five patients only after help from a prompt list—i.e., after they were not able to on their own nominate five areas of life important to their quality of life. Interestingly, those respondents' importance weighting of health was high. This finding

raises questions regarding the actual importance of the domains nominated by individuals without help from a prompt list, and the implied non-importance of those domains not nominated. It is possible that some of these individuals would reconsider their nominations and nominate health or other intrinsically important domains after checking with a prompt list.

The volunteer sort panel discussed above was also asked to sort the list of life domains available in the database into two groups: those that are "intrinsically important," which was defined as those life domains that are likely important to the overall quality of life of essentially all people, and those that may be important, even very important to some, but not necessarily all people. The top 12 domains, in terms of numbers of the panel that sorted those domains into the "intrinsically important" group, and for which predictions of satisfaction were made in the last chapter, are considered to be intrinsically important domains in this analysis. These domains (in alphabetical order) are: companionship, emotional wellbeing, family, feeling valued, financial security, friends, health, independence (freedom of choice), mental agility, personal safety and security, and preventing isolation.

Because data from three interviews (each eight months apart) are available for almost all respondents, the models were estimated as growth curve models using hierarchical linear modeling (HLM) (Heo et al., 2003; Raudenbush & Bryk, 2002; Singer, 1998). HLM corrects for the error structure violations that would be caused by performing an analysis of all data points using ordinary least squares (OLS) regression (i.e., observations over time for one individual cannot be assumed to be independent)

(Feldman, 1988; Heo et al., 2003). The models are estimated allowing the intercept and slope over time to have both fixed (group mean) and random (respondent-specific) effects. An unconditional model—one only including a time variable—is estimated first to provide baseline statistics useful for proper model specification (Raudenbush & Bryk, 2002). The Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) fit statistics are compared across models with different sets of predictor variables to determine which best fit the data. Both fit statistics are based on the log likelihood, are in the form of "smaller is better," and penalize the log likelihood for the number of parameters estimated (Raudenbush & Bryk, 2002; Singer, 1998). If the difference between BIC statistics for two models is greater than 10, that can be considered "very strong evidence" that the model with the lower BIC is a better fit to the data (Raftery, 1995). Nested models were compared using a $\chi^2$ test calculated as -2 times the difference between the log likelihood of the nested model and the log likelihood of the more inclusive model (Raudenbush & Bryk, 2002; Singer, 1998). The degrees of freedom for this test are equal to the number of variables in the more inclusive model minus the number in the nested (restricted) model. The model was estimated using restricted (residual) maximum likelihood (REML) estimation in the PROC MIXED procedure of SAS for Windows, Version 9.1 (SAS Institute Inc., Cary, NC). Coding for growth curve analysis was based on Singer (1998).

In addition to an unconditional model, models including each of the following sets of independent variables were estimated:

- Model 1.A – predicted satisfaction for those domains that were nominated and satisfaction set to 50 (the mid-point of the scale) otherwise.

- Model 1.B – actual reported satisfaction for those domains that were nominated and satisfaction set to 50 (the mid-point of the scale) otherwise.

- Model 2 – predicted satisfaction for all intrinsically important domains and for nominated non-intrinsically important domains, and satisfaction set to 50 (the mid-point of the scale) otherwise.

- Model 3 – predicted satisfaction for all domains.

- Model 4 – predicted satisfaction for only intrinsic domains; all other domains excluded.

- Model 5.A – predicted satisfaction for only those intrinsically important domains that were nominated, and satisfaction set to 50 (the mid-point of the scale) for non-nominated intrinsically important domains; all other domains excluded.

- Model 5.B – actual satisfaction for only those intrinsically important domains that were nominated, and satisfaction set to 50 (the mid-point of the scale) for non-nominated intrinsically important domains; all other domains excluded.

The results of the unconditional model are reported in Table 8. The interview variable contained the interview number—i.e., 1, 2, or 3. On average across all respondents, overall quality of life ratings decreased by 2 points (out of 100) from one interview to the next. The average overall quality of life rating at the first interview was about 75 (76.7 + -2.0 * 1) and decreased to about 71 (76.7 + -2.0 * 3) at the third interview. The variance estimates partial out the variance in the data into three parts. The

intercept error estimates the variance in the data across individuals. It makes up the

largest component of the variance seen in overall quality of life. The slope error estimates

the variance in the slopes (rates of change) seen across individuals. It makes up the

smallest component of the variance in overall quality of life. This is likely because there

is not much change in individuals' reported quality of life over the three interviews,

which only spanned 16 months. The residual estimate captures the remaining variance.

This component can be seen as unexplainable variance and is made up of the variance in

individuals' reports of life quality around their individual trend lines. The covariance

estimate indicates a negative covariance between the intercept and slope estimates—i.e.,

those with higher initial reported quality of life are more likely to have lower (here, more

negative) trends in quality of life over the three interviews and visa versa.

Table 8. Results of the unconditional model for overall quality of life (n=353)

|  | Estimate | p value |
|---|---|---|
| Intercept | 76.65 | <.0001 |
| Interview | -2.00 | 0.0195 |
| Variance and covariance estimates | | |
| Intercept error | 206.79 | 0.0015 |
| Covariance | -39.16 | 0.1502 |
| Slope error | 29.24 | 0.0135 |
| Residual | 110.90 | <.0001 |

Table 9 shows the fit statistics for the seven models run, as well as for the

unconditional model. For all three of the fit statistics shown, lower values indicate a

better fit to the data. Because the unconditional model is nested within all other models,

$\chi^2$ estimates are calculated for each to see if the model explains significantly more of the

variance seen in the dependent variable (overall quality of life) than the unconditional

model does. As can be seen only models 2, 3, and 4 are significantly better than the unconditional model. Comparing between models the AIC and BIC statistics are used. As can be seen the lowest AIC and BIC estimates are shown for model 4. Therefore, model 4 has the best fit to the data. Model 3 shows the second best fit.

Table 9. Fit statistics for the models tested and the unconditional model

| | -2 * Log Likeli-hood (-2LL) | Akaike Informa-tion Criterion (AIC) | Bayesian Informa-tion Criterion (BIC) | $\chi^2$ for comparison to unconditional model | |
|---|---|---|---|---|---|
| | | | | $\chi^2$ | $p$ value |
| Unconditional model | 2906.4 | 2914.4 | 2927.4 | | |
| Model 1.A | 2906.8 | 2912.8 | 2921.1 | -0.4 | NA |
| Model 1.B | 2905.1 | 2913.1 | 2924.2 | 1.3 | 1.0000 |
| Model 2 | 2860.8 | 2868.8 | 2879.9 | 45.6 | 0.0071 |
| Model 3 | 2847.8 | 2855.8 | 2866.9 | 58.6 | 0.0002 |
| Model 4 | 2828.7 | 2836.7 | 2847.8 | 77.7 | 0.0000 |
| Model 5.A | 2905.2 | 2913.2 | 2924.3 | 1.2 | 1.0000 |
| Model 5.B | 2898.0 | 2906.0 | 2917.1 | 8.4 | 0.7531 |

The fact that model 4 shows the best fit to the data is evidence that domain nomination is unimportant to the relationship between domain satisfaction and overall quality of life. It also provides evidence that intrinsically important domains matter more to this relationship than the others.

Neither of the models with actual satisfaction data (models 1.B and 5.B) was significantly better than the unconditional model in explaining the variance in overall quality of life. However, model 5.B was a slightly better fit to the data (smaller AIC and BIC) than model 5.A. This, and the even smaller differences between the AICs and BICs of models 1.A and 1.B, may indicate that the predicted satisfaction values used in these

models are reasonable estimations of what the actual values would have been, but that future actual values may improve model fit.

## The inclusion of loss aversion

As discussed above, loss aversion is the term used in Kahneman and Tversky's prospect theory to address the fact that individuals tend to react to a negative life event with a reduction in life satisfaction that is larger than the gain that would have ensued if that event was positive and of the same magnitude (Kahneman et al., 1990; Kahneman & Tversky, 1979; Tversky & Kahneman, 1992). Evidence of loss aversion has been mostly obtained from studies of preferences or of changes in actual life circumstances. This set of analyses looks at whether there is evidence of loss aversion in the relationship between domain satisfaction and overall quality of life. That is, are reductions in overall quality of life due to reductions in domain satisfaction from one interview to the next larger in magnitude than the gains that result from an increase in domain satisfaction?

Two types of loss aversion are hypothesized. According to Hsee et al. (2008), if overall quality of life in terms of satisfaction with various domains is highly evaluable—i.e., we have an inherent ability to judge it—then the additional reduction in overall quality of life should be proportional to the size of the loss in domain satisfaction. If overall quality of life in terms of domain satisfaction has low evaluability—i.e., it is difficult to judge how our overall quality of life is doing in response to a change in domain satisfaction, but we just know that we have a lower level of quality than before— then the additional reduction in overall quality of life is a one-time drop no matter how large the loss. In addition, in order to filter out minor variations in satisfaction reports, a

reduction in reported satisfaction for a domain from one interview to the next is not

considered a loss unless it is greater than .2 standard deviations for each domain (Cohen's

small effect size (Cohen, 1988)). In case the reaction is only to larger losses (i.e., larger

reductions in domain satisfaction between interviews), a minimum loss size of .5 standard

deviations (Cohen's medium effect size (Cohen, 1988)) is also tested.

Four sets of loss variables were constructed, one each for the four combinations of

loss types and sizes discussed above. Loss variables assuming high evaluability (i.e., that

the size of the loss matters) were set to the absolute value of the size of the loss if there

was one and zero otherwise. The loss variables assuming low domain satisfaction

evaluability were a set of 1/0 dummies with a "1" if there was a loss and zero otherwise.

If loss aversion is present the sign of the coefficients is expected to be negative.

The analyses, again using HLM, will add loss variables to only the best two models

from above—models 3 and 4. Models including each of the following sets of independent

variables were run:

- Model 3.2.L – predicted satisfaction for all domains with loss variables based on
  .2 standard deviations and equal to the losses seen.

- Model 3.2.1 – predicted satisfaction for all domains with loss variables based on
  .2 standard deviations and equal to "1."

- Models 3.5.L and 3.5.1 – predicted satisfaction for all domains with loss
  variables based on .5 standard deviations and equal to the losses seen (model
  3.5.L) or equal to "1" (model 3.5.1).

- Model 4.2.L – predicted satisfaction only for intrinsically important domains with loss variables based on .2 standard deviations and equal to the losses seen.

- Model 4.2.1 – predicted satisfaction only for intrinsically important domains with loss variables based on .2 standard deviations and equal to "1."

- Models 4.5.L and 4.5.1 – predicted satisfaction for all domains with loss variables based on .5 standard deviations and equal to the losses seen (model 4.5.L) or equal to "1" (model 4.5.1).

Table 10 shows the fit statistics for these models and for the unconditional model. As can be seen according to the first set of $\chi^2$ estimates, all but models 3.2.L and 3.5.L (the models including all domains and loss variables that were equal to the losses seen) fit the data better than the unconditional model. The second set of $\chi^2$ estimates compares each model to its base model without loss variables (i.e., models 3 or 4). According to these estimates, models 3.2.L and 3.5.L and the two models that included only intrinsic domains and loss variables equal to the losses seen (models 4.2.L and 4.5.L) failed to improve fit over their comparable models that did not include losses. Therefore, it seems that if loss aversion exists, it is a reaction to the loss and not to its size (at least not past a certain threshold of it being at least a small or a medium loss).

The models including "1/0" loss dummies, however, all improved model fit to the data (explained significantly more variance according to the $\chi^2$ statistics) over both the unconditional model and the models without loss variables. Therefore, it seems that loss aversion (or at least allowing a different reaction to a loss) may be important to the relationship between domain satisfaction and overall quality of life. Also, because the 1/0

loss variables proved the best fit, it appears that the reaction is to the fact of a loss and not to its size, and that, in general, these domain satisfactions seem to demonstrate low evaluability.

Table 10. Fit statistics for the models tested and the unconditional model

| | -2 * Log Likeli-hood (-2LL) | Akaike Informa-tion Criterion (AIC) | Bayesian Informa-tion Criterion (BIC) | $\chi^2$ for comparison to unconditional model | | $X^2$ for comparison to models without loss aversion | |
|---|---|---|---|---|---|---|---|
| | | | | $\chi^2$ | $p$ value | $\chi^2$ | $p$ value |
| Unconditional model | 2906.4 | 2914.4 | 2927.4 | | | | |
| Model 3.2.L | 2850.8 | 2858.8 | 2869.9 | 55.6 | 0.272 | -3.0 | NA |
| Model 3.2.1 | 2709.4 | 2717.4 | 2728.5 | 197.0 | 0.000 | 138.4 | 0.000 |
| Model 3.5.L | 2860.9 | 2868.9 | 2880.0 | 45.5 | 0.654 | -13.1 | NA |
| Model 3.5.1 | 2726.1 | 2734.1 | 2745.2 | 180.3 | 0.000 | 121.7 | 0.000 |
| Model 4.2.L | 2820.6 | 2828.6 | 2839.7 | 85.8 | 0.000 | 8.1 | 0.777 |
| Model 4.2.1 | 2756.5 | 2764.5 | 2775.6 | 149.9 | 0.000 | 72.2 | 0.000 |
| Model 4.5.L | 2826.7 | 2834.7 | 2845.8 | 79.7 | 0.000 | 2.0 | 0.999 |
| Model 4.5.1 | 2769.2 | 2777.2 | 2788.3 | 137.2 | 0.000 | 59.5 | 0.000 |

Comparing the models with loss variables based on at least small (greater in magnitude than .2 standard deviations of the satisfaction levels for that domain) losses to those with loss dummies based on at least medium (.5 standard deviations) losses using the AIC and BIC, it seems that small losses are important. In all cases the AIC and BIC for the .2 standard deviation models are lower than for the .5 standard deviation losses.

Finally, comparing the two models with .2 standard deviation "1/0" dummies (models 3.2.1 and 4.2.1) using a $\chi^2$ test, the model including all domains (model 3.2.1) explains significantly more of the variance in quality of life than the model only including intrinsically important domains ($\chi^2_{df=26} = 47.1$, p = 0.00685). Therefore, it

seems that when loss aversion is allowed, all domains are important to the relationship between domain satisfaction and overall quality of life.

Model 3.2.1 was able to explain 46 percent (calculated as 1 – regression sum of squares / total sum of squares or $R^2$) of the total variance in overall quality of life. In terms of specific variance components, the model was able to explain 61 percent of the variance across individuals in average levels of quality of life and 27 of the variance in the change in life quality over time. For comparison, the SEIQoL-Index (the sum of reported domain satisfactions multiplied by importance weights across nominated domains) explains 24 percent of the variance in overall quality of life and the WHOQOL-BREF overall quality of life facet (one item) explains 33 percent.

The coefficients estimated for models 3, 4, and 3.2.1 are shown in Table A.9 in the appendix. The coefficients estimated in these models should be interpreted with caution for at least three reasons. First, they are based on estimated, not actual reported, satisfaction levels. As discussed in the previous chapter, reasonable measures of life circumstances were available for only a few of the domains, and as can be seen in Table A.7, sample sizes were small and/or model fit was poor (low $R^2$) for several of the domain's models used to estimate satisfaction. Second, they represent the effect of domains that are not clearly defined. As mentioned a number of times in this paper, the only information available on what each domain contained was its label. On the other hand, the domain labels in most cases seem reasonable and straightforward, and in at least three cases, models estimating satisfaction with those domains entered expected variables. Finally, as discussed in Andrews and Withey (1976), because the domain

satisfactions are not completely independent, especially these estimated satisfactions, the

coefficients estimated for these models depend on the other variables included in the

model. Also, because similarly named domains included in other researchers' models

may actually represent larger, smaller, or different areas of life than the domains included

here, relative coefficient size may not be comparable across studies.

Nevertheless, in all three models, the slope coefficient was small and negative

reiterating the information gained from the unconditional model that overall quality of

life tended to decrease over time for this sample although only slightly. The domains

whose satisfactions seemed to be the largest contributors (coefficients greater than .2) to

overall quality of life in all models were: health, family, and emotional wellbeing/self

esteem. The next largest contributors (coefficients generally above .1) include:

companionship, feeling valued, independence (freedom of choice), mobility, personal

safety and security, holidays/travel and lunch club. Surprisingly, there were a number of

domains whose satisfaction seems to contribute negatively to overall quality of life.

These include: friends, mental agility, church, and social life/events. It is possible that

satisfaction is noticed or over-stated in these areas when overall quality of life is being

diminished through the influence of other domains (and visa versa).

There were several domains that seemed to demonstrate loss aversion. Losses

(reductions in satisfaction between one interview and the next of .2 standard deviations or

more) in the following domains resulted in an additional 5 points or more reduction in

overall quality of life: feeling valued, mental agility, personal safety and security, and

partner. On the other hand, there also seemed to be evidence of what might be called

"loss acceptance" in health and keeping busy. For these domains a reduction in satisfaction from one interview to the next resulted in 8 or 9 points less reduction in overall quality of life than would have been expected.

**Determination of whether domain satisfaction captures all the variance in overall quality of life otherwise explainable by individual traits.**

In this section, the proposition that individual traits exert their influence on overall quality of life entirely through their influence on domain satisfaction is tested. This proposition evident in the model shown in Figure 1 by the absence of a direct causal arrow between individual traits and overall quality of life. The overall quality of life ratings predicted by the best model above (model 3.2.1) were subtracted from actual reported quality of life to generate residuals, which can be considered to contain all the variance in quality of life not explained by model 3.2.1. Models containing only the available individual trait variables (sex, age, dispositional optimism and self esteem) and unconditional models were then estimated for actual overall quality of life and for these residuals. The fit statistics for these models are shown in Table 11.

Table 11. Fit statistics for unconditional models and models estimating overall quality of life and quality of life residuals using individual trait variables

| | -2 * Log Likeli-hood (-2LL) | Akaike Informa-tion Criterion (AIC) | Bayesian Informa-tion Criterion (BIC) | $\chi^2$ for comparison to each unconditional model | |
| --- | --- | --- | --- | --- | --- |
| | | | | $\chi^2$ | $p$ value |
| Unconditional model – Overall quality of life | 2906.4 | 2914.4 | 2927.4 | | |
| Model containing individual trait variables | 2864.6 | 2872.6 | 2883.6 | 41.8 | 0.0000 |
| Unconditional model – Residuals | 2710.1 | 2718.1 | 2731.2 | | |
| Model containing individual trait variables | 2712.7 | 2720.7 | 2731.8 | -2.6 | NA |

As can be seen from the $\chi^2$ estimates, the model estimated for overall quality of life using the individual trait variables predicted significantly more of the variance in quality of life than its unconditional model. However, the same model applied to the residuals does not. These results imply that whereas changes in individual traits are associated with changes in overall quality of life, the effect of these traits has already been captured in the domain satisfaction variables used to estimate the model. That is, that the effect of individual traits (at least for those available in this database) on overall quality of life is entirely mediated by domain satisfaction.

**DISCUSSION**

This study utilized an existing dataset to examine the relationship between overall quality of life and satisfaction with individual life domains in hopes to further progress toward a valid measure of overall quality of life that could be used in the evaluation of all types of social programs. The main benefits of such a measure include the ability to target programs to domains that have the largest effect on quality of life, and being able to track the mechanism by which an intervention affects quality of life, including the capture of unintended effects and being able to separate the effect of adaptation in the targeted domain from a possible offsetting life quality influence in another domain.

As a brief review, the analyses performed in this study have generated the following information regarding the development of a valid overall quality of life measure, at least for this population and given the limits of the Wandsworth dataset.

- Individuals tend to rate their quality of life and their satisfaction with the various domains of their life as high.

- Almost all individuals report one or more social network domains as important to their quality of life.

- Evidence of what is called response shift is ubiquitous; however, the process measured may or may not represent actual adaptation.

- A clearly defined, comprehensive set of life domains is much needed.

- Domain satisfaction seems to be explained by life circumstances and that relationship modified by individuals' traits.

- The domains that respondents weight as most important to their overall quality of life may actually be better considered to be life topics salient at the time.

- A significant portion of the variance in overall quality of life can be explained by domain satisfaction, and domain nomination is not important in this relationship.

- In terms of reported life quality, individuals react differently to reductions than to gains in domain satisfaction. However, this reaction is not always loss aversion. In some cases it seems that what could be called loss acceptance also occurs.

- The effect of individual characteristics on overall quality of life is entirely mediated by domain satisfaction.

This list contains some expected results as well as some surprises. The fact that respondents report high overall quality of life is not surprising—see for example the review by Diener and Diener (1996). It is also fairly common for individuals to report one or more of the various social network domains (e.g., family, friends) as important to their overall quality of life—see for example the studies referenced in Table 4.

<div align="center">

**Response shift**

</div>

It was, however, surprising to see the extent of the shift in domain nomination and of importance weight assignment from interview to interview. Both can be considered to be evidence of response shift—either via a re-prioritization of what is important to overall quality of life or via a re-conceptualization of its components. However, it is not likely that these shifts are due to re-prioritization or re-conceptualization, nor to any underlying process of adaptation. In fact, little evidence could be found to explain them. The reductions in importance weights seem to occur mostly in conjunction with a

reduction in satisfaction. Reported satisfaction levels provide a "window" into actual the life circumstances relating to a domain. A reduction in satisfaction could indicate that something "bad" may have happened in those domains triggering a re-prioritization of what was important to overall quality of life. However, the satisfaction reductions seen were small and no parallel increases in satisfaction were seen in domains for which the importance weights were increased. Domains with lower importance weights tended to be dropped from nomination more often, but no changes in satisfaction seemed to predict nomination changes. Also, domain nomination did not seem to be related to (predicted by) changes in life circumstances, nor did it contribute to the relationship between domain satisfaction and overall quality of life. Therefore, domain nomination may only be evidence of domain salience, and not of the re-prioritization of determinants, or the re-conceptualization of the concept of overall quality of life, both of which could be expected in adaptation.

## A comprehensive set of life domains

It seems that a large, well-organized and directed effort will be needed to generate the universe of life domains appropriate for inclusion in studies of overall quality of life. As reviewed in this study, a number of researchers have made the attempt; the most thorough of which, at least for the US population, seems to be the 1976 Andrews and Withey study. Issues that would need to be addressed in this effort include whether to include both of what Andrews and Withey call domains and criteria. Domains are more concrete and are usual targets of social programs, but criteria are also important and can be the targets of various psychological or sociological interventions. It could also be that

in some areas of the life-as-a-whole perceptual space, domains make more sense, and that in other areas, criteria better capture the concepts most related to overall quality of life.

Another issue is the specificity or scope of the various life domains included. It could be that more specific domain definitions are needed for program evaluation for domains in the area targeted, but less specific (broader or higher-order) domains are needed to represent all other domains. Satisfaction levels for higher-order domains can either be measured as indices constructed from the satisfaction levels reported for each of the encompassed lower-order domains, estimated as equal to the satisfaction reported for one or two representative encompassed domains, or measured directly themselves. In any event, the level of specificity must allow for the separation of domain concepts whose satisfaction has substantially different effects on overall quality of life in terms of direct effects and loss aversion.

It is likely that a modification of Andrews and Withey's approach to the development of their list of 123 life concerns would be best. They started with a list gleaned from the literature of 800 life concerns. This list was whittled down through the removal of duplicates, and through rewording to reduce differences in level of specificity, to a list of 60. Through a series of studies this list was modified to provide more clearly focused statements of concern and expanded as they encountered new concerns not already represented. Although Andrews and Withey did not use focus groups, they could be extremely important to the wording of the items needed to elicit satisfaction levels for each life domain, to the development of clear definitions of each domain, and to ensure that the full breadth of life domains is included. Some sort of mapping procedure would

also be important to ensure full consistent coverage of the life-as-a-whole perceptual space, and to later allow sampling across this space to obtain representative lists of domains to include in future studies.

**Validation of the proposed model of domain satisfaction as the most proximal determinant of overall quality of life**

Whereas, given the limits of this dataset, it cannot be said that the model presented in Figure 1 was proven, it can be said that it was supported. It does seem that for the most part life circumstances explain satisfaction with related domains, and that this relationship is modified by individual traits, at least for the domains tested. It also seems that, as seen in other studies, domain satisfaction predicts overall quality of life. In this study, the best model was able to explain 46 percent (based on a calculated $R^2$) of the total variance in overall quality of life. In terms of specific variance components, the model was able to explain 61 percent of the variance across individuals in average levels of quality of life and 27 of the variance in the change in life quality over time. These are respectable levels of explanatory power, especially since the models were estimated using satisfaction levels that were themselves estimated from limited other data. Finally, it was shown that the influence of individual traits on overall quality of life seems to be entirely mediated through domain satisfaction, at least for the traits available in this dataset.

**Domain nomination does not appear to add to the prediction of overall quality of life**

As discussed above, a number of studies have shown that, contrary to intuition, weighting domain-level data by the importance assigned to it by respondents adds nothing to the prediction of overall quality of life (Andrews & Withey, 1976; Evans, 1997; Hsieh, 2003; Russell et al., 2006; Trauer & Mackinnon, 2001). In this study evidence is provided that may indicate that domain nomination (thought to be a stronger indicator of domain importance) is also not a determinant of life quality. Actually, little support was generated in this study for domain nomination to be anything but a report of the domains salient to the respondent at the time of the interview, despite the fact that essentially all interviewees in the local interviews said that they would not have changed the domains they nominated if they had seen a list of domains ahead of time.

**Loss aversion and loss acceptance**

The analyses in the last chapter indicate that losses, as measured by a reduction in estimated satisfaction from one interview to the next, affect overall quality of life differently than satisfaction levels that stay the same or increase. The classic description of this phenomena comes from Kahneman and Tversky's prospect theory and is called loss aversion (Kahneman et al., 1990; Kahneman & Tversky, 1979; Tversky & Kahneman, 1992). In loss aversion, an individual reacts more strongly to losses than to gains. The analyses presented in the last chapter tested whether reports of overall quality of life would show a stronger change in reaction to reductions in domain satisfaction levels from one interview to the next than to gains. In general, they did. The analyses also

tested whether the reaction would be to even a small loss (it is) and whether the evidence indicated that the reaction of overall quality of life to a change in domain satisfaction was, in general, of high or low evaluability (low).

Several domains seemed to demonstrate loss aversion. Losses (reductions in satisfaction between one interview and the next of .2 standard deviations or more) in the following domains resulted in an additional 5 points or more reduction in overall quality of life than would be expected: feeling valued, mental agility, personal safety and security, and partner. However, there also seemed to be evidence of what might be called "loss acceptance" in health and keeping busy. For these domains a reduction in satisfaction from one interview to the next resulted in 8 or 9 points less reduction in overall quality of life than would have been expected.

As discussed above, some recent work has shown that for some losses (i.e., those considered "small" and easily discounted cognitively) the reduction in overall quality of life may be smaller than the corresponding gain (Harinck et al., 2007). Losses in health satisfaction averaged about 9 points on a 0-100 satisfaction scale from one interview to the next, but ranged from about 3 (the minimum counted as a loss) to 30 points with a median of 7 points. Losses in keeping busy averaged about 6 points, and ranged from about 3 to 25 points with a median of 3 to 4 points. It is possible that changes of less than 10 points in satisfaction for these two domains could be considered "small" and that they could be easily discounted cognitively, especially in this aging population. It is also interesting to note that the domains showing loss aversion may be more psychologically

close to individuals than those showing loss acceptance. Although one's health is highly

personal, it is not unusual for individuals to create psychological separation from it.

It should also be noted that although loss aversion is a well-documented

phenomenon, the results shown here may actually be the result of a ceiling effect.

Because overall quality of life ratings tend to be high, there is more room for their

decrease than their increase. Therefore, there might simply be less resistance to a

decrease in overall quality of life in response to a loss in domain satisfaction than there

would be to an increase due to an improvement.

**Potential characteristics of a valid measure of overall quality of life**

According to Rossiter's C-OAR-SE procedure for scale development, different

types of constructs require different types of measurement instruments (Rossiter, 2002).

The type of instrument (or instruments) needed for a measure of overall quality of life

will depend on whether the constructs of life satisfaction (as defined in the introduction to

this paper) and of satisfaction with individual life domains are considered to be

straightforward to respondents, and whether overall quality of life (life satisfaction) is

considered to be equal to the sum of its parts (satisfaction with life domains) or

something more.

The SEIQoL index is a measure of overall quality of life that assumes that life

satisfaction is equal to the sum (here weighted by relative importance) of reported

satisfaction with five life domains nominated by respondents as most important to their

life quality. However, according to the criteria set forth in the introduction by which the

most appropriate construct of life quality was chosen, this measure confuses the sources

of life satisfaction (satisfaction with life domains) with the thing itself. A validity study by Moons et al (2004) agrees. Its abstract includes the statement: "We found that the SEIQoL-DW is not a valid measure of quality of life, but rather assesses determinants that contribute to individuals' quality of life."

If it can be assumed that nearly everyone would agree with what "your life" means, and if nearly everyone describes the attribute "satisfaction" identically, then according to Rossiter (2002), a single well-worded item is a valid measure of overall quality of life (as life satisfaction). I would add to this, based on the analysis summarized in the introduction, that the response to this item must be informed and autonomous (not subject to coercion), that the item should be proceeded by a similarly worded item capturing and separating out the effect of mood, and that the wording of the item or instructions before the fact clarify the type of comparison desired, if a comparison is implicit in the evaluation of satisfaction.

Whether "nearly everyone" would agree regarding definitions of what Rossiter (2002) calls the object (life) and the attribute (satisfaction) must be the subject of further research, but the possibility seems reasonable. For the response to this single item to be informed requires that subjects are allowed and encouraged to review and evaluate what makes up their lives before being asked to give a summary evaluation of it. Obtaining statements of domain satisfaction for a comprehensive, well-defined set of life domains would ensure a complete and consistent review and also make the judgment heuristics appropriate for evaluation more salient.

The items required to obtain valid measures of satisfaction with individual life domains could also be a set of single items, one for each domain. Again, the attribute (satisfaction) would have to be universally understood, unambiguous definitions would be needed for each life domain, and the desired type of comparison implied in the evaluation clarified. Preceding items to separate out the effects of mood are less important here because it has been found that mood is used more often as a simplifying strategy when a cognitive judgment would be more burdensome—i.e., used more often in the judgment of overall life satisfaction than of specific life domains.

It seems that people's satisfaction with the individual life domains that make up their lives is a major determinant of overall life satisfaction. However, overall life satisfaction itself is an outcome of interest, and prediction via domain satisfaction cannot be considered a substitute for its direct measure. This is why the best measure of overall quality of life (life satisfaction) for program evaluation is one that measures both domain satisfaction for a representative sample of all domains as well as overall life satisfaction.

**How would the use of a life satisfaction measure change the impact of quality of life as an outcome?**

Note that the use of this type of quality of life measure as a primary outcome for social program would be quite different from the present use of quality-adjusted life-years (QALYs) in health care. First, since overall quality of life for each individual may have different determinants—due to individual traits, and thus, a different criterion for what determines satisfaction with each life domain—no table of weights similar to that of the preference weights used in indirect health-related quality of life measures (e.g., the

EQ5D (Kind, 1996; Shaw, Johnson, & Coons, 2005)) is possible. Basically, although various "life states" could be defined (similar to the health states that are assigned preference weights) there is little argument for believing that an average taken across all those experiencing any one life state would be a good estimate of the quality of life of another person moving into that life state. Due to individual traits, each person can experience a different level of satisfaction with that life state. Second, note that different from the generation of preference weights, which can be gathered from a representative sample of the population, the generation of a "life satisfaction" weights by definition would need to be gathered from a representative sample of the population of those who are experiencing (or have experienced) that life state.

Third, it is also possible that the approach of life satisfaction might help with better end of life care. In terms of a life satisfaction-type quality of life, states that are worse than death have not been presented in the literature, and are likely rare. Death is simply zero—a lack of quality of life due to a lack of life. In addition, a number of studies of patients with terminal disease have shown that quality of life does not decline as much as preference weights would indicate as people age and death approaches (Bowling, 1995; Fegg, Wasner, Neudert, & Borasio, 2005; McKee et al., 2005; Moons et al., 2006). Patients seem to reprioritize what is important in their lives, focus on what they still have, and at times report an increase in quality of life. While fear of death is a healthy survival instinct, our society would likely benefit from more realistic information regarding life quality and the process of dying.

Fourth, if improved quality of life (using a life satisfaction-type measure) is the goal, then the concepts of adaptation or response shift have to be accepted. That is, if an intervention causes an improvement in an individual's life circumstances, but the individual reports no (or very little) corresponding increase in overall quality of life, it could be because satisfaction levels did not increase for the targeted domain. Alternately, satisfaction levels for the targeted domain satisfaction may have increased, but unless an offsetting decrease in satisfaction in another domain due to an outside influence is identified, the intervention's impact on quality of life is still nil (or very small). Basically, ''quality of life is what the respondent says it is''(Ring, Hofer, McGee, Hickey, & O'Boyle, 2007) and not what it would seem from the improvement seen in the life circumstances that make up that domain. In order to understand the relationship between quality of life and its determinants and to separate null results from those due to adaptation, response shift must be understood.

Finally, if improved quality of life (as measured by life satisfaction) is the goal, effective programs may look quite different than they do today. In order to have an effect on an individual's overall quality of life, a program would have to have a net-positive effect on that individual's satisfaction across all life domains. Since domain satisfaction is at least partially a function of individual traits, a one-size-fits-all approach will not likely be as effective as an approach that individualizes care to what each participant values. Therefore, for example, a health program would need to target that aspect of health that was most important to each individual's satisfaction with their health.

## Conclusion

This study addresses the research question of whether overall quality of life can be predicted sufficiently from satisfaction with individual life domains. The overall goal of these analyses was to inform the future development of appropriate measures of overall quality of life and its determinants (domain satisfaction) for the evaluation of all types of social programs. Within the limitations of this dataset and for this healthy older population, it seems that measures of overall quality of life and domain satisfaction are feasible, and that domain satisfactions are the most proximal determinants of life quality. Individuals' ratings of domain importance do not affect this relationship, and individuals' traits only affect life quality via their influence on domain satisfaction. Therefore, it may not be essential to measure these for the purposes of determining quality of life effects. It also appears that individuals respond differently in terms of overall quality of life to reductions in certain domain satisfactions than to increases. These findings should be evaluated further as they could affect the design of future successful programs. Finally, although the data on life domains available to this study were sufficient to generate these results, the first step in the development of adequate measures of overall quality of life and of domain satisfactions will be the construction of a comprehensive, fully-representative list of the life domains that comprise life as a whole.

**APPENDIX A. SUPPLEMENTAL TABLES**

Table A.1. Measures included in the Beaumont and Kenealy (2004) dataset

| | Screen-ing (n=193) | Interviews | | |
|---|---|---|---|---|
| | | 1st (n=193) | 2nd (n=159) | 3rd (n=141) |
| **Demographics** | | | | |
| Sex, Cultural/ethnicity category | X | | | |
| Rough SES – based on last employment | X | | | |
| Age | X | X | X | X |
| Marital status | X | X | X | X |
| Residential status | X | X | X | X |
| Satisfaction with living status | X | X | X | X |
| Still working? Volunteer work? | X | X | X | X |
| **Significant recent life changes and events – only yes/no and whether positive or negative** | | | | |
| Significant life changes since last seen? | X | X | X | X |
| Significant events in past few days? | X | X | X | X |
| **Measures of health** | | | | |
| Currently ill? On prescription medications? | X | | | |
| # trips to the hospital & reason | X | | | |
| Self-assessment of health status (one item) (Beatty & Madans, 2002) | X | X | X | X |
| # of health problems & labels for up to 4 | X | X | X | X |
| Expanded disability status scale (EDSS) (Kurtze, 1983) | X | X | X | X |
| **Measures of mental status/cognition** | | | | |
| Dementia rating scale (DRS) (Mattis, 1976) | X | | | |
| Percentile of Senior Dementia of the Alzheimer's type (SDAT) population | X | | | |
| (AMI) Autobiographical Memory Interview (Kopelman, Wilson, & Baddeley, 1990) | X | | | |
| Geriatric depression scale (GDS) (Yesavage, 1988) | X | X | X | X |
| Kendrick Assessment scales of Cognitive Ageing (KASCA) (Kendrick & Watts, 1999) | | X | X | X |
| Digit span memory test | | X | X | X |
| **Measures of social support** | | | | |
| Do you have someone to turn to in time of trouble? If upset? If need help? | | X | X | X |
| Do you attend a group for older people? All ages? | | X | X | X |
| **Measures of general attitudes** | | | | |
| Life orientation test (LOT; dispositional optimism) (Scheier & Carver, 1987) | | X | X | X |
| Generalized self-efficacy scale (GSES) (Jerusalem & Schwarzer, 1992) | | X | X | X |
| Rosenberg self-esteem questionnaire (RSE) (Rosenberg, 1965) | | | | X |

Table A.1. Measures included in the Beaumont and Kenealy (2004) dataset (continued)

| | Screen-ing (n=193) | Interviews | | |
|---|---|---|---|---|
| | | 1st (n=193) | 2nd (n=159) | 3rd (n=141) |
| Measures of quality of life | | | | |
| Overall quality of life today? | X | X | X | X |
| Overall quality of life in general? | | X | X | X |
| Schedule for Evaluation of Individual Quality of Life: Direct Weighting (SEIQoL-DW) (C. O'Boyle et al., 1993) | | X | X | X |
| WHO quality of life – brief (WHOQOL-BREF) (The WHOQOL Group, 1998) | | X | X | X |
| Measures of social comparison | | | | |
| Social comparison interview (SCI) (Beaumont & Kenealy, 2004) | | X | X | X |
| Iowa- Netherlands Comparison Orientation Measure (Gibbons & Buunk, 1999) | | | | X |

Table A.2 Domain nominations, satisfaction, and importance in interview 1 (n=193)

| Domain name | Nominations | | No. of times nominated more than once by same person | Satisfaction levels (0-100) | | Importance Weights (0-100) | |
|---|---|---|---|---|---|---|---|
| | No. | % | | M | SD | M | SD |
| Family | 121 | 63% | 2 | 83.8 | 15.91 | 30.3 | 9.73 |
| Hobbies/interests | 93 | 48% | 11 | 72.8 | 19.16 | 17.6 | 7.56 |
| Friends | 91 | 47% | 0 | 79.3 | 15.32 | 19.4 | 7.76 |
| Health | 63 | 33% | 2 | 67.8 | 20.55 | 26.0 | 10.16 |
| Home | 51 | 26% | 1 | 81.4 | 17.96 | 21.3 | 8.12 |
| Companionship | 43 | 22% | 3 | 77.0 | 19.29 | 20.8 | 12.18 |
| Creativity | 41 | 21% | 5 | 71.6 | 20.88 | 16.2 | 7.67 |
| Independence (freedom of choice) | 34 | 18% | 0 | 76.2 | 18.22 | 22.3 | 8.97 |
| Social life/events | 34 | 18% | 1 | 71.5 | 17.53 | 17.0 | 9.10 |
| Mobility | 33 | 17% | 2 | 69.1 | 23.23 | 21.3 | 9.14 |
| Church | 32 | 17% | 0 | 81.5 | 11.06 | 26.5 | 11.50 |
| Mental agility | 22 | 11% | 1 | 76.0 | 18.98 | 16.8 | 9.43 |
| Financial security | 20 | 10% | 0 | 63.5 | 20.02 | 20.0 | 10.24 |
| Partner | 20 | 10% | 0 | 86.5 | 10.58 | 29.9 | 7.46 |
| Physical activity | 20 | 10% | 2 | 82.2 | 19.35 | 19.0 | 8.07 |
| Personal safety and security | 18 | 9% | 2 | 81.0 | 11.77 | 20.3 | 7.78 |
| Current affairs | 16 | 8% | 0 | 75.9 | 19.89 | 18.8 | 11.14 |
| Other | 15 | 8% | 0 | 80.5 | 17.86 | 17.5 | 6.10 |
| Feeling valued | 14 | 7% | 1 | 76.9 | 19.96 | 19.4 | 8.31 |
| Holidays/travel | 14 | 7% | 0 | 79.8 | 14.72 | 17.8 | 6.72 |
| Learning | 14 | 7% | 0 | 72.4 | 13.78 | 14.6 | 5.87 |
| Lunch club | 14 | 7% | 0 | 82.3 | 11.03 | 22.8 | 7.05 |
| Keeping busy | 12 | 6% | 0 | 79.1 | 21.86 | 18.5 | 7.34 |
| Voluntary work | 12 | 6% | 0 | 77.1 | 9.44 | 21.0 | 6.82 |
| Emotional wellbeing/self esteem | 11 | 6% | 1 | 72.5 | 24.31 | 22.4 | 8.66 |
| Independence (looking after oneself) | 10 | 5% | 0 | 79.3 | 20.23 | 20.1 | 5.97 |
| Transport | 8 | 4% | 0 | 72.8 | 23.11 | 22.5 | 9.84 |
| Preventing isolation | 5 | 3% | 0 | 83.9 | 11.85 | 15.0 | 4.06 |
| Self efficacy | 5 | 3% | 0 | 78.3 | 12.67 | 19.6 | 9.10 |
| Pleasurable pursuits | 4 | 2% | 0 | 80.5 | 13.13 | 13.8 | 10.69 |
| No. unable to name 5 domains | 61 | 32% | | | | | |
| No. unable to name 4 | 14 | 7% | | | | | |

Table A.3 Domain nominations, satisfaction, and importance in interview 2 (n=159)

| Domain name | Nominations | | No. of times nominated more than once by same person | Satisfaction levels (0-100) | | Importance Weights (0-100) | |
|---|---|---|---|---|---|---|---|
| | No. | % | | M | SD | M | SD |
| Family | 92 | 58% | 4 | 84.6 | 15.79 | 30.7 | 10.49 |
| Hobbies/interests | 72 | 45% | 14 | 76.8 | 17.35 | 17.7 | 6.10 |
| Friends | 65 | 41% | 1 | 81.7 | 14.88 | 22.8 | 7.96 |
| Health | 58 | 36% | 2 | 68.1 | 20.73 | 27.9 | 8.56 |
| Mobility | 36 | 23% | 0 | 71.8 | 20.85 | 26.9 | 9.25 |
| Companionship | 35 | 22% | 3 | 77.9 | 15.49 | 21.1 | 6.63 |
| Home | 33 | 21% | 0 | 83.0 | 17.94 | 21.6 | 7.10 |
| Church | 32 | 20% | 0 | 79.4 | 12.52 | 24.2 | 11.29 |
| Financial security | 25 | 16% | 0 | 67.0 | 19.96 | 20.6 | 10.12 |
| Creativity | 23 | 14% | 2 | 67.3 | 20.12 | 18.7 | 8.76 |
| Independence (freedom of choice) | 21 | 13% | 0 | 79.9 | 16.77 | 24.2 | 7.26 |
| Partner | 16 | 10% | 0 | 84.8 | 9.73 | 30.6 | 8.82 |
| Physical activity | 16 | 10% | 0 | 74.6 | 24.52 | 20.4 | 8.78 |
| Social life/events | 16 | 10% | 1 | 74.6 | 11.49 | 17.9 | 3.96 |
| Feeling valued | 15 | 9% | 1 | 76.7 | 21.36 | 24.2 | 7.91 |
| Mental agility | 15 | 9% | 1 | 74.5 | 14.31 | 15.3 | 6.80 |
| Current affairs | 14 | 9% | 0 | 67.8 | 27.58 | 19.0 | 9.21 |
| Learning | 14 | 9% | 0 | 77.7 | 14.30 | 18.1 | 6.33 |
| Lunch club | 13 | 8% | 0 | 83.5 | 9.87 | 25.5 | 9.01 |
| Other | 13 | 8% | 1 | 80.4 | 16.93 | 19.5 | 9.61 |
| Holidays/travel | 11 | 7% | 1 | 69.5 | 11.27 | 19.1 | 4.93 |
| Keeping busy | 11 | 7% | 2 | 81.3 | 15.16 | 19.5 | 6.38 |
| Emotional wellbeing | 8 | 5% | 0 | 71.7 | 8.48 | 25.6 | 10.73 |
| Prevention isolation | 7 | 4% | 0 | 80.6 | 22.06 | 17.1 | 5.11 |
| Voluntary work | 7 | 4% | 0 | 70.8 | 11.96 | 18.1 | 8.13 |
| Personal safety and security | 6 | 4% | 0 | 79.2 | 16.61 | 18.8 | 8.47 |
| Pleasurable pursuits | 6 | 4% | 0 | 84.7 | 10.69 | 16.8 | 5.81 |
| Independece (looking after oneself) | 3 | 2% | 0 | 79.5 | 14.34 | 22.0 | 2.65 |
| Transport | 3 | 2% | 0 | 92.8 | 8.52 | 23.3 | 3.79 |
| Self efficacy | 1 | 1% | 0 | 86.0 | NA | 23.0 | NA |
| No. unable to name 5 domains | 73 | 46% | | | | | |
| No. unable to name 4 | 33 | 21% | | | | | |
| No. unable to name 3 | 2 | 1% | | | | | |

Table A.4 Domain nominations, satisfaction, and importance in interview 3 (n=141)

| Domain name | Nominations | | No. of times nominated more than once by same person | Satisfaction levels (0-100) | | Importance Weights (0-100) | |
|---|---|---|---|---|---|---|---|
| | No. | % | | M | SD | M | SD |
| Family | 83 | 59% | 2 | 85.5 | 13.13 | 28.5 | 9.68 |
| Friends | 67 | 48% | 0 | 81.4 | 12.47 | 24.2 | 10.77 |
| Health | 56 | 40% | 1 | 69.8 | 17.04 | 28.3 | 11.51 |
| Hobbies/interests | 50 | 35% | 10 | 77.6 | 14.52 | 18.6 | 6.77 |
| Mobility | 40 | 28% | 0 | 71.9 | 19.07 | 24.5 | 10.13 |
| Home | 35 | 25% | 1 | 75.0 | 21.35 | 24.0 | 7.59 |
| Companionship | 23 | 16% | 2 | 77.4 | 16.31 | 22.7 | 9.83 |
| Financial security | 22 | 16% | 0 | 72.6 | 15.45 | 22.1 | 11.72 |
| Church | 20 | 14% | 0 | 81.6 | 16.74 | 27.0 | 10.84 |
| Social life/events | 20 | 14% | 1 | 76.0 | 16.18 | 21.0 | 8.85 |
| Creativity | 18 | 13% | 4 | 76.0 | 13.53 | 18.5 | 5.64 |
| Emotional wellbeing | 16 | 11% | 2 | 71.7 | 20.00 | 19.6 | 7.14 |
| Independence (freedom of choice) | 16 | 11% | 0 | 79.7 | 14.81 | 21.6 | 8.37 |
| Holidays/travel | 14 | 10% | 1 | 63.9 | 31.78 | 20.9 | 6.68 |
| Mental agility | 14 | 10% | 1 | 79.6 | 12.88 | 18.0 | 5.64 |
| Current affairs | 13 | 9% | 0 | 74.5 | 9.34 | 16.2 | 7.30 |
| Partner | 13 | 9% | 0 | 85.8 | 12.63 | 31.9 | 9.95 |
| Physical activity | 13 | 9% | 1 | 77.9 | 19.44 | 18.5 | 4.84 |
| Lunch club | 11 | 8% | 0 | 77.0 | 15.08 | 21.6 | 6.04 |
| Keeping busy | 10 | 7% | 0 | 78.3 | 14.03 | 20.8 | 4.24 |
| Independence (looking after oneself) | 9 | 6% | 1 | 81.3 | 12.67 | 21.9 | 6.90 |
| Other | 9 | 6% | 0 | 79.2 | 14.87 | 21.3 | 10.40 |
| Learning | 8 | 6% | 0 | 77.3 | 21.97 | 12.1 | 6.51 |
| Feeling valued | 6 | 4% | 0 | 73.3 | 6.35 | 19.5 | 5.68 |
| Personal safety and security | 5 | 4% | 0 | 73.6 | 16.76 | 22.4 | 4.39 |
| Preventing isolation | 5 | 4% | 0 | 81.9 | 11.04 | 14.8 | 10.35 |
| Transport | 5 | 4% | 0 | 74.2 | 27.58 | 17.8 | 4.76 |
| Voluntary work | 3 | 2% | 0 | 70.2 | 2.75 | 22.3 | 7.09 |
| Pleasurable pursuits | 2 | 1% | 0 | 84.0 | 0.00 | 7.5 | 6.36 |
| Self efficacy | 1 | 1% | 0 | 55.0 | NA | 4.0 | NA |
| No. unable to name 5 domains | 72 | 51% | | | | | |
| No. unable to name 4 | 22 | 16% | | | | | |
| No. unable to name 3 | 4 | 3% | | | | | |

Table A.5 Domain nominations, satisfaction, and importance across all three interviews

| Domain name | Nominations | | No. of times nominated more than once by same person | Satisfaction levels (0-100) | | Importance Weights (0-100) | |
|---|---|---|---|---|---|---|---|
| | No. | % | | M | SD | M | SD |
| Family | 296 | 60% | 8 | 84.5 | 15.10 | 29.9 | 9.97 |
| Friends | 223 | 45% | 1 | 80.6 | 14.37 | 21.8 | 9.03 |
| Hobbies/interests | 215 | 44% | 35 | 75.3 | 17.63 | 17.9 | 6.90 |
| Health | 177 | 36% | 5 | 68.5 | 19.48 | 27.3 | 10.12 |
| Home | 119 | 24% | 2 | 79.9 | 19.13 | 22.2 | 7.72 |
| Mobility | 109 | 22% | 2 | 71.0 | 20.83 | 24.3 | 9.73 |
| Companionship | 101 | 20% | 8 | 77.4 | 17.22 | 21.3 | 9.93 |
| Church | 84 | 17% | 0 | 80.7 | 13.02 | 25.7 | 11.20 |
| Creativity | 82 | 17% | 11 | 71.4 | 19.32 | 17.4 | 7.61 |
| Independence (freedom of choice) | 71 | 14% | 0 | 78.1 | 16.95 | 22.7 | 8.31 |
| Social life/events | 70 | 14% | 3 | 73.5 | 15.87 | 18.3 | 8.22 |
| Financial security | 67 | 14% | 0 | 67.8 | 18.70 | 21.0 | 10.59 |
| Mental agility | 51 | 10% | 3 | 76.5 | 15.99 | 16.7 | 7.72 |
| Partner | 49 | 10% | 0 | 85.7 | 10.69 | 30.6 | 8.47 |
| Physical activity | 49 | 10% | 3 | 78.6 | 21.01 | 19.3 | 7.51 |
| Current affairs | 43 | 9% | 0 | 72.8 | 20.36 | 18.1 | 9.35 |
| Holidays/travel | 39 | 8% | 2 | 71.2 | 22.37 | 19.3 | 6.24 |
| Lunch club | 38 | 8% | 0 | 81.2 | 11.98 | 23.4 | 7.51 |
| Other | 37 | 8% | 1 | 80.1 | 16.40 | 19.1 | 8.47 |
| Learning | 36 | 7% | 0 | 75.6 | 15.79 | 15.4 | 6.47 |
| Emotional wellbeing | 35 | 7% | 3 | 71.9 | 19.11 | 21.8 | 8.61 |
| Feeling valued | 35 | 7% | 2 | 76.2 | 18.65 | 21.5 | 7.92 |
| Keeping busy | 33 | 7% | 2 | 79.6 | 17.12 | 19.5 | 6.10 |
| Personal safety and security | 29 | 6% | 2 | 79.3 | 13.46 | 20.3 | 7.32 |
| Independence (looking after oneself) | 22 | 4% | 1 | 80.2 | 16.04 | 21.1 | 5.91 |
| Voluntary work | 22 | 4% | 0 | 74.2 | 9.95 | 20.3 | 7.11 |
| Preventing isolation | 17 | 3% | 0 | 81.9 | 15.81 | 15.8 | 6.48 |
| Transport | 16 | 3% | 0 | 77.0 | 22.89 | 21.2 | 7.67 |
| Pleasurable pursuits | 12 | 2% | 0 | 83.2 | 10.14 | 14.3 | 7.89 |
| Self efficacy | 7 | 1% | 0 | 76.1 | 14.20 | 17.9 | 9.70 |
| No. unable to name 5 domains | 206 | 42% | | | | | |
| No. unable to name 4 | 69 | 14% | | | | | |
| No. unable to name 3 | 6 | 1% | | | | | |

Table A.6. Domains added and dropped between interviews

| Domain | Dropped after interview 1 | | Added during interview 2 | | Dropped after interview 2 | | Added during interview 3 | |
|---|---|---|---|---|---|---|---|---|
| | Count | %* | Count | %** | Count | %* | Count | %** |
| Hobbies/interests | 38 | 41% | 29 | 40% | 31 | 43% | 21 | 42% |
| Health | 23 | 37% | 30 | 52% | 20 | 34% | 23 | 41% |
| Friends | 26 | 29% | 18 | 28% | 21 | 32% | 28 | 42% |
| Home | 26 | 51% | 16 | 48% | 13 | 39% | 17 | 49% |
| Companionship | 17 | 40% | 21 | 60% | 18 | 51% | 13 | 57% |
| Mobility | 11 | 33% | 23 | 64% | 12 | 33% | 20 | 50% |
| Family | 22 | 18% | 12 | 13% | 15 | 16% | 15 | 18% |
| Social life/events | 21 | 62% | 10 | 63% | 12 | 75% | 17 | 85% |
| Financial security | 10 | 50% | 20 | 80% | 13 | 52% | 12 | 55% |
| Independence (freedom of choice) | 20 | 59% | 10 | 48% | 13 | 62% | 10 | 63% |
| Creativity | 19 | 46% | 8 | 35% | 13 | 57% | 10 | 56% |
| Other | 12 | 80% | 12 | 92% | 10 | 77% | 7 | 78% |
| Mental agility | 11 | 50% | 7 | 47% | 9 | 60% | 10 | 71% |
| Physical activity | 9 | 45% | 6 | 38% | 9 | 56% | 7 | 54% |
| Keeping busy | 9 | 75% | 9 | 82% | 6 | 55% | 6 | 60% |
| Personal safety and security | 13 | 72% | 6 | 100% | 5 | 83% | 4 | 80% |
| Current affairs | 6 | 38% | 8 | 57% | 6 | 43% | 7 | 54% |
| Emotional wellbeing | 5 | 45% | 5 | 63% | 4 | 50% | 12 | 75% |
| Church | 5 | 16% | 8 | 25% | 10 | 31% | 2 | 10% |
| Learning | 7 | 50% | 7 | 50% | 8 | 57% | 3 | 38% |
| Feeling valued | 4 | 29% | 7 | 47% | 9 | 60% | 2 | 33% |
| Lunch club | 5 | 36% | 7 | 54% | 5 | 38% | 5 | 45% |
| Holidays/travel | 5 | 36% | 4 | 36% | 3 | 27% | 8 | 57% |
| Partner | 7 | 35% | 4 | 25% | 6 | 38% | 3 | 23% |
| Preventing isolation | 3 | 60% | 7 | 100% | 4 | 57% | 3 | 60% |
| Voluntary work | 7 | 58% | 4 | 57% | 5 | 71% | 1 | 33% |
| Independence (looking after oneself) | 4 | 40% | 1 | 33% | 2 | 67% | 9 | 100% |
| Transport | 4 | 50% | 0 | 0% | 1 | 33% | 4 | 80% |
| Pleasurable pursuits | 2 | 50% | 4 | 67% | 2 | 33% | 0 | 0% |
| Self efficacy | 5 | 100% | 1 | 100% | 1 | 100% | 1 | 100% |

* Percent that the number dropped was of that domain's nominations in that interview.
** Percent that the number added was of that domain's nominations in that interview.

Table A.7. Domains whose importance weights increased or decreased between interviews

| Domains | Increased between interviews 1 and 2 | | Decreased between interviews 1 and 2 | | Increased between interviews 2 and 3 | | Decreased between interviews 2 and 3 | |
|---|---|---|---|---|---|---|---|---|
| | Count | %* | Count | %* | Count | %* | Count | %* |
| Family | 38 | 41% | 34 | 37% | 20 | 24% | 31 | 37% |
| Friends | 24 | 37% | 15 | 23% | 19 | 28% | 6 | 9% |
| Health | 16 | 28% | 11 | 19% | 13 | 23% | 12 | 21% |
| Hobbies/interests | 12 | 17% | 11 | 15% | 13 | 26% | 5 | 10% |
| Church | 11 | 34% | 8 | 25% | 6 | 30% | 14 | 70% |
| Independence (freedom of choice) | 9 | 43% | 7 | 33% | 4 | 25% | 9 | 56% |
| Mobility | 8 | 22% | 4 | 11% | 9 | 23% | 3 | 8% |
| Home | 4 | 12% | 4 | 12% | 12 | 34% | 3 | 9% |
| Partner | 5 | 31% | 4 | 25% | 4 | 31% | 8 | 62% |
| Creativity | 8 | 35% | 7 | 30% | 2 | 11% | 0 | 0% |
| Companionship | 3 | 9% | 2 | 6% | 7 | 30% | 2 | 9% |
| Feeling valued | 6 | 40% | 4 | 27% | 0 | 0% | 3 | 50% |
| Lunch club | 4 | 31% | 3 | 23% | 3 | 27% | 3 | 27% |
| Social life/events | 4 | 25% | 3 | 19% | 1 | 5% | 4 | 20% |
| Learning | 4 | 29% | 3 | 21% | 2 | 25% | 2 | 25% |
| Current affairs | 2 | 14% | 2 | 14% | 3 | 23% | 2 | 15% |
| Financial security | 2 | 8% | 2 | 8% | 5 | 23% | 0 | 0% |
| Emotional wellbeing | 3 | 38% | 2 | 25% | 1 | 6% | 2 | 13% |
| Physical activity | 2 | 13% | 1 | 6% | 2 | 15% | 3 | 23% |
| Voluntary work | 1 | 14% | 0 | 0% | 2 | 67% | 2 | 67% |
| Pleasurable pursuits | 2 | 33% | 1 | 17% | 1 | 50% | 0 | 0% |
| Holidays/travel | 1 | 9% | 1 | 9% | 1 | 7% | 0 | 0% |
| Mental agility | 2 | 13% | 1 | 7% | 0 | 0% | 0 | 0% |
| Transport | 1 | 33% | 0 | 0% | 0 | 0% | 2 | 40% |
| Other | 1 | 8% | 0 | 0% | 0 | 0% | 2 | 22% |
| Keeping busy | 0 | 0% | 0 | 0% | 1 | 10% | 1 | 10% |
| Independence (looking after oneself) | 1 | 33% | 0 | 0% | 0 | 0% | 0 | 0% |
| Personal safety and security | 0 | 0% | 0 | 0% | 0 | 0% | 1 | 20% |
| Preventing isolation | 0 | 0% | 0 | 0% | 1 | 20% | 0 | 0% |
| Self efficacy | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |

* Percent of the number in the later interview.

Table A.8. Sample size and $R^2$ fit statistics for the models predicting satisfaction

| Domain | N | $R^2$ | $R^2$ Adjusted |
|---|---|---|---|
| Health | 166 | 0.56 | 0.54 |
| Family | 232 | 0.41 | 0.39 |
| Friends | 196 | 0.45 | 0.42 |
| Church | 80 | 0.47 | 0.44 |
| Companionship | 80 | 0.20 | 0.16 |
| Creativity | 78 | 0.75 | 0.70 |
| Current Affairs | 43 | 0.47 | 0.41 |
| Emotional Wellbeing/Self Esteem | 35 | 0.14 | 0.12 |
| Feeling Valued | 28 | 0.70 | 0.65 |
| Financial Security | 73 | 0.74 | 0.68 |
| Hobbies/Interests | 173 | 0.38 | 0.35 |
| Holidays/Travel | 41 | 0.71 | 0.64 |
| Home | 124 | 0.51 | 0.49 |
| Independence (Freedom of Choice) | 87 | 0.67 | 0.64 |
| Keeping Busy | 33 | 0.52 | 0.49 |
| Learning | 40 | 0.61 | 0.55 |
| Lunch Club | 33 | 0.40 | 0.33 |
| Mental Agility | 51 | 0.50 | 0.48 |
| Mobility | 97 | 0.44 | 0.42 |
| Partner | 51 | 0.56 | 0.51 |
| Personal Safety and Security | 20 | 0.39 | 0.36 |
| Physical Activity | 47 | 0.59 | 0.53 |
| Preventing Isolation | 21 | 0.78 | 0.74 |
| Social Life/Events | 87 | 0.63 | 0.57 |
| Voluntary Work | 27 | 0.81 | 0.78 |

Table A.9. Results of Models 3, 4, and 3.2.1

| Variable | Model 3 Estimate | *p* value | Model 4 Estimate | *p* value | Model 3.2.1 Estimate | *p* value | Model 3.2.1 Loss variables Estimate | *p* value |
|---|---|---|---|---|---|---|---|---|
| Intercept | -16.41 | 0.3792 | -20.58 | 0.1006 | 8.57 | 0.6832 | | |
| Interview | -1.62 | 0.0649 | -2.07 | 0.0140 | -2.47 | 0.0171 | | |
| Health | 0.35 | 0.0077 | 0.26 | 0.0078 | 0.45 | 0.0023 | 7.84 | 0.0013 |
| Family | 0.24 | 0.1019 | 0.26 | 0.0543 | 0.22 | 0.1670 | 0.65 | 0.7683 |
| Friends | -0.25 | 0.1109 | -0.24 | 0.0795 | -0.29 | 0.0842 | -1.68 | 0.5303 |
| Companionship | 0.15 | 0.3886 | 0.10 | 0.5358 | 0.09 | 0.6490 | 1.32 | 0.6000 |
| Emotional wellbeing | 0.38 | 0.0387 | 0.51 | 0.0023 | 0.56 | 0.0047 | 1.88 | 0.3660 |
| Feeling valued | 0.21 | 0.0716 | 0.19 | 0.0087 | 0.09 | 0.4850 | -7.42 | 0.0071 |
| Financial security | 0.02 | 0.2272 | 0.00 | 0.8317 | 0.02 | 0.2888 | 0.41 | 0.8749 |
| Independence (freedom of choice) | 0.17 | 0.2275 | 0.01 | 0.9519 | 0.15 | 0.3161 | 4.11 | 0.0591 |
| Mental agility | -0.09 | 0.5735 | -0.01 | 0.9511 | -0.24 | 0.1597 | -6.71 | 0.0022 |
| Mobility | 0.16 | 0.1204 | 0.09 | 0.2507 | 0.13 | 0.2535 | 2.15 | 0.2394 |
| Personal safety and security | 0.19 | 0.0021 | 0.11 | 0.0478 | 0.10 | 0.1520 | -7.80 | 0.1160 |
| Preventing isolation | -0.01 | 0.9496 | 0.03 | 0.7036 | -0.02 | 0.8303 | -3.42 | 0.1351 |
| Church | -0.17 | 0.1994 | | | -0.22 | 0.1436 | -3.43 | 0.2051 |
| Creativity | -0.08 | 0.2055 | | | -0.11 | 0.1269 | -0.55 | 0.8363 |
| Current affairs | -0.06 | 0.5033 | | | -0.17 | 0.0985 | -4.53 | 0.1073 |
| Hobbies/interests | 0.00 | 0.9697 | | | -0.03 | 0.8048 | -1.68 | 0.4249 |
| Holidays/travel | 0.14 | 0.0123 | | | 0.11 | 0.0897 | -2.25 | 0.2102 |
| Home | -0.08 | 0.6470 | | | 0.02 | 0.9269 | 0.77 | 0.7135 |
| Keeping busy | -0.03 | 0.8863 | | | 0.20 | 0.2945 | 9.23 | 0.1348 |
| Learning | 0.01 | 0.9354 | | | -0.03 | 0.7373 | 1.35 | 0.5799 |
| Lunch club | 0.20 | 0.2144 | | | 0.10 | 0.5586 | -2.55 | 0.6898 |
| Partner | 0.01 | 0.9216 | | | -0.02 | 0.8486 | -5.10 | 0.1961 |
| Physical activity | -0.04 | 0.4189 | | | -0.03 | 0.5811 | -0.74 | 0.7128 |
| Social life/events | -0.18 | 0.0003 | | | -0.10 | 0.0782 | 4.34 | 0.0297 |
| Voluntary work | -0.05 | 0.4581 | | | -0.09 | 0.1907 | 2.71 | 0.2250 |
| Intercept error | 89.89 | 0.0440 | 95.01 | 0.0424 | 81.15 | 0.0592 | | |
| Covariance | -29.81 | 0.1902 | -31.11 | 0.1924 | -19.54 | 0.3763 | | |
| Slope error | 26.54 | 0.0124 | 25.04 | 0.0203 | 21.36 | 0.0307 | | |
| Residual | 94.52 | <.0001 | 101.18 | <.0001 | 82.69 | <.0001 | | |
| -2 Log likelihood | 2847.8 | | 2828.7 | | 2709.4 | | | |
| AIC | 2855.8 | | 2836.7 | | 2717.4 | | | |
| BIC | 2866.9 | | 2847.8 | | 2728.5 | | | |
| $R^2$ Calculated | 0.42 | | 0.39 | | 0.46 | | | |
| % of individual variance explained | 57% | | 54% | | 61% | | | |
| % of slope variance explained | 9% | | 14% | | 27% | | | |

AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion

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