

**Investigating a Dynamic Modular Framework
for Subjective Well-Being**

by

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DEDICATION

This dissertation is dedicated to the memory of mother, Patricia, to my wife, Karen, and my daughter, Lauryn – the richest sources of my past, present, and future happiness.

ABSTRACT

According to Diener (1984), the three primary components of subjective well-being (SWB) are high life satisfaction (LS), frequent positive affect (PA), and infrequent negative affect (NA). The present dissertation extends previous research and theorizing on SWB by testing an innovative framework developed by Shmotkin (2005) in which SWB is conceptualized as an agentic process that promotes and maintains positive functioning. Two key components of Shmotkin's framework were explored in a longitudinal study of university students. In Part 1, SWB was examined as an integrated system of components organized within individuals. Using cluster analysis, five distinct configurations of LS, PA, and NA were identified at each wave. Individuals' SWB configurations were moderately stable over time, with the highest and lowest stabilities observed among participants characterized by "high SWB" and "low SWB" configurations, respectively. Changes in SWB configurations in the direction of a high SWB pattern, and stability among participants already characterized by high SWB, coincided with better than expected mental, physical, and interpersonal functioning over time. More positive levels of functioning and improvements in functioning over time discriminated among SWB configurations. However, prospective effects of SWB configurations on subsequent functioning were not observed. In Part 2, subjective temporal perspective "trajectories" were examined based on individuals' ratings of their past, present, and anticipated future LS. Upward subjective LS trajectories were normative at each wave. Cross-sectional analyses revealed consistent associations between upward subjective trajectories and lower levels of LS, as well as less positive mental, physical, and interpersonal functioning. Upward subjective LS trajectories were

biased both with respect to underestimation of past LS and overestimation of future LS, demonstrating their illusional nature. Further, whereas more negative retrospective bias was associated with greater current distress and dysfunction, more positive prospective bias was associated with less positive functioning in the future. Prospective relations, however, were not consistently observed. Thus, steep upward subjective LS trajectory appeared to be a form of wishful-thinking, rather than an adaptive form of self-enhancement. Major limitations and important directions for future research are considered. Implications for Shmotkin's (2005) framework, and for research on SWB more generally, also are discussed.

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TABLE OF CONTENTS

INTRODUCTION.....	1
Overview.....	1
Subjective Well-Being.....	1
<i>Definition.....</i>	1
<i>Other Models of Well-Being.....</i>	3
<i>Operationalizing SWB.....</i>	5
<i>Structure.....</i>	5
Theoretical Models.....	7
<i>Bottom-up Models.....</i>	7
<i>Top-Down Models.....</i>	9
<i>Cognitive Processing Models.....</i>	12
<i>Integrated Models.....</i>	14
<i>Action-Oriented Models.....</i>	16
<i>Sociocultural Models.....</i>	17
<i>Discussion of Theoretical Models.....</i>	18
A Dynamic Modular Framework for SWB.....	21
A “Person-Centered” Approach to SWB.....	25
<i>Preliminary Research.....</i>	29
<i>Overview of Part 1.....</i>	39
Subjective Temporal Perspective.....	39
<i>Preliminary Research.....</i>	48
<i>Overview of Part 2.....</i>	55

Summary.....	56
PART 1.....	58
Objectives and Hypotheses.....	58
<i>Objective 1: Longitudinal Replicability of SWB Configurations</i>	59
<i>Objective 2: Longitudinal Stability of SWB Cluster Assignments</i>	60
<i>Objective 3: Cross-Sectional Differences Between SWB Configurations in Positive Functioning</i>	60
<i>Objective 4: Longitudinal Associations Between SWB Configurations and Positive Functioning</i>	61
<i>Objective 5: Comparing Person-Centered and Variable-Centered Approaches</i>	63
<i>SWB and Positive Functioning</i>	64
Method.....	66
<i>Participants and Procedure</i>	66
<i>Measures</i>	68
<i>Subjective Well-Being</i>	68
<i>Mental Functioning</i>	68
<i>Physical Functioning</i>	69
<i>Interpersonal Functioning</i>	70
<i>Treatment of Missing Data</i>	71
Results.....	72
<i>Preliminary Analyses</i>	72
<i>Subjective Well-Being</i>	72
<i>Positive Functioning</i>	76

<i>Objective 1: Longitudinal Replicability of SWB Configurations.....</i>	82
<i>Determining the Optimal Cluster Solution.....</i>	82
<i>Cluster Descriptions.....</i>	86
<i>Consistency in Cluster Assignments Between Full Sample and Longitudinal Sample.....</i>	90
<i>Summary.....</i>	91
<i>Objective 2: Longitudinal Stability of SWB Cluster Assignments.....</i>	92
<i>Stability versus Instability in Longitudinal Cluster Assignments.....</i>	92
<i>Cross-Tabulations in Longitudinal Cluster Assignments.....</i>	93
<i>Summary.....</i>	95
<i>Objective 3: Cross-Sectional Differences Between SWB Configurations in Positive Functioning.....</i>	95
<i>Wave 1 Comparisons.....</i>	96
<i>Wave 2 Comparisons.....</i>	98
<i>Wave 4 Comparisons.....</i>	100
<i>Summary.....</i>	102
<i>Objective 4: Longitudinal Associations Between SWB Configurations and Positive Functioning.....</i>	103
<i>Change in Functioning by Wave 1 SWB Cluster and Cluster Stability.....</i>	103
<i>Short-Term Changes in Functioning by Wave 1 SWB Cluster and Cluster Stability: All Five Clusters.....</i>	104
<i>Short-Term Changes in Functioning by Wave 1 SWB Cluster and Cluster Stability: Middle Three Clusters.....</i>	108
<i>Longer-Term Changes in Functioning by Wave 1 SWB Cluster and Cluster Stability: All Five Clusters.....</i>	114

<i>Longer-Term Changes in Functioning by Wave 1 SWB Cluster and Cluster Stability: Middle Three Clusters</i>	118
<i>Discriminating SWB Cluster Membership Over Time With Wave 1 Functioning and Change in Functioning</i>	122
<i>Discriminating Among Wave 2 Clusters</i>	123
<i>Discriminating Among Wave 4 Clusters</i>	126
<i>Summary</i>	129
<i>Objective 5: Comparing Person-Centered and Variable-Centered Approaches</i>	133
<i>Predicting Wave 2 Functioning</i>	135
<i>Predicting Wave 4 Functioning</i>	137
<i>Summary</i>	139
<i>SWB and Positive Functioning</i>	141
Discussion of Part 1.....	142
<i>Longitudinal Replicability of SWB Configurations</i>	143
<i>Longitudinal Stability of SWB Cluster Assignments</i>	147
<i>Cross-Sectional Differences Between SWB Configurations in Positive Functioning</i>	150
<i>Longitudinal Associations Between SWB Configurations and Positive Functioning</i>	154
<i>SWB Configurations as Predictors of Future Functioning</i>	154
<i>SWB Configurations as Outcomes of Functioning</i>	158
<i>Comparing Person-Centered and Variable-Centered Approaches</i>	159
<i>SWB and Positive Functioning</i>	161
<i>Conclusions</i>	163
PART 2.....	165

Objectives and Hypotheses.....	165
<i>Objective 1: Longitudinal Replicability and Stability of Subjective LS Trajectories</i>	166
<i>Objective 2: Longitudinal Relations Between Subjective LS Trajectories and Positive Functioning</i>	168
<i>Objective 3: Determining Bias in Subjective LS Trajectories</i>	170
<i>Objective 4: Comparing the Predictive Utility of Actual versus Subjective LS Trajectories</i>	173
<i>Subjective LS Trajectories and Positive Functioning</i>	174
Method.....	177
<i>Participants and Procedure</i>	177
<i>Measures</i>	177
<i>Subjective Temporal Perspective Life Satisfaction Ratings</i>	177
Results.....	177
<i>Objective 1: Longitudinal Replicability and Stability of Subjective LS Trajectories</i>	177
<i>Mean-Level Trends</i>	178
<i>Latent Trajectory Models</i>	181
<i>Evaluating Model Fit</i>	182
<i>Addressing an Estimation Problem</i>	183
<i>Wave 1 Latent Trajectory Model</i>	185
<i>Wave 2 Latent Trajectory Model</i>	186
<i>Wave 4 Latent Trajectory Model</i>	187
<i>Stability in Latent Trajectories</i>	188
<i>Wave 1 to Wave 2 Stability</i>	191

<i>Wave 2 to Wave 4 Stability</i>	191
<i>Wave 1 to Wave 4 Stability</i>	191
<i>Additional Stability Analyses</i>	192
<i>Summary</i>	193
<i>Objective 2: Longitudinal Relations Between Subjective LS Trajectories and Positive Functioning</i>	194
<i>Within-Wave Models</i>	195
<i>Longitudinal Models</i>	200
<i>Predicting Positive Functioning</i>	200
<i>Predicting Latent Subjective Trajectories</i>	203
<i>Summary</i>	207
<i>Objective 3: Determining Bias in the Subjective LS Trajectories</i>	209
<i>Trends in Mean Levels of Present LS Across Waves</i>	209
<i>Bias in Wave 2 STP Ratings</i>	210
<i>Latent Trajectory Model for Present LS</i>	212
<i>Associations Between Bias Scores and Positive Functioning</i>	216
<i>Non-Linear Effects of Prospective Bias</i>	217
<i>Subsidiary Analyses: Indirect Effects of Subjective LS Trajectories</i>	219
<i>Summary</i>	222
<i>Objective 4: Comparing the Predictive Utility of Actual versus Subjective LS Trajectories</i>	223
<i>Cross-Sectional Models</i>	223
<i>Longitudinal Models</i>	228
<i>Predicting Positive Functioning Over Time</i>	228

<i>Predicting Separate LS Ratings Over Time</i>	232
<i>Summary</i>	236
<i>Subjective LS Trajectories and Positive Functioning</i>	237
Discussion of Part 2.....	238
<i>Longitudinal Replicability and Stability of Subjective LS Trajectories</i>	239
<i>Longitudinal Relations Between Subjective LS Trajectories and Positive Functioning</i>	246
<i>Determining Bias in the Subjective LS Trajectories</i>	251
<i>Comparing the Predictive Utility of Actual versus Subjective LS Trajectories</i>	255
<i>Subjective LS Trajectories and Positive Functioning</i>	260
<i>Conclusions</i>	262
GENERAL DISCUSSION..... ¹	265
General Limitations.....	266
<i>General Limitation 1: Sampling</i>	266
<i>General Limitation 2: Self-Report</i>	269
<i>Assessing SWB</i>	269
<i>Assessing Positive Functioning</i>	271
<i>General Limitation 3: An Abundance of Statistical Tests</i>	274
General Implications.....	277
<i>General Implication 1: The Structure of SWB</i>	277
<i>Congruous and Incongruous SWB Configurations</i>	278
<i>Informing Competing Structural Models of SWB</i>	280
<i>On the Underlying Nature of SWB</i>	282

<i>General Implication 2: The Function of SWB Configurations.....</i>	285
<i>General Implication 3: Upward versus Onward Subjective Trajectories.....</i>	291
<i>General Implication 4: Bias in Subjective Trajectories for Life Satisfaction....</i>	297
<i>General Implication 5: The Many Faces of SWB.....</i>	300
<i>General Implication 6: Looking Beyond Shmotkin (2005).....</i>	305
Conclusion.....	306
REFERENCES.....	308
APPENDICES.....	350

LIST OF TABLES

Table 1.	Means, Standard Deviations, and Internal Consistency Estimates by Study Measure by Wave.....	71
Table 2.	Correlations Between SWB Components.....	72
Table 3.	Results from Principal Components Analysis of Functioning Measures by Wave.....	78
Table 4.	Means, Standard Deviations, Internal Consistency Estimates, and Correlations Between Composite Functioning Scores by Wave.....	80
Table 5.	Total and Incremental Explained Variance in SWB Scores by Cluster Solutions, and Replicability in Cluster Configurations.....	84
Table 6.	Cluster Descriptives for the Final Five-Cluster Solution by Cluster by Wave.....	87
Table 7.	Cross-Tabulations of Wave 1 Cluster Assignments Derived Using Full Versus Longitudinal Samples.....	91
Table 8.	Cross-Tabulations of Cluster Assignments Across Waves.....	94
Table 9.	Results from Discriminant Function Analysis Predicting Wave 2 Cluster Membership From Wave 1 Cluster Membership, Wave 1 functioning, and Changes in Functioning.....	124
Table 10.	Results from Discriminant Function Analysis Predicting Wave 4 Cluster Membership From Wave 1 Cluster Membership, Wave 1 functioning, and Changes in Functioning Between Wave 1 and Wave 4.....	128
Table 11.	Summary of Results from Hierarchical Regression Models Testing Wave 1 SWB Clusters, SWB Components, and Changes in Clusters and Components as Predictors of Residual Wave 2 Functioning.....	136
Table 12.	Summary of Results from Hierarchical Regression Models Testing Wave 1 SWB Clusters, SWB Components, and Changes in Clusters and Components as Predictors of Residual Wave 4 Functioning.....	138
Table 13.	Summary of Part 1 Hypotheses.....	142

Table 14.	Means, Standard Deviations, and Correlations Among Subjective Temporal Perspective Life Satisfaction Ratings by Wave.....	179
Table 15.	Model Fit Results from Latent Trajectory Models by Wave.....	185
Table 16.	Model Fit Results from Within-Wave Correlations Models.....	197
Table 17.	Within-Wave Associations Between Subjective Trajectories and Positive Functioning.....	198
Table 18.	Results from Longitudinal Models Predicting Future Functioning From Latent Intercept and Trajectory Factors.....	202
Table 19.	Results from Longitudinal Models Predicting Subjective Trajectories...	205
Table 20.	Model Fit Results from Latent Trajectory Models for Ratings of Present Life Satisfaction.....	214
Table 21.	Associations Between Wave 2 Prospective and Retrospective Bias Scores and Positive Functioning Measures by Wave.....	217
Table 22.	Non-Linear Associations Between Wave 2 Prospective Bias and Wave 4 Functioning.....	218
Table 23.	Results from Longitudinal Models Predicting Wave 4 Functioning from Wave 2 Subjective Trajectories and Prospective Bias.....	221
Table 24.	Within-Wave Correlations Between Subjective Temporal Perspective Life Satisfaction Ratings and Measures of Functioning.....	224
Table 25.	Within-Wave Predictive Associations Between Subjective Temporal Perspective Life Satisfaction Ratings and Measures of Functioning.....	225
Table 26.	Within-Wave Predictive Associations Between Estimated LS Intercept and Subjective LS Trajectory Factor Scores and Measures of Functioning.....	227
Table 27.	Results from Longitudinal Models Predicting Future Functioning From Separate Life Satisfaction Ratings.....	229
Table 28.	Results from Longitudinal Models Predicting Future Functioning From Estimated LS Intercept and Subjective LS Trajectory Factor Scores.....	231
Table 29.	Results from Longitudinal Models Predicting Subjective Temporal Perspective Life Satisfaction Ratings.....	233

Table 30.	Results from Longitudinal Models Predicting Estimated LS Intercept and Subjective LS Trajectory Factor Scores.....	235
Table 31.	Summary of Part 2 Hypotheses.....	239

LIST OF FIGURES

Figure 1.	Scatter plots for Wave 1 SWB Components.....	73
Figure 2.	Scatter plots for Wave 2 SWB Components.....	74
Figure 3.	Scatter plots for Wave 4 SWB Components.....	75
Figure 4.	Cluster Centers from the Optimal Five-Cluster Solution by Cluster by Wave.....	88
Figure 5.	Wave 1 Mental, Physical, and Interpersonal Functioning by Cluster...	97
Figure 6.	Wave 2 Mental, Physical, and Interpersonal Functioning by Cluster...	99
Figure 7.	Wave 4 Mental, Physical, and Interpersonal Functioning by Cluster....	101
Figure 8.	Residual Wave 2 Functioning by Wave 1 SWB Clusters by Cluster Stability.....	106
Figure 9.	Changes in Wave 1 to Wave 2 Functioning by Wave 1 SWB Cluster and by Direction of Change in Cluster Membership Over Time.....	111
Figure 10.	Changes in Wave 1 to Wave 4 Functioning by Wave 1 SWB Cluster for Non-Stable and Stable Participants.....	115
Figure 11.	Changes in Wave 1 to Wave 4 Functioning by Wave 1 SWB Cluster and by Direction of Change in Cluster Membership Over Time.....	120
Figure 12.	Trends in Mean Life Satisfaction Ratings by Subjective Temporal Perspective by Wave.....	180
Figure 13.	Latent STP Trajectory Model.....	182
Figure 14.	Longitudinal Latent Trajectory Models for Wave 1 to Wave 2 (Panel A), Wave 2 to Wave 4 (Panel B), and Wave 1 to Wave 4 (Panel C)....	190
Figure 15.	Example of Within-wave Correlation Model.....	196
Figure 16.	Example of Within-wave Predictive Model.....	199
Figure 17.	Example of Longitudinal Model Predicting Mental, Physical, and Interpersonal Functioning.....	201

Figure 18.	Example of Longitudinal Model Predicting Latent Intercept and Trajectory Factors.....	204
Figure 19.	Comparison Between Actual Trend in Mean Levels of Present LS Over Time versus Wave 2 STP Ratings for Past, Present, and Anticipated Future LS.....	210
Figure 20	Example of Longitudinal Model Predicting Wave 4 Functioning from Wave 2 Latent Intercept, Wave 2 Latent Trajectory, Wave 2 functioning, and Prospective Bias Scores.....	220
Figure 21.	Wave 1 Subjective LS Trajectories by SWB Configuration.....	302

INTRODUCTION

Overview

In this dissertation, I examine the connection between subjective well-being (SWB) and positive human functioning. In the present section, I review the definition and operationalization of SWB, along with relevant theoretical models. The conceptual framework serving as the foundation for the present work, Shmotkin's (2005) dynamic modular framework for SWB, is then introduced. Previous studies in which I have tested aspects of Shmotkin's models are then reviewed. Finally, the two-part longitudinal study comprising the present dissertation is outlined.

Subjective Well-Being

Research on SWB grew out of the 'social indicators' movement in the 1960s. At this time, social scientists began to include global subjective quality of life indicators (e.g., "How happy are you with your life these days?", "How satisfied are you with your life, overall?") in large-scale population surveys to supplement the standard battery of social indicators, which typically included questions related to education level, household income, and health status. Early research in the area of subjective quality of life was primarily concerned with validating self-report measures of life satisfaction and global happiness, and evaluating the predictors and correlates of these well-being indicators (e.g., Andrews & Withey, 1976; Campbell, Converse, & Rodgers, 1976; Cantril, 1965).

Definition

In 1984, a review article was published in *Psychological Bulletin* by Ed Diener which has become a touchstone for psychological inquiry on well-being. In this seminal review, Diener (1984) defined subjective well-being (SWB) as "how and why people

experience their lives in positive ways, including both cognitive judgments and affective reactions” (p. 542). Three hallmarks of SWB were described. First, because SWB resides within an individual’s experience, the study of SWB is concerned with individuals’ subjective evaluations of their own lives using whatever criteria they deem appropriate. Second, SWB pertains to positive experiences and appraisals, in addition to negative factors such as distress or dysfunction. Third, SWB includes an integrated assessment of all aspects of a person’s life. Consistent with emerging research in this area at that time (e.g., McKennell, 1978), Diener described three primary components of SWB: life satisfaction (LS), positive affect (PA), and negative affect (NA). Whereas LS was thought to reflect a primarily cognitive appraisal concerning one’s life, PA and NA were described as a person’s emotional experiences and reactions to daily life events.

Following pioneering research by Bradburn (1969), PA and NA were presented by Diener (1984) as separate forms of affective experience. This bidimensional view of affective experience was not without its critics (for a recent review, see Schimmack, 2008). Among the most popular contemporary models of affective experience, the circumplex model (Russell & Feldman Barret, 1999) specifies two primary bipolar dimensions: affect valence (negative to positive) and affect arousal/activation (low to high), rather than orthogonal PA and NA dimensions. Nonetheless, models specifying separate PA and NA factors continue to be influential (Cacioppo, Gardner, & Bernston, 1999; Schimmack & Crites, 2005; Tellegen, 1985; Watson, Weise, Vaidya, & Tellegen, 1999). With respect to the cognitive component of SWB, LS evaluations are no longer considered to reflect purely cognitive appraisals or a mental ‘summing up’ of one’s life, but rather to involve cognitive, affective, and situational factors (Davern, Cummins, &

Stokes, 2007; Schimmack, 2008). Further, although distinction also has been drawn between a person's momentary feelings and thoughts about his or her well-being (e.g., Kahneman, 1999; Schwartz & Strack, 1999) and global life evaluations, consistent with Diener's (1984) original formulation, the conceptual and empirical emphasis in research on SWB has remained on global cognitive evaluations and affective reactions as reflected in the three main components of SWB: LS, PA, and NA (Diener, 2008).

Other Models of Well-Being

Although Diener's (1984) three component model of SWB has served as the foundation for a large volume of research, other models of well-being also have been proposed. For example, in an influential commentary, Waterman (1993) proposed two distinguishable types of well-being: (i) hedonic well-being, which pertains to enjoyment and satisfaction, and (ii) eudaimonic well-being, which addresses self-actualization and personal growth (see also Ryan & Deci, 2001). Approaches to both types of well-being have been examined empirically. For example, consistent with the hedonic approach, Kozma and Stones have examined self-reported happiness as a product of short-term positive and negative experiences, and long-term propensities (e.g., Kozma, Stone, & Stones, 1990; Stones & Kozma, 1985). Lyubomirsky and colleagues have conceptualized happiness as a personality trait which influences how people think, feel, and act (Lyubomirsky & Lepper, 1999; Lyubomirsky, 2001). As an example of the eudaimonic approach, Ryff and colleagues have developed an influential model of "psychological well-being", comprising six factors thought to universally describe positive functioning: self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth (Ryff, 1989; Ryff & Keyes, 1998).

Although there have been debates concerning the most appropriate model of well-being (see, for example, the exchange between Ryff & Singer, 1998 and Diener, Sapyta, & Suh, 1998), researchers have consistently found strong positive correlations between the two types of well-being (e.g., Compton, 2001; Keyes, Shmotkin, & Ryff, 2002; King, Hicks, Krull, & Del Gaiso, 2006; van Dierendonck, 2005; Vitterso, 2003), raising questions about the empirical separability of these concepts. An emerging body of research on well-being seeks to understand the relation between, if not integrate, hedonic and eudaimonic conceptualizations of well-being (Diener, Oishi, & Lucas, 2003; King & Napa, 1998; Westerhof, Dittman-Kohli, & Thissen, 2001). For example, Keyes has developed an integrative model which combines components from Diener's model of SWB, Ryff's model of psychological well-being, and Keyes' own concept of "social well-being", which pertains to an individual's functioning within social and societal contexts (Keyes, 1998). Other integrative approaches include a model described by Seligman and colleagues comprising three anticipated paths to the "good life": enjoyment (i.e., hedonic well-being), meaning (i.e., eudaimonic well-being), and engagement or flow (Seligman, Steen, Park, & Peterson, 2005).

SWB is arguably the most widely-researched of these various models of well-being, and is the focus of the present dissertation. Clearly, however, SWB is not the only conceptualization of interest to well-being researchers, nor does it provide a complete account of positive quality of life or "flourishing" (Keyes et al., 2002; Keyes, 2003). Although beyond the scope of the present work, an important priority for future research on the broader topic of well-being is to develop a "more elaborate, yet more precise,

understanding of the interrelations of SWB with other faculties of well-being” (Shmotkin, Berkovic, & Cohen, 2006, p. 140).

Operationalizing SWB

Consistent with the subjective focus of SWB, it is typically assessed through self-report. Various measures of the three SWB components exist. The earliest measures of the LS component comprised single-item global ratings (e.g., Fordyce, 1977; Kilpatrick & Cantril, 1960) which continue to be widely employed. Another popular measure of LS is the five-item *Satisfaction With Life Scale* developed by Diener and colleagues (Diener, Emmons, Larsen, & Griffin, 1985). Of the numerous measures of self-reported affect, a large proportion of research on SWB has used either Bradburn’s (1969) 10-item *Affect Balance Scale* or the 20-item *Positive and Negative Affective Schedule* (Watson, Clark, & Tellegen, 1988). These latter scales provide separate scores for PA and NA, and, paralleling the global nature of LS ratings, SWB investigators most typically assess PA and NA with respect to an individual’s affective experiences “in general”.

Structure

Diener and colleagues have repeatedly emphasized the importance of measuring all three components of SWB (e.g., Diener, 1984, 1994; Diener et al., 2003; Diener & Lucas, 1999; Lucas, Diener, & Suh, 1996; Pavot & Diener, 1993). There is little consensus, however, concerning how the LS, PA, and NA components can be best utilized to form a comprehensive analytic model of SWB. Rather, three primary approaches concerning the structure of SWB have been promoted over the past 30 years.

The first structural model treats SWB as three separate components. Proponents of this model emphasize the relative independence of LS, PA, and NA and focus on the

correlates and predictors of each separate SWB component (Andrews & Robinson, 1991; Argyle & Martin, 1991; Campbell, 1981; Diener, 1984; Diener & Biswas-Diener, 2002; Larsen & Eid, 2008; Lucas, Diener, & Suh, 1996; Pavot & Diener, 2008; Westerhof & Keyes, 2006). From this perspective, SWB is simply a research domain, rather than a specific construct.

The second model treats SWB as a hierarchical construct. Proponents of this approach emphasize that ratings of LS, PA, and NA are often moderately to highly intercorrelated: Typically, LS and PA are positively correlated, LS and NA are negatively correlated, and PA and NA are often negatively correlated (Diener, 1984, 1999, 2001). This shared variance is interpreted as evidence of a higher-order SWB factor (e.g., Andrews & Withey, 1976; Arthaud-Day, Rode, Mooney, & Near, 2005; Bettencourt & Sheldon, 2001; Diener, 1994; Diener, Sandvik, & Pavot, 1991; Liang, 1985; Malka & Chatman, 2003; McCulloch, 1991; Oishi, Diener, & Lucas, 2007; Sheldon & Lyubomirsky, 2006; Shmotkin & Hadari, 1996; Vitterso, Biswas-Diener, & Diener, 2005). In corresponding hierarchical analytic models, a latent SWB factor is assumed to be the common cause of its' first-order indicators, that is, LS, PA, and NA.

The third structural model specifies causal relations among the three SWB components. Specifically, proponents consider affect to be an important source of information for global life evaluations and, in empirical models treat PA and NA as joint predictors of LS (Beiser, 1974; Bradburn, 1969; Brenner, 1975; Costa and McCrae, 1980; Davern & Cummins, 2006; Davern et al., 2007; Diener, Lucas, Oishi, & Suh, 2002; George, 1991; Kim-Prieto, Diener, Tamir, Scollon, & Diener, 2005; Kozma & Stones, 1980; Schimmack, 2008; Schimmack, Schupp, & Wagner, 2008; Schimmack, Diener, &

Oishi, 2002). In such models, PA and NA components are often conceptualized as mediators of the impact of other ‘external’ variables (e.g., environmental factors, personality traits) on LS judgments (e.g., Schimmack et al., 2008).

Each type of structural model continues to be employed in contemporary research on SWB. There have been few systematic attempts, however, to integrate or comparatively evaluate these three competing models (Busseri, Sadava, & DeCourville, 2007). Despite this diversity in approach concerning the structure of SWB, there is growing recognition of the importance of measuring all three SWB components and that a complete accounting of SWB requires attention to LS, PA, and NA.

Theoretical Models

A large number of theoretical models have been advanced to explain the sources of, and influences on, SWB. In this section, I provide an overview of extant theoretical models of SWB, including bottom-up, top-down, cognitive processing, integrative, action-oriented, and sociocultural models.

Bottom-Up Models

Among the earliest accounts of SWB were “bottom-up” models (Diener, 1984) which attempted to explain global life evaluations in terms of demographics, socioeconomic factors, and living conditions (Feist, Bodner, Jacobs, Miles, & Tan, 1995; Seidlitz & Diener, 1993). These sociodemographic accounts have received much empirical attention, resulting in a substantive volume of evidence concerning the relations between SWB and variables such as age, sex, education, income, marital status, religion, and employment status. General estimates are that up to 20% of the variance in SWB is attributable to living conditions and other demographic factors (Argyle, 1999; DeNeve &

Cooper, 1998; Diener, 1984; 1999; Diener, Oishi, & Lucas, 2003; Headey, Veenhoven, & Wearing, 1991; Lyubomirsky, Sheldon, & Schkade, 2005; Myers, 2000). Once basic needs have been met, however, there may be little additional impact in improved life circumstances on SWB (Cummins, 2000; Diener, Suh, Lucas, & Smith, 1999; Easterlin, 2001; Myers, 2000).

A second type of bottom-up account assumes that daily experiences and life events accumulate over time to influence SWB (e.g., Brief, Houston Butcher, George, & Link, 1993; Ehrhardt, Saris, & Veenhoven, 2000; Headey et al., 1991; Schimmack, 2003). Daily events do explain short-term variability in SWB, both within individuals over time and between individuals (e.g., Oishi, Schimmack, & Diener, 2001; Suh, Diener, & Fujita, 1996). However, many people adapt relatively quickly to changing circumstances and many types of life events (Diener et al., 1999; Lyubomirsky et al., 2005b). Although the degree of adaptation may vary across people, and does not necessarily counteract the effects of all life events (Lucas, Clark, Georgellis, & Diener, 2004), for most individuals, SWB is restored to “baseline” within a relatively short period of time, often six months or less.

In an even more fine-grained bottom-up model of SWB, the “instant utility” of momentary experiences is thought to provide an objective measure of well-being, free from recall bias or imperfect memories (Kahneman, 1999; Schwarz, Kahneman, & Xu, 2008). At present, however, little is known concerning the relation between aggregated instant utility evaluations and more typical global indicators of SWB.

Although socioeconomic conditions, daily events, and momentary experiences can impact subjective life evaluations, the available evidence indicates that changes in

these factors typically do not have a lasting impact on SWB. Rather, aggregate levels of SWB are generally stable over extended periods of time (Diener et al., 1999; Diener, 2000; Eid & Diener, 1999, 2004). Long-term levels of SWB, therefore, are unlikely to be explained solely by bottom-up processes (Cummins, Eeckersley, Pallant, Van Vugt, & Misajon, 2003; Diener & Oishi, 2005; Lyubomirsky et al., 2005b).

One possible exception is the potential impact of “domain” satisfactions on overall LS. Domain satisfactions were originally conceptualized in early research on SWB (e.g., Andrews & Withey, 1976; Michalos, 1980) as judgments of satisfaction with particular areas of one’s life, including family, friends, work, leisure, and finances. Researchers have argued that domain satisfactions, when considered across a range of important life domains, are likely to be among the most proximal and subjectively important predictors of overall LS (e.g., Cummins et al., 2003; Davern et al., 2007; Headey, Veenhoven, & Wearing, 1991; Schimmack et al., 2002; Schimmack & Oishi, 2005). Recent reviews, however, suggest that the evidence supporting the causal role of domain satisfaction on LS is mixed and, in fact, may also be consistent with a model in which overall evaluation of one’s life may impact one’s evaluation of specific life domains (Schimmack, 2008).

Top-Down Models

The failure of bottom-up models to provide a complete account of individual differences in SWB lead to a second broad class of explanatory models emphasizing genes, predispositions, and traits. According to these “top-down” accounts (e.g., Diener, 1984, 1994), the longer-term stability in SWB, and the tendency for people to return to baseline levels of SWB following positive and negative life events can be explained by a

SWB “set-point”. Set-points are not thought to be fixed to single value, however (Diener, Lucas, & Scollon, 2006). Rather, there may be a range of values within which an individual’s level of SWB typically varies (e.g., Lyubomirsky et al., 2005b). SWB baselines typically are positive, rather than neutral or negative (Diener et al., 1999; Heading & Wearing, 1989; Myers & Diener, 1995). For example, in samples from countries around the globe, mean levels of LS typically average however around 75% of the scale maximum (Cummins, 2000).

One type of explanation for positive SWB set-points is that SWB may be largely genetically determined (Lykken & Tellegen, 1996). Genes may determine a person’s SWB set point directly and indirectly, through influencing traits, goals, attitudes, actions, and other intervening variables (Nes, Roysamb, Tambs, Harris, Reichborn-Kjennerud, 2006; Roysamb, Harris, Magnus, Vitterso, & Tambs, 2002; Roysamb, Tambs, Reichborn-Kjennerud, Neale, & Harris, 2002; Weiss, Bates, & Luciano, 2008). The positive set-point for SWB also has been considered from an evolutionary perspective linking SWB to the processes of harm avoidance and obtaining rewards (Grinde, 2002). Simply stated, as long as pain and negative mood-inducing stimuli are avoided, overall affect should be positive. A positive SWB offset is also expected to be biologically advantageous because “a good mood is more likely to spur the individual to participate in procreation and life-supporting functions” (Grinde, 2002, p. 344). To date, however, researchers have yet to investigate the specific mechanisms linking genetic influences to SWB, or test predictions derived from an evolutionary explanation for positive SWB set-points.

A second group of top-down accounts of SWB are trait-based, in which SWB is conceptualized as a stable individual difference variable. For example, individuals may differ in an underlying propensity toward positive appraisals and affective reactions (e.g., Diener, 1994; Kahneman, 1999; Pavot & Diener, 1993), regardless of specific experiences (Diener, Napa Scollon, Oishi, Dzokoto, & Suh, 2000; Vitterso, 2003, 2004; Vitterso & Nilsen, 2002). Others consider SWB to be determined by more basic traits, such as extraversion and neuroticism (e.g., Brief et al., 1993; Costa & McCrae, 1980; DeNeve & Cooper, 1999; Diener & Lucas, 1999; Diener et al., 2003; McCrae & Costa, 1991; Pavot, Diener, & Fujita, 1990). From this perspective, extraverted/non-neurotic individuals have a “head-start” in achieving higher levels of SWB (Diener, Lucas, & Oishi, 2002) because they chose to be in more pleasant situations and social interactions, and may be particularly sensitive to positive information (Argyle & Martin, 1991; Fogle, Nwukah, Dedo, & Messinger, 1992; Larson & Ketelaar, 1991; Lucas, Diener, Grob, Suh, & Shao, 2000; Oishi & Diener, 2001; Pavot et al., 1990; Watson & Clark, 1997). Stable personality traits such as extraversion and neuroticism also may serve an equalizing function in the face of changing life events or circumstances (Headey & Wearing, 1989, 1991) such that consistency in SWB derives from consistency in other traits (Cummins et al., 2003; Kozma, Stone, & Stones, 2000; Lucas, 2008).

Combining these various top-down perspectives, individuals may be characterized by genetically influenced SWB set-points or set-ranges. Stable individual differences in SWB may also reflect an inherited predisposition toward positive life evaluations, as well as characteristic ways of interacting and reacting to environmental stimuli (Diener et al., 2003; Kozma et al., 2000; Lyubomirsky et al., 2005b; Pavot et al., 1990). Thus, genes

and traits may impact baseline levels of SWB and people's evaluations and reactions to their lives.

Cognitive Processing Models

A third group of theoretical models of SWB focuses on cognitive processes. In such models, people with high SWB are assumed to make a preponderance of positive appraisals of their lives, whereas individuals with low SWB see a majority of factors as negative or harmful (Diener, 1994; Seidlitz & Diener, 1993). In these appraisal theories, interpretations of life events and circumstances, rather than the objective events themselves, are the primary influences on SWB (DeNeve & Cooper, 1998; Diener, 1994; Seidlitz & Diener, 1993; Stones & Kozma, 1980).

One of the first cognitive accounts of LS was based on comparison standards. When individuals compare their lives to internal standards, personal goals, and other people, the perceived magnitude of the gap between aspirations and accomplishments leads to higher or lower levels of SWB (Michalos, 1980). Research supports this notion of SWB being dependent, at least in part, on disparities involving personal wants and needs on the one hand, and available resources and social comparisons on the other (Cheng, 2004; Diener & Lucas, 1999; Diener et al., 1999, 2002; Heylighen & Bernheim, 2000; Lyubomirsky, 2001; Veenhoven, 2000). Comparison standards also provide a potential explanation for SWB set-points. Indeed, the analogy of a hedonic or satisfaction "treadmill" (Brickman, Coates, & Janoff-Bulman, 1978; Kahn & Juster, 2002; Kahneman, 1999) has been used to describe a cycle in which striving for material gains provides only temporary increases in SWB because changes in income lead to changes in

expectations and internal standards, eliminating any net change over time in overall SWB levels (Easterlin, 2001, 2002).

In addition to comparison standards, a variety of other cognitive factors and processes have been examined, including accuracy and efficiency of processing, allocation of attention, information salience, recall of positive and negative information, and the general versus specific nature of the judgment target (Diener & Lucas, 1999; Diener et al, 2002b; Oishi & Diener, 2001; Schkade & Kahneman, 1998; Seidlitz, Wyer, & Diener, 1997; Tversky & Griffin, 1991). From this perspective, people with high SWB are more likely to have access to, and rely on information related to personal strengths and self-enhancing appraisals, whereas low SWB individuals weight personal weaknesses and negative aspects of their lives more heavily. Accordingly, consistency in chronically accessible and salient information explains both intraindividual stability in SWB judgments over time, and individual differences in levels of SWB (e.g., Diener et al., 2002b).

Other researchers working within a cognitive-processing framework have emphasized the situational nature of SWB judgments. For example, global well-being judgments have been explained as a product of the information that is applicable, accessible, and appropriate to the judgment context, as well as the nature and order of the survey questions (e.g. Strack, Martin, & Schwarz, 1988; Schwarz & Strack, 1991, 1999; Strack, Schwarz, & Gschneidinger, 1985). In addition, current mood may influence the positive versus negative nature of the information recalled, resulting in SWB judgments that are congruent with current mood (Cheng, 2004a, 2004b; Lent, 2004; Lent, Singley,

Sheu, Gainor, Brenner, Treistman, & Ades, 2005; Schwarz & Clore, 1983; Schwarz & Stack, 1999; Seidlitz & Diener, 1993).

In summary, cognitive processing models seek to explain SWB in terms of the types of cognitions, thoughts, and information used by individuals to make SWB judgments. Whereas some view these processes as influenced by individual differences in processing styles, others emphasize the situational and context-dependent nature of SWB evaluations.

Integrated Models

Several researchers have conceptualized SWB in terms of both bottom-up and trait-based top-down influences. That is, some accounts focus on interactions among life events, living conditions, and personality (e.g., Biswas-Diener, Vitterso, & Diener, 2005; Brief et al., 1993; Diener, Lucas, & Oishi, 2002; Diener et al., 2003; Lyubomirsky et al., 2005b; Schimmack et al., 2002, 2008; Schimmack, Oishi, Furr, & Funder, 2004). In such accounts, SWB comprises a trait-like global tendency and the accumulation of moment-to-moment experiences such that both aspects are necessary for understanding how people think and feel about their lives (Brief et al., 1993; DeNeve & Cooper, 1998; Diener et al., 1999; Diener, Napa Scollon, Oishi, Dzokoto, & Suh, 2000; Headey & Wearing, 1989, 1990; Suh et al., 1996). A positive fit between personality and environment also may be relevant, such that SWB will be higher in situations in which people act in a way that is consistent with their personalities (Diener & Lucas, 1999; Diener et al., 1999, 2003).

Integrated bottom-up and cognitive-processing models also have been described. For example, global judgments of SWB are thought to reflect a combination of bottom-up

sources of information that vary across situation, chronically accessible sources that provide variable information, and chronically accessible sources that produce stable information, such as satisfaction within a given life domain (Schimmack et al., 2002). In such accounts, stability in cognitive SWB judgments reflect both trait-based and chronically accessible and stable sources of information (e.g., Oishi, Schimmack, & Colcombe, 2003; Schimmack & Oishi, 2005). In other models, SWB judgments are predicted to be based on bottom-up information such as event-specific knowledge when such information is available (e.g., due to recency of events). However, when such information is unavailable (e.g., with the passage of time), people will use their beliefs about themselves, their lives, and their emotions in assessing their SWB (Robinson & Clore, 2002; Robinson, Crawford Soldberg, Vargas, & Tamir, 2003).

SWB also has been conceptualized as a series of interrelated stages that unfold over time, and encompassing bottom up factors, including life events, as well as top-down factors, such as affective and cognitive judgments, as well as personality. For example, according to Robinson's (2000) three-stage model, life events may impact affective evaluations, which then impact cognitive judgments. A reciprocal path also may run from cognitive judgments to affect reactions to life circumstances. Kim-Prieto, Diener, Tamir, Scollon, and Diener's (2005) four-stage model comprises life events and circumstances, affective reactions to these events, recall of events and reactions, and global life evaluations. In this model, circumstances and life events are expected to be influential at the first stage, thus impacting primarily momentary evaluations of well-being, rather than global SWB ratings. In contrast, personality is expected to impact all stages of the sequence, and thus should be among the strongest influences on SWB. Thus,

dynamic stage models of SWB offer one potential avenue for integrating various theoretical notions into a holistic model of SWB (Dolan & White, 2006).

Action-Oriented Theories

Extending accounts of SWB based on life events, genetics, personality, and cognitive processing, a group of “action-oriented” theories highlights the active role that people play in shaping their own well-being (Diener et al., 1999). Goal-based models of SWB focus on an individual’s ability to act in a way that is consistent with personal values and cultural norms, as well as making progress toward personal goals and satisfying needs (e.g., Brunstein, Schultheiss, & Grassman, 1998; Cantor & Sanderson, 1999; Diener & Lucas, 1999; Elliot, Sheldon & Church, 1997; Emmons, 2003; Oishi & Diener, 2001; Sheldon, Elliot, Ryan, Chirkov, Kim, Wu, et al. 2004; Sheldon, Kasser, Smith, & Share, 2002). Related accounts emphasize the importance of the types of goals to which people aspire as well as various goal-related factors (commitment, attainability, controllability, self-efficacy, sufficiency of resources, conflict among the goals, congruence between needs, values, and goals) that may impact well-being or moderate the relation between goal progress and well-being (e.g., Brunstein, 1993; Cantor & Sanderson, 1999; Elliot et al., 1997; Emmons, 2003; Kasser & Ryan, 1993; Lang & Heckhausen, 2001; Reidiger & Freund, 2004; Sagiv & Schwartz, 2000; Wrosch, Heckhausen, & Lachman, 2000; Wrosch, Scheier, Miller, Schultz, & Carver, 2003).

Other research emphasizes the importance of involvement in meaningful activities which are expected to impact SWB due to the positive experience of being psychologically engaged (Csikszentmihalyi, 1999; Diener et al., 2002; Vitterso, 2003) and the anticipated benefits of rewarding social connections (Baker, Cahalin, Gerts, &

Burr, 2005; Cantor & Sanderson, 1999). Active pursuit of well-being also is central to the thesis that “intentional activities”, defined as effortful things that people do and think in their daily lives, can impact positively on SWB through the accumulation of small positive experiences and from a new sense of meaning and purpose (Sheldon & Lyubomirsky, 2006; see also Cantor & Sanderson, 1999; Csikszentmihalyi & Hunter, 2003; Diener & Oishi, 2005; Emmons & McCullough, 2003). In such models, involvement in new and engaging activities offsets or delays the tendency toward hedonic adaptation.

Researchers have also conceptualized the ‘doing’ part of well-being as reflected in growth, meaning-making, and self-actualization (Vitterso, 2004; Waterman, 1993). Ryff and colleagues (e.g., Ryff, 1989; Ryff & Keyes, 1998; Ryff & Singer, 1998) proposed six dimensions of positive psychological functioning: self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life, and personal growth. Under this formulation, SWB is a result or “by-product of a life that is well-lived” (Ryff & Singer, 1998, p. 5). Consistent with this proposal, extant evidence indicates strong positive correlations between SWB and indicators of personal growth/positive psychological functioning (e.g., Bettencourt & Sheldon, 2001; Compton, 2001; Compton, Smith, Cornish, & Qualls, 1996; Keyes et al., 2002; King et al., 2006; Lent, 2004; Ryff et al., 2002; Waterman, 1993; Urry, Nitschke, Dolski, Jackson, Dalton, & Mueller, et al., 2004; van Dierendonck, 2005; Vitterso, 2003).

Sociocultural Models

Whereas the previous theoretical frameworks have emphasized individual-level factors (events, traits, judgments, actions), SWB also is thought also to be influenced by

culture and society. Further, SWB has been examined at the aggregate, national level. For example, individual differences in SWB can reflect cultural norms and values related to emotional expression or concerning the appropriate types and levels of aspirations (Biswas-Diener et al., 2005; Diener & Lucas, 1999, 2000; Diener et al., 1999; 2003; Lu, 2001; Lu & Gilmour, 2004; Rice & Steele, 2004; Schimmack et al., 2002, 2004; Sheldon et al., 2004). Whereas personal achievement-related experiences and frequent positive affect may be important in Western and individualistic societies, realization of social harmony may be more important to determining SWB levels in East Asian and collectivistic cultures (Mondillon, Niedenthal, Brauer, Rohmann, Dalle, & Uchida, 2005; Schimmack et al., 2002).

Societal-level factors also may impact societal-level differences in SWB. For example, within societies where basic needs are not met, variability in SWB will be influenced strongly by the availability of essential resources and safe living conditions (Diener & Seligman, 2004). In contrast, in societies where basic social and physical needs are met and large negative events are absent, high SWB will be common (Biswas-Diener et al., 2005). Emerging research also suggests that, across nations, societal-level factors such as economic development, increases in social tolerance, and improved freedom of choice are related to increases in nation-level differences in SWB over time (Inglehart, Foa, Peterson, & Welzel, 2008).

Discussion of Theoretical Models

The theoretical accounts of SWB summarized above span a wide range of perspectives, including life circumstances, daily events, genetics, traits, cognitive processing, personal goals and activities, and culture. These conceptualizations

encompass many fundamental features, such as where SWB comes from, factors that produce stability and lead to changes in SWB over time, and how and why individuals as well as societies differ in levels of SWB. As I have reviewed, some attempts have been made to combine some of these various frameworks – particularly those involving events, situations, and personality – into an integrative theoretical account. At present, however, there is no dominant or unifying theoretical approach in contemporary research on SWB. Studies vary in conceptual and empirical focus, and few investigations incorporate theoretical perspectives by examining multiple types of anticipated determinants of SWB simultaneously (for a recent exception, see Sheldon & Hoon, 2007).

Notwithstanding this heterogeneity in theoretical focus, one striking commonality among these various theoretical models is that they all cast SWB as a product, result, or outcome of purported causal factors. Research based on this perspective has produced an impressive body of information concerning the predictors and correlates of SWB. Indeed, a broad network of constructs and variables has been linked with SWB including experiential, psychological, cognitive, motivational, personality, cultural, contextual, and demographic factors (Argyle, 1999; DeNeve & Cooper, 1988; Diener, 1984, 1994; Diener et al., 1999). Higher (relative to lower) levels of SWB are associated with fewer symptoms of mental illness, more positive social functioning, stronger interpersonal relations, more functional health status, more adaptive dispositions and temperaments, and more self-enhancing cognitive styles (e.g., Diener, 1984, 1994, 2000; Diener et al., 1999; Lyubomirsky, King, & Diener, 2005a; Pressman & Cohen, 2005). Consequently, a high level of SWB is considered to be an indicator of optimal human functioning (Diener et al., 1998; Keyes, 2005; Ryan & Deci, 2001). Being highly satisfied with one's life and

experiencing a preponderance of positive over negative affect are considered by researchers and laypeople alike to be important personal and societal goals (Diener, 2000; Diener & Seligman, 2004; Seligman, 2000; Sirgy, Michalos, Ferriss, Easterlin, Patrick, & Pavot, 2006).

Another possibility, however, is that SWB may promote, rather than simply indicate, optimal human functioning (e.g., Diener & Seligman, 2004; Sirgy et al., 2006; Veenhoven, 2008). This novel perspective casts SWB in an agentic and functional role. For example, some researchers have proposed that PA may play an important adaptive role in broadening momentary thought-action repertoires, expanding personal and interpersonal resources, and undoing the psychophysiological effects of negative emotions (Fredrickson, 1998, 2001). Others have proposed health-related benefits of PA – including improved immune system functioning, lower morbidity and mortality, and fewer physical symptoms – as a result of increased psychological resources, lower stress, greater engagement in health-promoting behavior, and expanded social support (Chesney, Darbes, Hoerster, Taylor, Chambers, & Anderson, 2005; Cohen & Pressman, 2006; Pressman & Cohen, 2005; Salovey, 2000). Other evidence suggests that people who experience a preponderance of positive emotions also tend to be successful and accomplished across multiple life domains (Lyubomirsky et al., 2005b).

Whereas each of these proposals addresses the potential functions of one component of SWB, PA, consideration of the function of SWB based on all three components (LS, PA, and NA) has received limited attention – a gap that has recently been acknowledged by SWB researchers (Diener, 2008; Kesebir & Diener, 2008; Oishi & Koo, 2008). In the following section, I provide an overview of a new framework

proposed by Shmotkin (2005) in which SWB is conceptualized in agentic terms. In this model, SWB plays a promotive role in advancing and maintaining positive functioning.

A Dynamic Modular Framework for SWB

Rather than viewing SWB as simply an end-product or life outcome, Shmotkin (2005) proposed that “the task of SWB is not to allow one to indulge in mere pleasure but to sustain one’s favorable psychological environment” (p. 301). In this framework, SWB is conceptualized as a dynamic and modular system that plays an adaptive role by promoting and maintaining a favorable psychological environment in the face of hostility and adversity. When life events and circumstances impinge negatively on life evaluations and affective reactions, SWB also functions as a homeostatic mechanism by maintaining, or ensuring an eventual return to a positive baseline.

More specifically, SWB is conceptualized as a regulatory mechanism which controls the salience of disturbing beliefs, including actual or potential self-perceived threats – which Shmotkin refers to as the “hostile world scenario” – thereby shielding people from these unwarranted disturbances. At medium and high levels, for example, SWB provides a favorable state of mind that allows a person to maintain on-going tasks without being disrupted, whereas a low level of SWB indicates a failure to manage one’s psychological environment favorably. When functioning well, SWB is thought to induce positivity by creating a mindset that is more pleasant at the output stage than the input stage. This positivity offset is thought to help ensure that the motivation to approach is stronger than the motivation to avoid, and seeks to promote the attainment of accomplishment, fulfillment, and nurturance. Further, consistent with Fredrickson’s

(1998) theory of positive emotions, Shmotkin (2005) proposes that SWB functions to broaden thought-action repertoires and build resources.

Shmotkin (2005) conceptualizes the SWB system in terms of four ‘modules’, with each module representing “an integrative pattern of SWB-related activity” (p. 301). The first module, “experiential SWB”, concerns a person’s private, self-awareness of personal SWB experiences. These private SWB appraisals are thought to result from comparisons between one’s current state and internal standards, including (but not limited to) fulfillment of needs, the preponderance of positive over negative experiences, congruence between aspects of the self, engagement in challenging activity, and progression toward personal goals. Personal SWB experiences are likely to reflect “core themes”, which Shmotkin described as personal accounts of the sufficient causes of high SWB, including (but not limited to) a preponderance of positive over negative experiences, congruence among aspects of the self, and progression toward goals.

The second module, “declarative SWB”, refers to the public self-report of SWB. According to Shmotkin, we mean to say something through SWB reports beyond the appearance of the report itself. Public reports of SWB are typically biased, for example, as a result of distortions in memory or motivated reasoning. Declarative functions encompass self-expression (displaying sincere feelings and revealing one’s true self), self-presentation or impression management (aimed at facilitating social interaction, social rewards, and self-identity), self-deception (motivated and overly positive self-perception despite self-threatening information), self-reinforcement for positive actions and successes, and self-simulation (exploring a hypothetical situation in order to assess potential reactions from others and rehearse or plan potential SWB), and defensive

pessimism (avoiding disappointment about oneself by endorsing negative self-expectations). Thus, according to Shmotkin, SWB can serve multiple declarative functions, all of which support various adaptational motives, including self-assessment, self-verification, and self-improvement.

The third module, “differential SWB”, refers to the configurations of LS, PA, NA as distinct SWB “types”. According to Shmotkin, these SWB types are not fixed predispositions, but rather adjustable modes of managing and optimizing positive functioning. The dynamic and flexible nature of SWB types allows people to tackle both consistencies and inconsistencies in their life conditions and experiences, as reflected in various different combinations of SWB components. For example, although a person may not be highly satisfied with their life overall, he or she may still experience a preponderance of PA relative to NA. Alternatively, where an individual may lack frequent experiences of PA, he may nonetheless find his life satisfying, overall. Consistent with this perspective, congruence among SWB components may be beneficial at high levels of well-being (i.e., high LS, high PA, and low NA), but particularly detrimental at low levels of well-being (i.e., low LS, low PA, high NA). In contrast, incongruence among components may lead to strain due to a lack of internal consistency (i.e., high NA may conflict with high PA) but also offer benefits in the form of substitution and compensation (i.e., high LS may offset low PA).

The fourth module, “narrative SWB” refers to the temporal trajectory of an individual’s life story, that is, their perceived progression through time, indicated by perceptions of their past, present, and anticipated future well-being. According to Shmotkin, a SWB trajectory is a personally constructed pattern of personal life

evaluations. Each trajectory has an underlying meaning or motto, reflecting a unique account of one's life over time. Subjective trajectories play a functional role by offsetting negative experiences, down-regulating accessibility of negative cognitions, minimizing negative emotions, and providing enjoyable mental simulation of one's desired future.

Together, these four modules constitute multiple paths and processes for managing challenges, complexities, incongruities, and undesirable life outcomes, as well as adjusting to the potential deleterious effects of adverse environments. The plurality of processes implied by these multiple modules is essential to fostering flexibility and adaptability in facing life exigencies and sustaining positive functioning over time. Indeed, in Shmotkin's model, SWB is conceptualized as a dynamic agentic process, rather than an attribute or outcome. When considered jointly, a person's private experiences of SWB, public declarations, configurations of SWB components, and subjective trajectories of SWB through time define a personal SWB profile. Unique to each individual, SWB profiles are vital to negotiating and effectively regulating threats and adversity.

Shmotkin's (2005) conceptualization of SWB provides a new paradigm within which to consider the agentic role of SWB in promoting optimal human functioning. In particular, the emphasis on SWB as a dynamic and modular process is unique among theoretical and conceptual models. The delineation of various incarnations of SWB – for example, SWB types and subjective trajectories – also extends previous methodological approaches to examining SWB. Of the four modules proposed by Shmotkin, the differential and narrative modules are the most unique from previous research and theorizing on SWB and have important conceptual and methodological implications (as

discussed in detail below). In this dissertation, I seek to expand our understanding of SWB, both theoretically and methodologically, through investigating these two modules from Shmotkin's framework in relation to adaptive functioning.

My central thesis is that SWB can be conceptualized as a dynamic and agentic system manifested in various forms. I anticipate that examining SWB from this perspective will provide novel and valuable insights concerning the connection between SWB and optimal human functioning. I examine the connection between SWB and positive functioning based on Shmotkin's framework, each employing innovative methodological approaches. The first part is based on Shmotkin's differential SWB module based on a person-centered perspective in which SWB is characterized in terms of intraindividual configurations of LS, PA, and NA. The second part is based on Shmotkin's narrative module, and utilizes a subjective temporal perspective in which assessments of past, present, and anticipated future LS are used to derive subjective LS trajectories. In both parts, dynamic connections with positive functioning over time are evaluated. In the following two sections, I review in greater detail the rationale and background literatures for both parts of the present work.

A "Person-Centered" Approach to SWB¹

According to the third module in Shmotkin's (2005) SWB framework, a core component of the SWB system is "the self-organization of one's different dimensions of SWB into distinct types" (p. 307). SWB "types" represent alternative ways of adapting to changes, deficits in personal resources, and threatening life conditions. For example, while the combination of high LS, frequent PA, and infrequent NA may reflect congruity and complementarity among the SWB components, low levels of LS and a

¹ This section draws heavily on material presented in Busseri, Sadava, Molnar, and DeCourville (2009).

preponderance of NA over PA may represent deprivation. Further, whereas congruency may produce a sense of coherence that is advantageous when LS and PA are high (and NA is low), internal consistency among SWB components may be particularly aversive when both LS and PA are low, and NA is elevated. Similarly, incongruous types of SWB may be accompanied by the strain of diverging components (e.g., high LS, but low PA), but also can provide flexibility in maximizing healthy functioning through substitution and compensation (e.g., high PA may serve to compensate for moderate LS). Thus, according to Shmotkin, differences between people in intrapersonal configurations of LS, PA, and NA have implications for adaptive human functioning.

The typical perspective used to study SWB can be described as “variable-centered” (Bornstein, Gini, Suwalksy, Putnick, & Haynes, 2006; Magnusson, 2003). Following Diener (1984), SWB researchers typically assess all LS, PA, and NA and operationalize SWB based on individual differences in these components. In variable-centered research, variables are typically treated either as the agents of change or as the ‘affected objects’ (Laursen & Hoff, 2006). For each component, there is an implied continuum running from low to high levels, and an individual’s relative standing on each dimension is taken as a indication of higher versus lower levels of SWB. Further, commonly applied analytic approaches (e.g., correlations, regression, structural equation modeling) focus on how LS, PA, NA relate to each other and to other variables. Also, a given population is typically thought to be homogeneous with respect to how the variables operate in relation to each other (Laursen & Hoff, 2006; Magnusson, 2003); consequently, results provide information concerning relations among LS, PA, and NA and other variables at the aggregate level.

Different from the typical variable-centered approaches, Shmotkin's (2005) conceptualization is consistent with a "person-centered" perspective (Bergman & El-Khoury, 2003; Bergman, Magnusson, & El-Khoury, 2003; Magnusson, 2003) in which the system of variables is of primary interest, rather than individual components. Such a system "derives its characteristic features and properties from interactions among its elements rather than the effect of isolated parts" (Bornstein et al., 2006, p. 548). Further, in person-centered research, variables are interpreted as properties of individuals, rather than the agents of change or outcomes (Laursen & Hoff, 2006). Applying a person-centered approach to SWB informs how LS, PA, and NA are configured within individuals as an integrated system. Analyses conducted using a person-centered approach typically involve categorizing individuals into distinct and homogeneous groupings; these sub-groups are expected to function in different ways (Magnusson, 2003). A person-centered perspective on SWB thus emphasizes the patterning of LS, PA, and NA components within individuals, and the connection between SWB configurations and positive functioning would be examined based on differences among individuals, or groups of individuals, characterized by distinct SWB profiles.

What types of SWB configurations might be expected? Although LS, PA, and NA dimensions could combine to form a very large number of SWB configurations, a basic premise of the person-centered approach is that there will be a small and replicable number of frequently observed patterns (Bergman & El-Khoury, 2003; Bergman et al., 2003; Magnusson, 2003). Since the beginning of research on SWB (e.g., Andrews & Withey, 1976; Diener, 1984), "high SWB" has been described as the combination of high LS, frequent PA, and infrequent NA. The tendency for LS and PA to correlate positively,

and for both of these components to correlate negatively NA in many studies of SWB (Schimmack, 2008), suggests that at least some individuals are likely to be characterized by a profile of high SWB. However, a large body of evidence indicates that although SWB components share some common variance, a substantial amount of the variance is reliable and unique to each component (Bussner et al., 2007; Vitterso, 2004). Consequently, various other combinations of LS, PA, and NA are possible.

Diener and Lucas (1999), for example, speculated that while persons reporting high levels of pleasant affect and little unpleasant affect could be described as “happy”, someone experiencing high levels of both pleasant and unpleasant affect might be labeled “highly emotional”. Others might be satisfied with their lives despite experiencing infrequent PA and frequent NA, or dissatisfied with their lives despite frequent PA and infrequent NA (Arthaud-Day et al., 2005). Even individuals reporting similar overall levels of SWB may be characterized by distinct “hedonic profiles” (Lyubomirsky et al., 2005a).

Relative to the enormous volume of research conducted from a variable-centered perspective, comparatively little empirical evidence exists concerning how the SWB components are organized within individuals, and what the implications of distinct SWB configurations may be for positive functioning. A small number of studies has differentiated distinct sub-groups of individuals based on SWB ratings (Diener & Seligman, 2002; McKennell, 1978; Michalos, 1980; Shmotkin, 1998; Shmotkin, Berkovich, & Cohen, 2006). None of the investigations, however, considered all three SWB components (i.e., LS, PA, and NA). Further, ad hoc procedures and researcher-defined cut-scores were used to divide respondents (e.g., median splits, extreme groups)

rather than empirical classification methods. Finally, only one of these studies (Shmotkin et al., 2006) was based on a theoretical framework in which SWB configurations have significance, or from which hypotheses and results concerning differences among SWB profiles could be considered.

Preliminary Research

One exception is a recent investigation reported by Busseri et al. (2009a).

Drawing on Shmotkin's (2005) dynamic modular framework, our first goal was to describe intraindividual SWB configurations by identifying reliable and generalizable SWB patterns using an empirical classification procedure. In two samples – a sample of first-year undergraduates ($N = 756$) and a community sample of young adults ($N = 550$) – we employed a multi-stage cluster analytic approach to identify replicable sub-groups of individuals characterized by distinct SWB configurations.

The cluster analytic approach we used was based on a well-established procedure drawn from the previous person-centered research (Asendorpf, 2003; Asendorpf, Borkeneau, Ostendorf, & Van Aken, 2001; Caspi & Silva, 1995; Costa, Herbst, McCrae, Samuels, & Ozer, 2002). It involved a multi-stage approach in which a hierarchical (agglomerative) cluster analysis was performed for each sample using Ward's method and squared Euclidean distance as the dissimilarity measure. The cluster centers from these solutions then were used as start values for a series of k-means cluster analyses. Within-in sample replicability was assessed by comparing classification results from the full sample to those based on five random sub-samples. Generalizability across samples was determined by comparing results from the student sample to those derived based on sample of community adults. Multiple criteria were used to identify the best-fitting

cluster solution: total explained variance, incremental explained variance resulting from increasing the number of clusters, replicability of cluster assignment based on cluster solutions derived from random samples within each sample, and replicability of cluster assignments based on cluster solutions derived from the cross-sample cluster solutions.

Based on Diener's (1984) three-component model, we predicted that some persons would be characterized by a high SWB profile, as indicated by the co-occurrence of high LS, frequent PA, and infrequent NA. At the other extreme, a low SWB profile – indicated by the co-occurrence of low LS, infrequent PA, and frequent NA – also was anticipated (e.g., Diener & Seligman, 2002). Further, to the extent that individuals differ in more than just overall level of SWB, distinct SWB profiles were expected to characterize the remaining individuals, rather than a single, undifferentiated profile of moderate SWB.

Our second goal was to evaluate differences in positive functioning among groups of individuals characterized by distinct SWB configurations. If intraindividual configurations of LS, PA, and NA represent unique ways of adapting and coping, then people characterized by different SWB configurations should differ in meaningful ways in their health and well-being (Shmotkin, 1998, 2005). Consistent with the World Health Organization's definition of health as "a state of complete physical, mental, and social well-being" (1996, p. 15), we examined indicators of physical, mental, and interpersonal functioning. Based on the proposed connection between high SWB and optimal human functioning (e.g., Diener & Seligman, 2002; Keyes, 2005; Ryan & Deci, 2001), we predicted that individuals characterized by a high SWB profile would report elevated levels of mental, physical, and interpersonal functioning compared to people with a low

SWB configuration. Further, based on Shmotkin's (2005) model, we hypothesized that in addition to individuals characterized by a high SWB profile, other people with configurations reflecting compensation among SWB components (e.g., high PA in combination with moderate NA) also may report healthy functioning due to compensatory processes. Similarly, people with profiles other than low SWB also might be characterized by poor functioning due to the hypothesized strain of incongruous profiles (e.g., low LS despite moderate PA).

We found five distinct SWB configurations that exhibited high replicability within samples and strong generalizability across samples. In both samples, the five cluster solution explained at least 60% of the total variance in the SWB components and had high replicability of cluster assignments, based on results from classification accuracy among random subsamples using cluster solutions derived within and between samples ($kappas > .80$). Further, in both samples, the five cluster solution was superior on these criteria to all other solutions, ranging from two to ten clusters. Based on the standardized mean levels of LS, PA, and NA of each clusters, the five clusters were named "high LS, high PA, low NA", "low affect", "high NA", "low LS", and "low LS, low PA, high NA".² A high SWB profile – defined as the co-occurrence of high LS, frequent PA, and infrequent NA – is central to Diener's (1984) three-component model. In our work, a high SWB profile characterized a substantial proportion of individuals in each sample (26% and 28% of student and community respondents respectively). At the other extreme, a low SWB configuration – indicated by the co-occurrence of low LS, infrequent PA, and frequent NA – also was a reliable, albeit less common, profile (11%

² Standardized mean LS, PA, and NA scores 0.50 or greater were labeled as "high", standardized mean scores -0.50 or lower were labeled as "low", and all other standardized mean scores fell between -0.50 and 0.50.

and 12% in student and community samples respectively). One previous study has differentiated between high and low SWB groups (Diener & Seligman, 2002), but using ad-hoc cut-scores and a composite SWB index. Our findings, based on an empirical classification procedure using all three SWB components and replicated across two samples, demonstrated that a substantial proportion of students and adults were characterized by one of these two opposing SWB profiles.

Not only were these two groups of individuals characterized by opposite configurations of LS, PA, and NA, but profiles of functioning for the high and low SWB profiles were the mirror image of each other. As hypothesized, people characterized by a high SWB profile reported superior mental, physical, and interpersonal functioning (on average) compared to individuals with a low SWB profile. These findings support previous proposals concerning the linkage between high SWB and optimal functioning (e.g., Diener, 2000; Keyes, Shmotkin, & Ryff, 2002; Ryan & Deci, 2001; Seligman, 2000). Further, although research on SWB typically is conducted within a positive psychology framework aimed at advancing our understanding of “the good life” (Seligman, 2000), present results suggest that a low SWB configuration (i.e., low LS, low PA, high NA) may be a marker of psychosocial and physical dysfunction. By identifying individuals characterized by high SWB and low SWB, a person-centered approach provides a window into both ends of the psychosocial and physical functioning continuums.

The majority of individuals, however, were characterized by configurations of SWB components other than the high SWB and low SWB patterns. Reliable distinctions were found in addition to high SWB and low SWB profiles. Results for the “low affect”

cluster were most similar to participants characterized by a high SWB profile across the indicators of mental, physical, and interpersonal functioning. At the other extreme, results for people characterized by a “low LS” profile were most similar to the low SWB individuals. In general, therefore, positive indications of mental, physical, and interpersonal functioning were not unique to individuals characterized by high SWB, and heightened levels of dysfunction were not unique to people characterized by low SWB. Thus, even though high SWB has been described as a hallmark of optimal functioning (Diener, 2000; Keyes, 2005; Ryan & Deci, 2001), our findings highlighted the importance of considering optimal functioning among individuals in addition to those characterized by high (or low) SWB.

Why might this be the case? According to Shmotkin (2005; see also Shmotkin et al., 2006), in striving to maintain a positive psychological environment, the SWB system may adapt to contextual needs – even among individuals characterized by incongruous SWB configurations. That is, some individuals may cope with inconsistencies among SWB components in ways that do not constrain adaptive functioning. Indeed, positive levels of one component may compensate for low levels of another. Among “low affect” individuals, for example, the disadvantage of infrequent experiences of PA may be offset by infrequent NA and a moderate level of LS. For individuals in this cluster, the mean level of NA was comparable to the high SWB cluster (standardized *M*s for NA = -0.63 versus -0.72, respectively). The capacity for extracting some satisfaction in one’s life and, in particular, avoiding negative emotions also may indicate successful adaptation to emotionally complex situations and life challenges – including those related to relatively infrequent positive affective experiences (Shmotkin et al., 2006). Thus, compensation

among components resulting from a particularly favorable (low) level of NA in combination with moderate levels of LS and PA might aid in maintaining healthy functioning for people characterized by a “low affect” profile.

In contrast to these positive compensation effects, according to Shmotkin (2005), particularly low levels of an SWB component among individuals with incongruous configurations may result in debilitating strain. For individuals characterized by “low LS”, for example, the mean level of LS *exceeded* that of the low SWB cluster (standardized *M*s for LS = -1.51 versus -0.87, respectively). Consequently, among these individuals, being highly dissatisfied with one’s life may simply have been too great to be compensated for by their moderate levels of PA or NA. Individuals who judge their current lives as overly discrepant from their aspirations also may be struggling to cope with life situations and experiences, which ultimately precludes frequent PA and infrequent NA (Shmotkin et al., 2006). Thus, the strain of an extremely dampened level of LS found among people with a “low LS” profile may impede and/or signal of lack of healthy functioning.

Also noteworthy, some individuals in both samples were characterized by a profile of “high NA”. In research based on a dimensional approach, heightened negative affectivity has been linked with neuroticism and a generalized tendency toward distress and complaining (e.g., Watson 1988; Watson & Pennebaker, 1989). Although people in the “high NA” cluster did report more distress and greater dysfunction than those in the high SWB group, individuals with a “high NA” profile also reported more adaptive functioning than people characterized by a low SWB profile. Stated differently, the “high NA” configuration was connected with moderate levels of functioning, rather than

synonymous with distress and dysfunction. As a possible explanation for this pattern, we note that the mean level of NA in the high NA cluster was considerably less extreme than in the low SWB configuration (standardized *M*s for NA = 0.73 versus 1.55, respectively). Further, although SWB was manifested most distinctively in negative emotional experience for individuals characterized by high NA, it did not preclude positive affective experiences or global life satisfaction – mean levels for both of which components were normative. Thus, the ability to have some pleasurable experiences, remain moderately satisfied with life, and avoid extremely heightened experiences of NA among individuals characterized by a “high NA” configuration may indicate a moderate degree of positive adaptation to the factors contributing to frequent negative affect of these individuals.

Although we found that the five SWB configurations differed in predictable ways across indicators of mental, physical, and interpersonal functioning, the largest differences in both samples were between the high SWB and low SWB clusters. Differentiation among the “low affect”, “high NA”, and “low LS” clusters was less robust. One possibility, therefore, is that a three-cluster solution would be more parsimonious: high SWB; low SWB; and a moderate SWB profile (a combination of individuals in the “low affect”; “high NA”; and “low LS” clusters). Relative to the five-cluster solution, however, a three-cluster solution explained considerably less variance in the SWB components and was less reliable within and across samples. Further, in neither sample did the cluster profiles in the three-cluster solutions include a configuration of “moderate SWB” (i.e., moderate LS, moderate PA, moderate NA). Rather, in addition to high SWB and low SWB profiles, a “low affect” configuration was found in the student

sample in three-cluster solution instead of moderate SWB, and a “low LS, high NA, low NA” profile was found in the community sample. These results, therefore, do not support a three-cluster solution comprising high, moderate, and low SWB configurations.

Further, although not as robust as the contrasts between the high SWB and low SWB profiles, some differentiation among the “low affect”, “high NA”, and “low LS” clusters was found in both samples. Indeed, on several comparison measures, the “low affect” group was similar to the high SWB cluster, and the “low LS” group was similar to the low SWB cluster. Thus, the profiles of mental health, physical health, and interpersonal functioning were not the identical for the “low affect”, “high NA”, and “low LS” clusters. Nonetheless, additional evidence is needed to further inform the nature of the similarities and differences among these three clusters.

This study by Busseri et al. (2009a) provided evidence that distinct, reliable, and generalizable SWB configurations can be identified using a person-centered approach, consistent with Shmotkin’s (2005) dynamic modular framework. An important shortcoming of this work, however, was its cross-sectional design. Cross-temporal antecedents and consequences of the various SWB configurations were not examined. Further, to the extent that SWB configurations are flexible modes of adaptation, profiles may change within individuals over time in order to maintain positive functioning. That is, the adaptive processes proposed by Shmotkin imply dynamic interchanges between SWB and positive functioning, in addition to the expectation that people experience different life outcomes as reflected in, if not promoted by, the way SWB components are configured in their lives. Research based on a longitudinal design would provide an opportunity to examine SWB configurations as predicted by other factors, and assess

prospective relations over time between SWB configurations and indicators of positive functioning.

A second critical issue is the integration of person-centered and variable-centered approaches to SWB. Researchers examining similar issues in studies of personality have debated the value and appropriateness of one approach over the other (e.g. Asendorpf et al., 2002; Asendorpf et al., 2006; Costa et al., 2002). With respect to research on SWB, in my view this sort of “either/or” debate is counterproductive. These approaches can be most productively seen as complementary, rather than contradictory (Asendorpf & van Aken, 1999; Laursen & Hoff, 2006; Magnusson, 2003; Robins & Tracy, 2003). Each approach has unique advantages and addresses different sorts of questions.

For example, relations among SWB components and other variables of interest can be examined using linear models such as multiple regression and structural equation models. Analyses of this sort provide valuable information about a sample or population of interest concerning individual differences in levels of SWB in relation to relative standing on other measures of interest, as well as informing the unique associations involving a given SWB component independent of the other components. On the other hand, by conceptualizing SWB as constellation of components that co-occur within individuals, questions concerning SWB configurations, and the unique characteristics of people with a particular profile (e.g., high SWB), can be addressed directly through the application of empirical classification procedures and theoretically-informed group comparisons. Whereas a variable-centered approach can be used to determine what are the most important components of SWB in a given context, the person-centered approach can be used to determine whether individuals share the same SWB profile. Further,

whereas the variable-centered approach informs the implications of being high or low on particular SWB components, the person-centered approach addresses the implications of distinct configurations of components. In my view, therefore, a comprehensive model of SWB could incorporate both person-centered and variable-centered approaches.

Despite the potential complementarity of variable-centered and person-centered approaches, some proponents of variable-centered approaches have argued that “if the types reflect qualitatively different modes of psychological functioning, then type membership itself should be a powerful predictor of certain outcomes” (Costa, Herbst, McCrae, Samuels, & Ozer, 2002, p. 80). It is possible, for example, that interactions among SWB components (e.g., the combination of high levels of LS, high PA, and low NA), non-linearities, and discontinuities in LS, PA, and NA combinations may be better captured by the SWB configurations, compared to simply examining the separate LS, PA, and NA components – particularly if SWB configurations reflect truly distinct sub-groups. Alternatively, because configural approaches are typically accompanied by a loss of information (because sub-groups with distinct configurations are assumed not to differ within groups), examining the SWB components separately and simultaneously may yield more robust predictive results than a person-centered approach – particularly if SWB configurations are not truly distinct sub-groupings, but simply artificial (or artifactual) categories. Thus, although predictive validity is only one of various criteria with which the usefulness of an approach can be assessed (see Robins & Tracy, 2003), additional evidence for the unique contribution of a person-centered approach to SWB would be provided if SWB configurations were found to provide incremental predictive utility relative to the separate LS, PA, and NA dimensions.

Overview of Part 1

In the first part of the present dissertation, I investigate a person-centered approach to SWB in the context of a longitudinal study of university students.³ My first and second objectives were to examine the cross-wave replicability of the five SWB configurations identified by Busseri et al. (2009a) and the stability of cluster membership over time. The third objective was to replicate the pattern of differences in functioning among the SWB configurations reported in the preliminary study at all three waves in the present study. The fourth objective was to assess predictive relations between SWB configurations and positive functioning over time, treating SWB configurations both as predictors of change in mental, physical, and interpersonal functioning, as well as potential outcomes of functioning over time. My fifth objective was to compare the predictive utility of SWB configurations relative to the LS, PA, and NA dimensions. Specific hypotheses related to each of these objectives are presented in a subsequent section. In summary, this part of the dissertation extends previous research and theorizing on SWB through investigating the connection between SWB configurations and positive human functioning using a longitudinal, person-centered approach to SWB based on Shmotkin's (2005) dynamic modular framework.

*A Subjective Temporal Perspective*⁴

The fourth module of Shmotkin's (2005) dynamic modular framework for SWB concerns individuals' narrative "trajectories" for their well-being through time. A narrative refers to an individual's perception of his or her SWB through time, comprising personal evaluations of recollected experiences, present events, and anticipated outcomes.

³ The first wave from this longitudinal study was one of the two samples reported by Busseri et al. (2009a).

⁴ This section draws heavily on information presented in Busseri, Choma, and Sadava (2009).

SWB trajectories are a product of these narratives, reflected in ratings of past, present, and anticipated future well-being. Trajectories can take various forms, including judgments of stability, progression, or regression, depending on whether an individual sees his or her life as consistent, improving, or declining over time. Trajectories also are thought to carry an underlying message or motto. For example, an upward trajectory reflects a personal motto that “my SWB steadily gets better” (Shmotkin, 2005, p. 311).

The study of subjective trajectories has a long history in research related to SWB. Kilpatrick and Cantril (1960) introduced a “self-anchoring” ladder on which people rated their satisfaction with their past, present, and anticipated future lives from the “worst life” to the “best life” one could imagine. In studies conducted over the past four decades, based on population surveys and convenience samples from around the globe, the past is typically judged less positively than the present, and the anticipated future is rated even more highly than the present (e.g., Andrews & Withey, 1976; Cantril, 1965; Easterlin, 2001; Feather, 1981; Hagerty, 2003; Pavot, Diener, & Suh, 1998; Shmotkin, 1998; Staudinger, Bluck, & Herzberg, 2003). Upward subjective temporal perspective (STP) trajectories have been interpreted in various ways, with several researchers proposing that people attempt to understand their well-being across time by constructing personal accounts of their well-being through time (e.g., Ryff, 1991; Staudinger et al., 2003). According to this view, STP trajectories reflect people’s present life outlook, based both on retrospective and prospective well-being evaluations. Other researchers have interpreted patterns of discrepancies among STP ratings as reflective of implicit theories of stability and change in the self (e.g., Keyes, 2000; McFarland, Ross, & Giltrow, 1992; Ross, 1989; Wilson & Ross, 2001). According to Ross and Newby-Clark (1998) for

example, one explanation for upward STP trajectories is that people's "intuitive theories imply that life will get better and better" (p. 148).

Robust age-related differences in the patterns of discrepancies among STP ratings of life satisfaction, happiness, psychological well-being, and personality also have been reported. For example, the slope of the typical STP trajectory decreases with age, such that past the age of 70 years, the anticipated future is rated less positively than the present and past (e.g., Andrews & Withey, 1976; Bortner & Hultsch, 1972, 1974; Lachman, Rocke, Bosnick, & Ryff, 2008; Okun, Dittburner, & Huff, 2006; Ryff, 1991; Shmotkin, 1991; Staudinger et al., 2003; Woodruff & Birren, 1972). These age-related changes in STP trajectories have been interpreted as evidence for a culturally-shared theory of human development comprising expectations of growth and gains during the early and middle adult years, and decline and losses during old age (Fleeson & Baltes, 1998; Fleeson & Heckhausen, 1997; Heckhausen, Dixon, & Baltes, 1989; Lacey, Smith, & Ubel, 2006; McFarland et al., 1992; Mehlsen, Platz, & Fromholt., 2003; Ryff, 1991; Staudinger et al., 2003). Relatedly, according to lifespan development research, representations of personality and well-being that people hold for specific periods of the lifespan may impact well-being, identity, motivation, and goal focus (e.g., Fleeson & Baltes, 1998; Fleeson & Heckhausen, 1997; Freund, 2006; Lachman et al., 2008; Marcus & Nurius, 1986; Robinson & Ryff, 1999; Staudinger et al., 2003).

Consistent with these proposals concerning the potential functional role of subjective trajectories, in Shmotkin's (2005) framework the SWB system acts to offset negative emotional states and experiences with positives ones, and down-regulate the accessibility and salience of negative thoughts and beliefs in favor of positive cognitions.

Subjective trajectories also may support self-enhancement and self-improvement motives through providing an opportunity for self-simulation and self-deception. For example, according to Shmotkin, positive projections into the future provides opportunities to enjoy pretended states of mind. Through such mental simulation, an individual feels good and in control, can explore future self-conceptions against which present circumstances can be evaluated, and may plan for desired future SWB. Subjective trajectories also provide a context for self-deception. In the form of mild positive illusions, self-deception allows an individual to maintain optimistic expectations for the future. Self-deception also serves a defensive function against anxiety and distress by minimizing negative emotions associated with adversity and life challenges.

Predictions derived from Shmotkin's (2005) framework concerning the role of STP trajectories in promoting and maintaining adaptive functioning have yet to be tested directly. Several related areas of research and theorizing, however, provide important insights. In fact, as I review next, the extant literature supports opposing predictions concerning the potential implications of upward STP trajectories for positive functioning.

Ross and Newby-Clark (1995) proposed that "when people mentally travel to the future, they discover a time of happiness and self-improvement" (p. 148). Research on self-enhancement suggests that positive expectancies for the future are related to more positive levels of mental health, physical health status, and interpersonal functioning (Taylor & Brown, 1988). Indeed, Robinson and Ryff (1999) suggest that *not* expecting future well-being to exceed present levels may have negative consequences for psychological and physical functioning. Empirical evidence demonstrates that optimistic and self-enhancing expectations that remain grounded in reality impact positively on

health and well-being through promoting effective coping, motivating goal-striving, and supporting personal agency (e.g., Davidson & Prkachin, 1997; Keyes & Ryff, 2000; Kwon, 2002; Oettingen, Pak, & Schnetter, 2001; Snyder, 2002; Taylor & Armor, 1996; Taylor, Pham, Divkin, & Armor, 1998).

Consistent with Taylor's (1983) theory of cognitive adaptation, investigators have shown that under conditions of threat or negative affect, positive mood may increase following motivated self-enhancement, including perceived self-improvement (McFarland & Alvaro, 2000), or predictions of positive future experiences (Buehler, McFarland, Spryropoulos, & Lam, 2007). Thus, mental simulation (Sanna, Carter, & Buckley, 2005), in which the present is evaluated against recollections of the past and an imagined future, could repair negative emotions in reaction to stress and adversity (Taylor & Armor, 1996), as well as provide a flexible mechanism for minimizing current threats or challenges (Frye & Karney, 2002). More generally, anticipating enjoyment of future outcomes helps people feel good about their present lives (MacLeod & Conway, 2005).

Thus, through dampening reactions to threatening information, compensating for negative moods, and motivating planning and action, self-enhancing expectancies for an improved future relative to the present and past may serve both offensive and defensive functions (Robins & Beer, 2001). By extension, upward STP trajectories could support adaptive self-enhancement motives, as well as affect regulation in response to threat and adversity. One possibility, therefore, is that upward trajectories that are grounded in reality promote positive functioning.

Despite this positive potential, an upward STP trajectory may not be warranted. Some researchers have found that positive expectations that are not grounded in reality can lead to compromised health and well-being as a result of neglectful behavior, lack of planning and procrastination, and avoidant coping responses (e.g., Colvin, Block, & Funder, 1995; Davidson & Prkachin, 1997; Peterson & Chang, 2003; Radcliffe & Klein, 2002; Shepperd, Ouellete, & Fernandez, 1996; Taylor et al., 1998). Indeed, evidence suggests that rather than acting to bring about the desired future, some individuals might engage merely in fantasizing and wishful thinking (Oettingen et al., 2001; Sigall, Kruglanski, & Fyock, 2000). Such individuals may be among the least well-prepared to respond to challenges and set-backs (Sweeny, Carroll, & Shepperd, 2006; Sweeny & Sheppard, 2007).

Imagining how things could be in the future may also lead to frustration and disappointment if an individual expects the future to be worse than the present (Higgins, 1987; Markus & Nurius, 1989; Michalos, 1985; Sanna et al., 2005); even positive expectancies for the future may be experienced as subjective deprivation if the present is seen as inferior to the one's future aspirations (Bortner & Hultsch, 1974). Further, self-serving distortions might become overly forceful in response to aversive information instead of adjusting to reality (Taylor & Armour, 1996) and, as some studies suggests, could be maladaptive (Kwon, 2002; Shedler, Mayman, & Manis, 1993). Finally, it has been proposed that perceived self-improvement could lead to distress because it violates a self-consistency standard, and the sense of predictability and control that perceived continuity typically provides (Fleeson & Baltes, 1998; Keyes & Ryff, 2000; Westerhof & Keyes, 2006).

Thus, for each of these reasons, expectations for an improved future might be linked with distress and maladaptive functioning. By extension, to the extent that upward STP trajectories represent a distortion of reality, deviate from a self-consistency standard, and are accompanied by complacency, they might have negative implications for health and well-being. A second possibility, therefore, is that upward trajectories are a form of fantasizing, a sign of disappointment, and an impediment to adaptive functioning.

Another important issue is the forecasting accuracy of upward STP trajectories. In research on affective forecasting, the emotional impact of specific anticipated life events is less intense, and often of less duration, than anticipated (e.g., Wilson & Gilbert, 2003). Similarly, by comparing the anticipated level of LS for some time in the future to the actual level of LS observed at that future time, the degree of over versus under-estimation of future LS can be assessed.¹ This “future satisfaction bias” could then be examined in relation to STP trajectories and positive functioning. As has been demonstrated in research on unwarranted optimism (e.g., Davidson & Prkachin, 1997; Peterson & Chang, 2003; Radcliffe & Klein, 2002) and positive illusions (e.g., Baumeister, 1989; Taylor & Brown, 1988), the realistic versus illusory nature of predictions for the future can be a determining factor of the implications of such predictions. For example, researchers have shown that overly optimistic expectations are linked with disappointment and dissatisfaction (Higgins, 1987; Markus & Nurius, 1986; Michalos, 1985).

Based on the opposing predictions concerning the implications of upward STP trajectories outlined above, parallel predictions can be made regarding future satisfaction bias. First, if upward STP trajectories are an effective form of self-enhancement, individuals with steeper upward trajectories should be more successful in attaining their

anticipated level of future LS, thereby decreasing the discrepancy between anticipated and actual future LS. If so, upward trajectories should be associated with less bias, and less bias should be associated with greater well-being. Alternatively, if upward STP trajectories are an impediment to positive adaptation, individuals with steeper upward trajectories should be less successful in attaining the desired future, thereby increasing the discrepancy between anticipated and actual future LS. In this case, upward trajectories should predict greater bias, and greater bias should be associated with greater disappointment and dysfunction. Therefore, evaluating the forecasting accuracy of upward STP trajectories is critical for determining whether these positive projections are realistic expectancies for the future, or unwarranted fantasies.

Little evidence has been reported concerning the link between upward STP trajectories and positive functioning. Some investigators have assessed STP ratings separately in relation to measures of affective well-being, self-esteem, traits, and demographic variables (e.g., Pavot et al., 1998; Staudinger et al., 2003), examined all three STPs as simultaneous predictors (e.g., Fleeson & Baltes, 1998), or evaluated discrepancies between pairs of STPs (e.g., past vs. present; present vs. future) in relation to other indicators of positive functioning (e.g., Keyes & Ryff, 2000; Lachman et al., 2008; Robinson & Ryff, 1999; Westerhof & Keyes, 2006). Although informative, such analyses do not address the implications of STP trajectories which, by definition, encompass all three perspectives. Rather, STP trajectories should be examined based on discrepancies among all three temporal perspectives, so that individual differences in trajectories can be examined in relation to indicators of positive functioning.

A promising approach for addressing these issues is latent trajectory modeling. Latent trajectory modeling, also known as latent growth curve modeling, was developed to estimate aggregate and within-individual changes across multiple assessments (Willett & Sayer, 1994). This approach incorporates mean-level trends in a repeatedly measured attribute or behavior, within-individual trajectories, and associations among the repeated measures (Curran & Hussong, 2003).

In the standard latent trajectory model, two latent factors are specified. First, a latent “intercept” factor, representing the level of the repeatedly measured variable at the start of the growth period, is specified with unit-weighted loadings from each of the repeated measures (Duncan, Duncan, & Strycker, 2006). Second, the latent “trajectory” (or slope) factor, representing change in the repeated measure across assessments, is also indicated by loadings from each repeated measure. The specific pattern of loadings, however, depends on the hypothesized growth function. In a linear growth model, for example, the loadings for the three repeated measures on the latent trajectory factor would be fixed to 0, 1, and 2 respectively.

The main parameters of interest in the standard latent trajectory model are the latent factor means and variances, and the covariation between latent factors. The latent trajectory approach can incorporate unevenly spaced repeated assessments, non-linear trajectories, and various patterns of missing data (for an overview, see Duncan et al., 2006). Further, predictors, correlates, and outcomes of the latent intercept and trajectory factors can be incorporated into the model (Curran & Hussong, 2003; Duncan et al., 2006).

A latent trajectory approach can be used to estimate STP trajectories. Instead of repeated measures taken across time, however, STP ratings from a given point in time (recollected past, present, anticipated future) could be used. The latent intercept factor would be indicated by fixed factor loadings of 1 from each of three STP ratings. The latent trajectory factor would be indicated by a set of factor loadings specifying a trajectory running from the recollected past, through the present, to the anticipated future. In this case, the present rating could serve as the intercept. In a linear growth model, for example, the loadings on the latent trajectory factor for ratings of past, present, and anticipated future could be set to -1, 0, and 1 respectively. Thus, this approach to examining STP trajectories could account for aggregate intercepts and trajectories, individual differences in intercept and trajectories, and covariation between intercepts and trajectories.

Operationalizing STP trajectories in this manner would correspond closely with Shmotkin's (2005) description of narrative trajectories as an integration of present outlook, captured the latent intercept factor, and perceptions of well-being through time, represented by the latent trajectory factor (see also Ryff, 1991; Staudinger et al., 2003). Further, additional variables can be added to explore correlates and consequences associated with the latent intercept and STP trajectory factors. Thus, a latent trajectory modeling approach would appear to be an ideal method for examining STP trajectories and the implications of such trajectories in relation to positive functioning.

Preliminary Research

In a recent publication using this approach (Busseri et al., 2009b), we reported results from a longitudinal study of young community adults in which STP trajectories

for life satisfaction were estimated based on ratings of past, present, and anticipated future life satisfaction (LS) at each of two time points separated by five years.⁵ Consistent with previous research, we found that at both time points the study sample was characterized, on average, by an upward subjective LS trajectory (i.e., past < present < anticipated future LS). These results support previous proposals concerning a normative, culturally-sanctioned theory comprising the expectation of positive growth throughout much of the human life span, but particularly among younger adults (Fleeson & Heckhausen 1997; Lachman et al., 2008; Staudinger et al., 2003; Ryff, 1991), as well as models emphasizing the importance of personal theories of self-improvement (e.g., Ross, 1989; Shmotkin, 2005).

Moderate stability was observed for the latent intercept and latent trajectory factors over a five year period. Moreover, individuals differed both in the overall level of present LS (as captured by the latent intercept factor) and degree to which they were characterized by the anticipated upward trajectory (as reflected in the latent trajectory factor). This significant variability observed among respondents in the latent intercept and trajectory factors meant that these factors could be examined in relation to each other, as well as indicators of mental, physical, and interpersonal functioning within and across time.

Indeed, the use of a prospective design also allowed us to examine latent STP trajectories in relation to positive functioning both concurrently and over time. To do so, we examined the latent trajectories for LS in relation to various indicators of mental,

⁵ The fourth module of Shmotkin's (2005) framework is described with respect to subjective trajectories for SWB. Consistent with previous research examining subjective trajectories for individuals' global evaluations of their lives, however, both in our preliminary study and in the current work, I examined subjective trajectories for LS only. Subjective trajectories for all three components of SWB (LS, PA, and NA) are not addressed in the present work, but are considered in the Discussion section in Part 2.

physical, and interpersonal functioning. Consistent with a large body of previous research demonstrating positive associations between LS and a wide range of indicators of health and well-being (e.g., Diener, 1984, 2000; Diener et al., 1999), we found that the latent intercept factor was positively correlated with mental, physical, and interpersonal functioning at both time points. In contrast, at each time point, higher values on the latent trajectory factor were negatively associated with the latent intercept factor and the functioning indicators – suggesting that steeper upward trajectories were more likely among participants reporting lower levels of present LS and less positive levels of mental, physical, and interpersonal functioning. A similar pattern was observed in the prospective analyses: Independent of baseline functioning, latent intercepts were associated with more positive indicators of functioning the future (including mental and interpersonal functioning), whereas steeper upward trajectories were uniquely associated with less positive functioning (specifically, indications of physical health and social support).

Thus, although theory and research support opposing predictions concerning the potential implications of upward trajectories, these results were unequivocal: In cross-sectional and longitudinal analyses, steeper upward LS trajectories were linked with lower intercepts (i.e., lower levels of present LS), along with less positive mental, physical, and interpersonal functioning. Even after controlling for individual differences in the level of the intercept, the latent trajectory factor had unique negative concurrent relations with several indicators of functioning, as well as unique links with less positive physical functioning and social support in the longitudinal models. The longitudinal

results are especially compelling given the five-year interval between assessments and the relative stability observed in each criterion.

Why would anticipating the future to be substantially better than the present and past be associated with lower levels of present life satisfaction, as well as negative mental, physical, and interpersonal outcomes? Consistent with Shmotkin's (2005) framework, the negative relation between present LS and subjective trajectories may indicate that under conditions of greater adversity, some individuals engage more forcefully in self-deception and self-enhancement as a defensive reaction. From this perspective, steeper upward trajectories in the face of low present LS are a motivated distortion of reality (see also Shmotkin et al., 2006; Taylor & Armor, 1996). With respect to functioning more generally, whereas well-adjusted individuals plan for, and work effectively toward important personal goals (Taylor & Brown, 1988; Taylor et al., 1998), complacent people might simply enjoy the desired future in the here and now, and fail to act in their own best interests (Oettingen & Mayer, 2002; Oettingen & Thorpe, 2006). In addition, individuals who consistently expect improved futures despite the comparatively gloomy realities of present life may be characterized by an inability to process negative personal and interpersonal feedback or monitor the environment accurately – potential signs of a more general dysfunction (Taylor & Armor, 1996). If so, lack of motivation, ineffective self-regulation, inability to process negative feedback, and insufficient environmental monitoring all may be critical contributors to the observed links between steep upward STP trajectories and poorer functioning.

Also noteworthy was the observed dissociation between the level of present LS (as captured by the latent intercept factor) and degree to which respondents were

characterized by the anticipated upward trajectory (as reflected in the latent trajectory factor). The latent intercept and trajectory factors were negatively correlated in cross-sectional and longitudinal analyses. Further, consistent with previous research demonstrating positive links between global life satisfaction and other indicators of positive functioning (e.g., Diener, 1984, 2000; Diener et al., 1999), the latent intercept was positively (rather than negatively) associated with mental, physical, and interpersonal functioning both concurrently and over time. This dissociation would not have been observed had we relied on more typical analytic approaches. Indeed, bivariate correlations suggested positive links between the individual ratings of past, present, and anticipated future LS and mental, physical, and interpersonal functioning. Thus, an important feature of the latent trajectory approach is that it allowed for the decomposition of the variability in the three STP ratings into two separable sources (i.e., intercept and trajectory), each having a distinctive pattern of relations with indicators of mental, physical, and interpersonal functioning.

In addition to examining individual differences in the latent STP LS trajectories, and assessing relations with positive functioning, the use of the longitudinal design also allowed us to determine the forecasting accuracy of STP trajectories, and the implications of future satisfaction bias. Consistent with previous research on affective forecasting (e.g., Wilson & Gilbert, 2003), we found that, on average, people overestimated their level of future LS. Further, the latent trajectory factor was strongly associated with future satisfaction bias, such that individuals characterized by steeper upward trajectories tended to be less accurate (i.e., more biased) in their predictions of personal future LS. Although this relation was strong and positive, it was not perfect, implying that upward STP

trajectories and future satisfaction bias are not necessarily synonymous. Nonetheless, the positive link between upward trajectories and future satisfaction bias provides preliminary evidence of the illusory (rather than realistic) nature of steep upward STP LS trajectories.

Moreover, prospective bias was negatively associated with positive functioning at the second wave, such that individuals who were more biased in their predictions for their future LS also tended to report less positive levels of mental, physical, and interpersonal functioning in the future. These results parallel findings from other recent research showing that accuracy in predicting levels of future LS, rather than under or overestimation, is associated with the most positive levels of functioning (Lachman et al., 2008). As I have speculated, people who perceived their lives to be on a steep upward trajectory may have failed to act in their own best interests, and consequently were less successful in achieving their anticipated future resulting in the distress and disappointment this discrepancy typically implies (Higgins, 1987; Markus & Nurius, 1986; Michalos, 1985).

In summary, the study reported by Busseri et al. (2009b) examined the implications of an upward subjective trajectory for LS spanning the subjective past, present and future, and whether such a trajectory provides an accurate prediction of things to come. Steeper upward trajectories did not reflect the reality of people's lives, did not appear to be beneficial in promoting a brighter future, and did not provide an accurate forecast for the future. Collectively, these findings support the conclusion that a steep upward STP trajectory for life satisfaction is an illusory, unwarranted form of fantasizing or wishful thinking. These results conflict with Shmotkin (2005) with respect

to the anticipated positive implications of upward LS trajectories. However, the fact that the subjective trajectories were associated with indicators of functioning both concurrently and prospectively validates Shmotkin's (2005) more general claim that an individual's subjective sense of their well-being through time conveys important information concerning their psychological environment.

An important limitation of the study reported by Busseri et al. (2009b) is that subjective LS trajectories were not examined in a fully dynamic fashion, in which the latent intercept and trajectory factors are treated both as predictors and outcomes of positive functioning – thereby missing the potential dynamic links between changes in subjective trajectories and changes in positive functioning over time. Such an approach also would allow for examination of the predictors of LS trajectories, that is, whether current levels of adversity predict subsequent changes in trajectories over time. Together, such analyses would provide a more complete assessment of the dynamic link between subjective LS trajectories and adaptive functioning hypothesized by Shmotkin (2005).

A second limitation of this previous work is that the LS trajectories were defined based on recollections of past LS and anticipated future LS without direct evidence bearing on the accuracy of these recollections. Rather, only the accuracy of participant's future satisfaction ratings was assessed. Yet the accuracy of both recollections and predictions is directly relevant to the distinction between reality and fantasy or wishful thinking (Lachman et al., 2008). To this end, recollections of past LS could be compared with LS ratings made in the past. Further, as reported by Busseri et al. (2009b), ratings of anticipated future LS could be compared with LS ratings made in the future. Such an approach would allow for a direct assessment of the relation between LS trajectories

based on subjective temporal perspective ratings at a given point in time and trajectories based on LS ratings taken at multiple points over time. Further, the relative predictive roles of subjective trajectories versus actual levels of LS over time could be examined in relation to adaptive functioning. Thus, as in research on positive illusions and unrealistic optimism (e.g., Colvin & Block, 1994; Colvin et al., 1995; Loewenstein & Schkade, 1999; Peterson & Chang, 2003; Radcliffe & Klein, 2002; Robins & Beer, 2001; Sheppard et al., 1996), assessing the accuracy of recollections of the past and expectations for the future may provide critical new insights concerning the connection between subjective temporal perspective LS trajectories and adaptive functioning.

Overview of Part 2

To address these issues, in the second part of the dissertation, I investigate a subjective temporal perspective for LS in the context of a three-wave longitudinal study.⁶ The first objective will be to examine the cross-temporal stability of subjective versus actual LS trajectories across three waves. The second objective will be to assess prospective relations between subjective LS trajectories and positive functioning over time, treating LS trajectories both as predictors of change in functioning and potential outcomes of functioning. The third objective will be to determine bias in the subjective LS trajectories by comparing LS trajectories based on subjective ratings at a given point in time versus ratings of present LS taken across multiple time points – thereby permitting the determination of retrospective and prospective satisfaction bias. The fourth objective will be to compare the predictive utility of subjective LS trajectories relative to trajectories in actual levels of LS over time. Specific hypotheses related to each of these

⁶ This longitudinal study draws on the same longitudinal sample utilized in Part 1 of the present dissertation.

objectives are presented in a subsequent section. In summary, this part of the dissertation extends previous research and theorizing on SWB through investigating the dynamic connections between subjective trajectories for life satisfaction and positive human functioning based on Shmotkin's (2005) dynamic modular framework.

Summary

The study of SWB is concerned with how people evaluate and experience their lives in positive ways. Following Diener (1984), researchers exploring SWB typically focus on three main components: a judgment of life satisfaction (LS), and positive and negative affective experiences (PA and NA). Although consensus has yet to emerge concerning how these three components are best conceptualized with respect to the structure of SWB, there is wide-spread recognition that models of SWB should include LS, PA, and NA. Similarly, despite the lack of a unifying theoretical model purporting to explain the roots of SWB, a wide-range of perspectives have been described and studied with respect to SWB, including sociodemographic and sociocultural factors, life events and circumstances, genes and personality, cognitive judgment models, and personal actions and goals. The vast majority of research and theorizing on SWB has focused on the causes and correlates of SWB, casting SWB as an important outcome or criterion.

Unique from existing SWB frameworks, Shmotkin (2005) has conceptualized SWB as a dynamic process, rather than simply an outcome. In Shmotkin's framework, SWB plays an agentic role, functioning to promote and maintain positive functioning. SWB accomplishes these goals through four modules pertaining to private experiences of SWB, reports of SWB, intrapersonal configurations of SWB, and subjective trajectories for well-being over time. These latter two modules – configurations and subjective

trajectories – are particularly unique features of Shmotkin’s model, having both major conceptual and methodological implications for the study of SWB.

The present dissertation comprises two parts in which I examine these two modules, with both parts drawing on a longitudinal investigation of a university student sample. The first part examines SWB from a person-centered perspective by identifying sub-groups of individuals characterized by distinct configurations of SWB components and comparing these sub-groups within and across time on indicators of mental, physical, and interpersonal functioning. The second part examines a subjective temporal perspective in which people’s evaluations of their past, present, and anticipated future LS are used to derive subjective trajectories for LS, and these trajectories are examined as predictors and outcomes of mental, physical, and interpersonal functioning over time. Following the presentation of these studies, I consider implications of my work for Shmotkin’s (2005) framework, including the integration of person-centered and subjective temporal perspectives, and other directions for future research.

In summary, the present work extends previous research and theorizing on SWB by testing an innovative functional perspective on SWB based on Shmotkin’s (2005) dynamic systems framework. Ultimately, in this dissertation I seek to inform our understanding of the role SWB may play in promoting and sustaining positive human functioning.

PART 1

Objectives and Hypotheses

In this part of the dissertation, I test a person-centered approach to SWB based on Shmotkin's (2005) dynamic modular framework. In the third module of Shmotkin's model, the structure of SWB is conceptualized in terms of within-individual configurations of LS, PA, and NA components. These SWB configurations are described as flexible modes, rather than fixed dispositions, adapting to adversity and threat in order to maintain or promote positive functioning.

As described above, in a preliminary study using this approach, Busseri et al. (2009a) employed cluster analysis to categorize individuals from two samples (first-year university students surveyed during the first week of classes; a community sample of young adults) into SWB configurations based on LS, PA, and NA ratings. The best-fitting cluster solution comprised five distinct SWB configurations that were replicable within both samples and generalizable across samples: "high SWB" (i.e., high LS, high PA, low NA), "low affect" (i.e., moderate LS, low PA, low NA), "high NA" (i.e., moderate LS, moderate PA, high NA), "low LS" (i.e., high LS, moderate PA, moderate NA), and "low SWB" (i.e., low LS, low PA, and high NA). In both samples, comparisons between clusters across a range of indicators of mental, physical, and interpersonal functioning revealed consistent differences among clusters, particularly involving (but not limited to) groups characterized by high SWB versus low SWB configurations. Extending this preliminary work, objectives and hypotheses for the present study are detailed below.

Objective 1:

Longitudinal Replicability of SWB Configurations

My first objective in the present study was to examine the longitudinal replicability of SWB configurations in a longitudinal study of university students, using a multi-stage cluster analytic approach to determine the best-fitting cluster solution at each of wave. Results from the first wave of this study were reported by Busseri et al. (2009a). The second and third waves occurred, respectively, at the end of the first academic term (approximately four months following Wave 1) and the end of the third academic year (approximately 31 months following Wave 1) – thus providing both short-term and longer-term follow-up periods. Drawing on Diener's (1984) three-component model of SWB and Shmotkin's (2005) dynamic modular framework, in our preliminary report we hypothesized that high SWB and low SWB configurations would be observed. In addition, consistent with the notion that SWB configurations would reflect more than just a single continuum of low to high SWB, we anticipated various other configurations characterized primarily by heightened (or dampened) levels of one or two (rather than all three) SWB components, rather than simply expecting a third, indiscriminant group of individuals characterized by moderate SWB (i.e., moderate LS, moderate PA, moderate NA).

For the present study, I saw no reason why this rationale should not also apply to the same group of individuals when studied over time. Therefore, with respect to the longitudinal replicability of SWB configurations, I hypothesized that the same five cluster configurations identified by Busseri et al. (2009a) would replicate at all three waves in the longitudinal sample (Hypothesis 1).

Objective 2:

Longitudinal Stability of SWB Cluster Assignments

The second objective was to evaluate the longitudinal stability of cluster assignment, that is, the extent to which individuals were characterized by the same SWB configurations over time. According to Shmotkin (2005), SWB configurations are flexible modes, rather than fixed dispositions, which respond to, and help promote and/or maintain positive functioning. Relevant in this regard are findings from Busseri et al. (2009a) that the relatively highest levels of mental, physical, and interpersonal functioning were characteristic of individuals in the high SWB cluster followed by the low affect cluster and high NA clusters; and the relatively least positive levels of functioning were characteristic of members of the low SWB and low LS clusters.

On these bases, and assuming the same SWB configurations reported in the preliminary study would be observed at each wave in the current study (see Hypothesis 1), I predicted that stability in SWB cluster membership would be moderated by the initial configuration. More specifically, I hypothesized that stability would be moderate overall, but relatively highest among individuals characterized by high SWB, followed by the low affect cluster; intermediate for the high NA cluster; followed by the low LS cluster, and lowest among members characterized by low SWB (Hypothesis 2).

Objective 3:

Cross-Sectional Differences Between SWB Configurations in Positive Functioning

The third objective of the present study was to evaluate differences between SWB configurations in mental, physical, and interpersonal functioning at each wave. As a preliminary step to the longitudinal analyses, I sought to replicate the general pattern of

findings reported by Busseri et al. (2009a) by showing consistent differences in functioning between SWB configurations at each wave. Of particular interest was whether, in addition to the anticipated high level of functioning among the high SWB cluster and low functioning among individuals characterized by low SWB, any other SWB clusters would show levels of functioning comparable to either the high SWB or low SWB clusters.

On the basis of Shmotkin's (2005) framework, and consistent with Busseri et al. (2009a), I hypothesized that SWB configurations would differ with respect to mental, physical, and interpersonal functioning at each wave (Hypothesis 3a); that high SWB and low SWB configurations (if observed at each wave) would show the highest and lowest levels of functioning in each comparison (Hypothesis 3b); and that high and low levels of positive functioning would not necessarily be unique to these two configurations (Hypothesis 3c).

Objective 4:

Longitudinal Associations Between SWB Configurations and Positive Functioning

The fourth objective of the present study was to assess predictive relations between SWB configurations and positive functioning over time, treating SWB configurations both as predictors of change in mental, physical, and interpersonal functioning, as well as potential outcomes of functioning. If SWB configurations play a functional role in promoting positive functioning (Shmotkin, 2005), the Wave 1 configurations should predict unique variance in functioning over the short term (Wave 1 to Wave 2) and longer term (Wave 1 to Wave 4). For example, based on the preliminary cross-sectional findings reported by Busseri et al. (2009a), increases in positive

functioning should be greatest for individuals characterized by a high SWB configuration, and lowest for individuals characterized by low SWB. Thus, I hypothesized that Wave 1 SWB configurations would be related prospectively to functioning in both the short-term (Wave 1 to Wave 2) and longer term (Wave 1 to Wave 4) with, most markedly, high SWB linked with the most positive changes and low SWB linked with the most negative changes (Hypothesis 4).

In addition to these expected prospective effects of SWB configurations, SWB configurations also should change over time in response to adversity (Shmotkin, 2005). If so, levels of functioning at Wave 1 should predict SWB configuration membership over the short term (Wave 1 to Wave 2) and longer term (Wave 1 to Wave 4). For example, based on the preliminary cross-sectional findings reported by Busseri et al. (2009a) in which the most positive levels of functioning were most characteristic of individuals characterized by (in descending rank order) high SWB, low affect, high NA, low LS, and low SWB clusters, respectively, higher functioning at Wave 1 should predict a greater probability of membership in the high SWB cluster (versus low SWB and, perhaps, low LS clusters) at subsequent waves, whereas lower functioning at Wave 1 should predict a greater probability of membership in the low SWB cluster (versus high SWB and, perhaps, low affect) at subsequent waves. Consequently, I hypothesized that Wave 1 functioning would be related prospectively to SWB cluster membership, both in the short-term (Wave 1 to Wave 2) and longer term (Wave 1 to Wave 4), as follows: Higher functioning at Wave 1 would predict high SWB cluster membership in the future, and lower functioning at Wave 1 would predict a low SWB configuration in the future (Hypothesis 5).

SWB configurations and positive functioning also should be linked dynamically over time (Shmotkin, 2005). From this perspective, changes in SWB configurations could occur (i) in response to changes in functioning, as the SWB system adapts to changes in adversity or threats, or (ii) in an attempt to promote positive functioning, ideally resulting in more positive levels of functioning. For example, as an individual's mental and social functioning improve over time, so too might the likelihood increase of being characterized by high SWB in the future. Alternatively, among individuals characterized by a low SWB configuration that is consistent over time, stability in low levels of mental, physical, and interpersonal functioning also may be observed. Therefore, I predicted that change in SWB cluster membership would be linked with changes in functioning over time (Hypothesis 6).

Objective 5:

Comparing Person-Centered and Variable-Centered Approaches

The fifth objective of the present study was to assess the relative predictive utilities of SWB configurations versus SWB components. To examine this issue, I compared the utility of Wave 1 cluster membership versus Wave 1 SWB components as predictors of Wave 2 and Wave 4 functioning (as detailed below). If SWB is best conceptualized as a series of related but distinct dimensions along which individuals differ in a monotonic fashion, and if the SWB dimensions capture meaningful individual differences that are obscured through artificially grouping individuals into configurations, then the SWB dimensions should show more robust associations with positive functioning than the SWB configurations. Alternatively, if (as proposed by Shmotkin, 2005), SWB is organized as an integrated system within individuals that cannot be

adequately captured by examining LS, PA, and NA as separate dimensions, and if the SWB configurations represent truly distinct groups of individuals (rather than statistical artifacts resulting from the clustering process), then SWB configurations should show more robust associations with positive functioning than the SWB dimensions. I hypothesized that the person-centered approach based on SWB configurations would provide greater unique predictive utility than the variable-centered approach (Hypothesis 7).

SWB and Positive Functioning

Consistent with the World Health Organization's (1996) definition of health – in which “health” is conceptualized not only as the absence of illness but also the presence of positive mental/psychological, physical, and interpersonal functioning – in the present study I operationalized positive functioning with respect to mental, physical, and interpersonal functioning (see also Busseri et al., 2009a). In the preliminary study, consistent with the exploratory nature of that investigation, we examined SWB configurations in relation to multiple indicators of each component of healthy functioning, including stress, physical symptoms, and social support as indicators of mental, physical, and interpersonal functioning, respectively. In contrast, in the present work, I focus on composite functioning scores (described in a subsequent section), rather than multiple separate indicators of each domain of functioning. The rationale for this decision was two-fold. First, I sought to minimize the number of statistical comparisons tested by collapsing across multiple interrelated indicators within each domain of functioning. Second, none of the hypotheses outlined above are specific to particular indicators of mental, physical, or interpersonal functioning.

I did, however, formulate a general prediction concerning the relative strength of the relations between SWB configurations and three domains of positive functioning. The relation between mental health and SWB has been a long-standing issue in research related to well-being (Bradburn, 1969; Compton, 1989; Diener, 1984; Keyes, 2000; Lent, 2004; Ryan & Deci, 2001; Ryff & Singer, 1998; Suldo & Shaffer, 2008). With its focus on overall subjective quality of life evaluations, SWB has been conceptualized as distinct from mental health – particularly with respect to models of mental health based on clinical dysfunction or symptoms of mental illness (Diener, 1984, 2008; Diener et al., 1998; Shmotkin, 2005). Yet when considered with respect to the components of SWB, the inclusion of NA as an indicator of SWB typically results in significant and robust associations between SWB and mental health indicators such as depression and anxiety (Cairney, Corna, Veldhuizen, Herrman, & Streiner, 2008; DeNeve & Cooper, 1999; Diener & Seligman, 2002; Lent, 2004).

In contrast, several studies have shown reliable, but modest relations between indicators of physical health and SWB (e.g., Feist et al., 1995; Keyes & Grzywacs, 2002; King & Miner, 2000; LaPierre, Bouffard, & Bastin, 1997; Okun & George, 1984). In such works an empirical distinction is often found with respect to objective indicators (e.g., cardiovascular functioning; body mass index; physical ratings) versus subjective ratings of health (e.g., physical pain or symptoms). Consistent with the subjective basis for both SWB and self-reported physical health measures, SWB is more closely aligned with subjective than objective indicators of physical health.

In contrast to the typically modest relations between SWB and indicators of physical functioning, positive interpersonal functioning is one of the most robust

correlates of SWB (Diener, 1995, 2008; Uchida, Kitayama, Mesquita, Reyes, & Morling, 2008). According to Diener and Seligman (2002), for example, strong and satisfying social relationships are a necessary condition for high SWB. Therefore, although construed as a subjective phenomenon, SWB is also sensitive to social contexts and relationships.

Across the three domains of positive functioning, therefore, connections with SWB may be stronger for measures of mental and interpersonal functioning, compared to indicators of physical functioning. Indeed, this pattern was observed in Busseri et al. (2009a) with respect to the relative magnitudes of the differences between SWB configurations in that effect sizes for mental functioning and interpersonal functioning were both greater than physical functioning. In the present study, therefore, I hypothesized that associations with SWB configurations would be more substantive for mental and interpersonal functioning than for physical functioning – with the relative rank ordering of the clusters for each type of functioning also being consistent with the preliminary study, that is, high SWB, low affect, high NA, low LS, and low SWB (Hypothesis 8).

Method

Participants and Procedure

A sample of Brock University (Canada) first year students ($N = 783$) participated in a longitudinal study of health and well-being comprising four surveys administered over a three-year period. The baseline survey was administered during the first two weeks of respondents' first term at university during September 2002. The questionnaire was administered in small group settings and respondents were paid \$10. At baseline (Wave

1), the average respondent was 18.67 years old ($SD = 1.21$) and 27% were male.

Subsequent surveys were administered at the end of their first term at university (Wave 2; December, 2002), at the end of their first academic year (Wave 3; April, 2003) and at the end of their third year of university (Wave 4; Spring, 2005). At each of these three later time points, surveys were completed on-line in exchange for gift certificates valued at \$10. As several of the relevant measures described below were not included in the Wave 3 survey, only results from Wave 1, Wave 2, and Wave 4 were analyzed.

Of the 786 Wave 1 participants, 57% ($n = 446$) also completed the Wave 2 and Wave 4 surveys. These longitudinal respondents differed significantly from the remaining, baseline-only respondents ($n = 339$) on only two of the study variables described in the *Measures* section: Wave 1 longitudinal respondents were significantly more likely to be female than non-longitudinal respondents (76% vs. 70%), and reported significantly higher levels of PA at baseline (3.76 vs. 3.65, respectively). The magnitude of both effects were small (i.e., η^2 s < .01). All subsequent analyses were based on the sample of 446 longitudinal respondents.

The average longitudinal respondent was 18.59 years old ($SD = 0.87$) at Wave 1, and 76% were women. Ninety-seven percent were Canadian citizens. The most common religious affiliations were Protestant (38%) and Catholic (37%); 19% indicated no religious affiliation. The survey did not assess respondent ethnicity or race. Whereas half (56%) were single, the remaining 44% reported being in a serious relationship. Two-thirds (67%) were living in on-campus residence, 22% were living with family, and 11% reporting living off campus either with other students or alone. One-third of respondents

(35%) were employed for a median of 10 hours per week. Parents' total income in the previous year averaged between \$70,000 and \$79,999.

Measures

The variables examined at Wave 1, Wave 2, and Wave 4 included indicators of SWB (i.e., LS, PA, NA) and mental, physical, and interpersonal functioning. The study measures described below were identical across survey assessments.

Subjective Well-Being

Based on Kilpatrick and Cantril's (1960) life satisfaction ladder, participants' current life satisfaction was assessed at each time point using a single item with possible ratings ranged from 1-*worst life I could have*, to 9-*best life I could have* (see Appendix A, column 1). The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) was used to assess the extent to which participants experienced 10 positive and 10 negative emotions "on average" (see Appendix B). The rating scale ranged from 1-*not at all*, to 5-*extremely*. Composite measures of positive affect (PA) and negative affect (NA) were derived by averaging the 10 positive affect ratings and 10 negative affect ratings.

Mental Functioning

The SF-36 measure (Ware, Snow, Kosinski, & Gande, 1993) was used to measure the four mental health-related factors contained within the SF-36 scale (see Appendix C): global "mental health" (five items; ratings ranged from 1-*none of the time*, to 6-*all of the time*), "role emotional", that is, the impact of emotional functioning on daily role responsibilities (three items; ratings were 1-*yes*, 2-*no*), a subjective sense of "vitality" (four items; ratings ranged from 1-*none of the time*, to 6-*all of the time*), and "social

functioning” (two items; ratings ranged from 1-*not at all*, to 5-*extremely*). Consistent with recommendations from Ware et al. (1993), all four composite scores were rescaled from 0 to 100. Two additional items (averaged) created for the present study assessed the level of stress in participants’ lives (see Appendix D): the number of times participants became stressed and tense in a one-week period (0-*never*, to 4-*every day*); and the degree of general life stress (1-*not at all stressful*, to 3-*very stressful*; this item was rescaled from 0 to 4 prior to averaging with the first item).

Physical Functioning

The SF-36 measure (Ware et al., 1993) was used to measure the four mental health-related factors contained within the SF-36 scale (see Appendix C): general “physical health” (five items; ratings ranged from 1-*definitely true*, to 5-*definitely false*), “role physical”, that is, the impact of one’s physical functioning on daily responsibilities (four items; ratings were 1-*yes*, 2-*no*), “bodily pain” (two items; ratings ranged, respectively, from 1-*none* to 6-*very severe*, and from 1-*not at all*, to 5-*extremely*; this latter items was rescaled from 1 to 6 prior to averaging), and “physical functioning”, which addressed functional limitations (10 items; ratings ranged from 1-“yes, limited a lot” to 3-“no, not limited at all”).

Participants also completed a 21-item checklist of common physical complaints experienced in the previous two or three months (Mendes de Leon & Markides, 1986; see Appendix E); ratings ranged from 1-*never*, to 4-*most of the time*. The number of complaints endorsed to any degree was used as a composite measure of physical symptoms. Participants’ self-perceived health and fitness levels relative to other people their own age also were assessed using two items (ratings ranged from 1-*poor*, to 4-

excellent) created for the present study (see Appendix F). Finally, the degree of health-care utilization was assessed in terms of the number of sick days and visits to doctors' offices during the past year (both ratings ranged from 1-*none*, to 7-*more than 15*; see Appendix G).

Interpersonal Functioning

The six-item version of the Social Support Questionnaire (Sarason, Sarason, Shearin, & Pierce, 1987) was used to assess network size and satisfaction. For network size, the number of different individuals listed (0 to 9) was averaged across the six items (see Appendix H). For satisfaction with one's social support, ratings ranging from 1-*very dissatisfied* to 6-*very satisfied*, were averaged. The 30-item Relationship Styles Questionnaire (Griffin & Bartholomew, 1994; Kurdek, 2002) was used to derive two dimensions of attachment insecurity (see Appendix I): avoidance (eight items) and anxiety (five items). Ratings ranged from 1-*not at all like me*, to 5-*very much like me*.

Treatment of Missing Data

Across all participants, measures, and waves, there was a small amount of missing data (less than 1%). The total amount of missing data per respondent was not significantly related to any of the study variables. Further, across individuals the presence/absence of data for each particular variable was not significantly correlated with any of the other variables. These findings suggest that missing values were 'missing at random' (Schafer & Graham, 2002). Therefore, missing values were imputed using the expectation-maximization (EM) procedure in SPSS.

Means, standard deviations, and internal consistency estimates for each measure at each wave are shown in Table 1 below.

Table 1. Means, Standard Deviations, and Internal Consistency Estimates by Study Measure by Wave

Measure	Wave 1			Wave 2			Wave 4		
	α	M	SD	α	M	SD	α	M	SD
Life satisfaction	--	7.21	1.32	--	6.94	1.32	--	7.04	1.39
Positive affect	.83	3.65	0.59	.86	3.64	0.59	.88	3.66	0.59
Negative affect	.84	2.27	0.62	.84	2.21	0.59	.87	2.23	0.64
Mental health	.75	69.95	16.58	.77	70.56	16.69	.85	68.57	18.52
Role emotional	.80	82.70	31.73	.81	71.96	37.85	.81	68.56	40.34
Vitality	.60	57.22	15.97	.71	50.50	17.74	.82	50.39	19.82
Social functioning _a	.57	84.19	18.74	.59	84.76	20.12	.65	80.32	22.88
Stress _a	.45	1.40	0.81	.53	1.51	0.84	.48	1.63	0.89
General health	.77	71.23	18.09	.79	69.26	18.66	.81	69.72	20.89
Role physical	.77	90.46	22.48	.79	87.05	25.88	.85	81.21	32.05
Bodily pain _a	.76	76.28	19.82	.77	77.89	19.44	.78	77.01	21.42
Physical functioning	.94	91.07	18.48	.82	94.10	10.61	.95	89.39	21.16
Symptoms	.84	8.82	4.17	.83	8.36	3.73	.90	12.43	4.57
Health/fitness _a	.60	3.07	0.65	.65	2.97	0.66	.64	2.94	0.74
Health-care utilization _a	.41	2.52	1.07	.40	2.59	1.11	.52	2.67	1.23
Support network	.92	4.58	2.08	.93	4.93	2.02	.91	5.66	2.04
Support satisfaction	.91	5.40	0.76	.91	5.41	0.71	.91	5.31	0.77
Attachment avoidance	.75	2.36	0.67	.76	2.32	0.65	.81	2.28	0.69
Attachment anxiety	.79	2.03	0.84	.82	1.95	0.83	.77	1.88	0.75

Note. $N = 446$. _aFor two-item composites, r s are shown instead of Cronbach α s.

Results

Preliminary Analyses

Subjective Well-Being

Means and standard deviations for LS, PA, and NA measures at Wave 1, Wave 2, and Wave 4 are shown in Table 1 (above). Bivariate correlations are shown below in Table 2 below. At each wave, significant moderate correlations among SWB components were observed. Further, significant stability over time was observed within SWB components across each pair of waves, particularly for PA and NA.

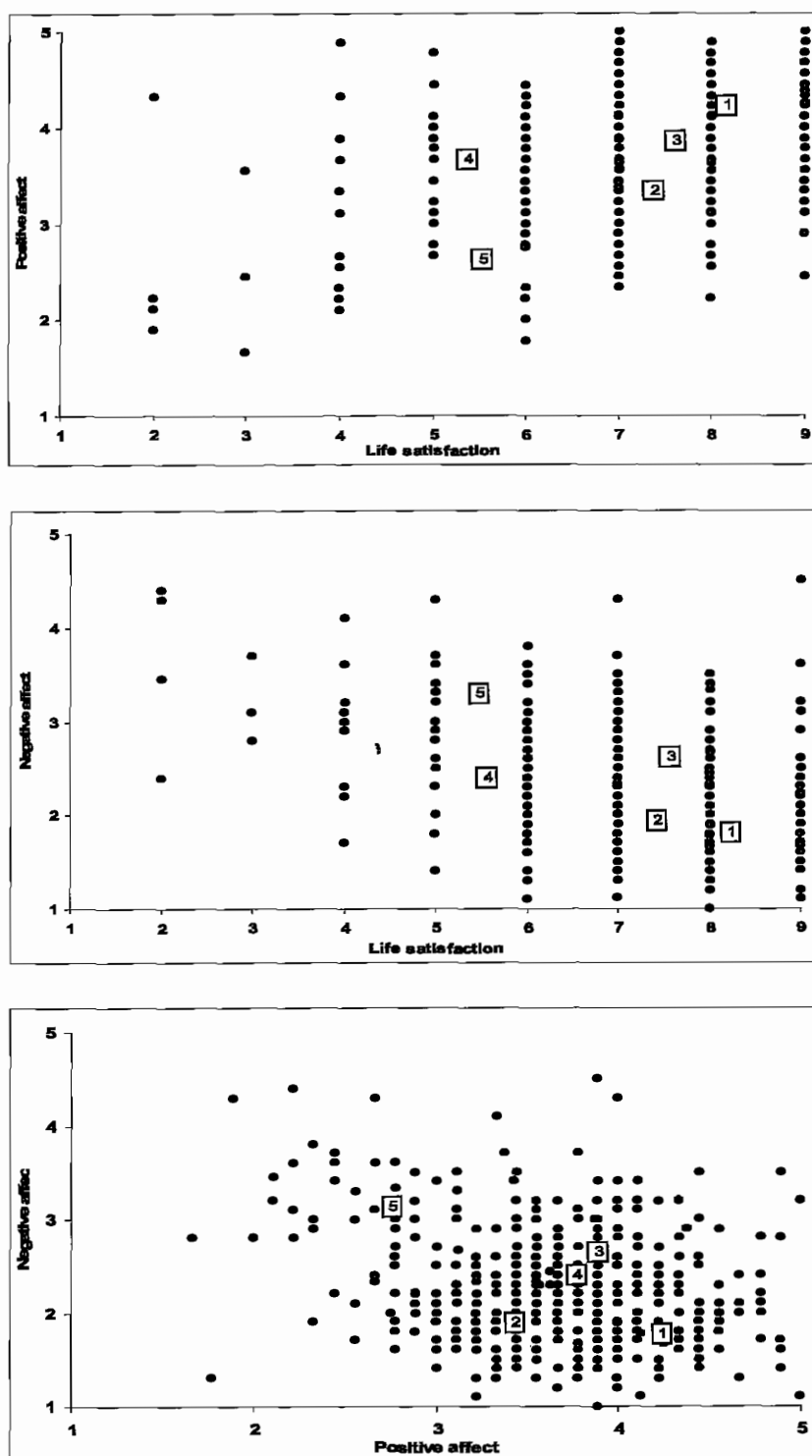
Table 2. *Correlations Between SWB Components*

Measure	1	2	3	4	5	6	7	8
1. W1 LS	--							
2. W1 PA	.39	--						
3. W1 NA	-.36	-.24	--					
4. W2 LS	.46	.25	-.25	--				
5. W2 PA	.38	.69	-.28	.49	--			
6. W2 NA	-.28	-.23	.66	-.42	-.35	--		
7. W4 LS	.34	.28	-.19	.43	.37	-.24	--	
8. W4 PA	.33	.55	-.24	.28	.58	-.32	.43	--
9. W4 NA	-.15	-.23	.45	-.24	-.29	.54	-.40	-.37

Note. $N = 446$. W = survey wave. LS = life satisfaction. PA = positive affect. NA = negative affect. All $ps < .05$.

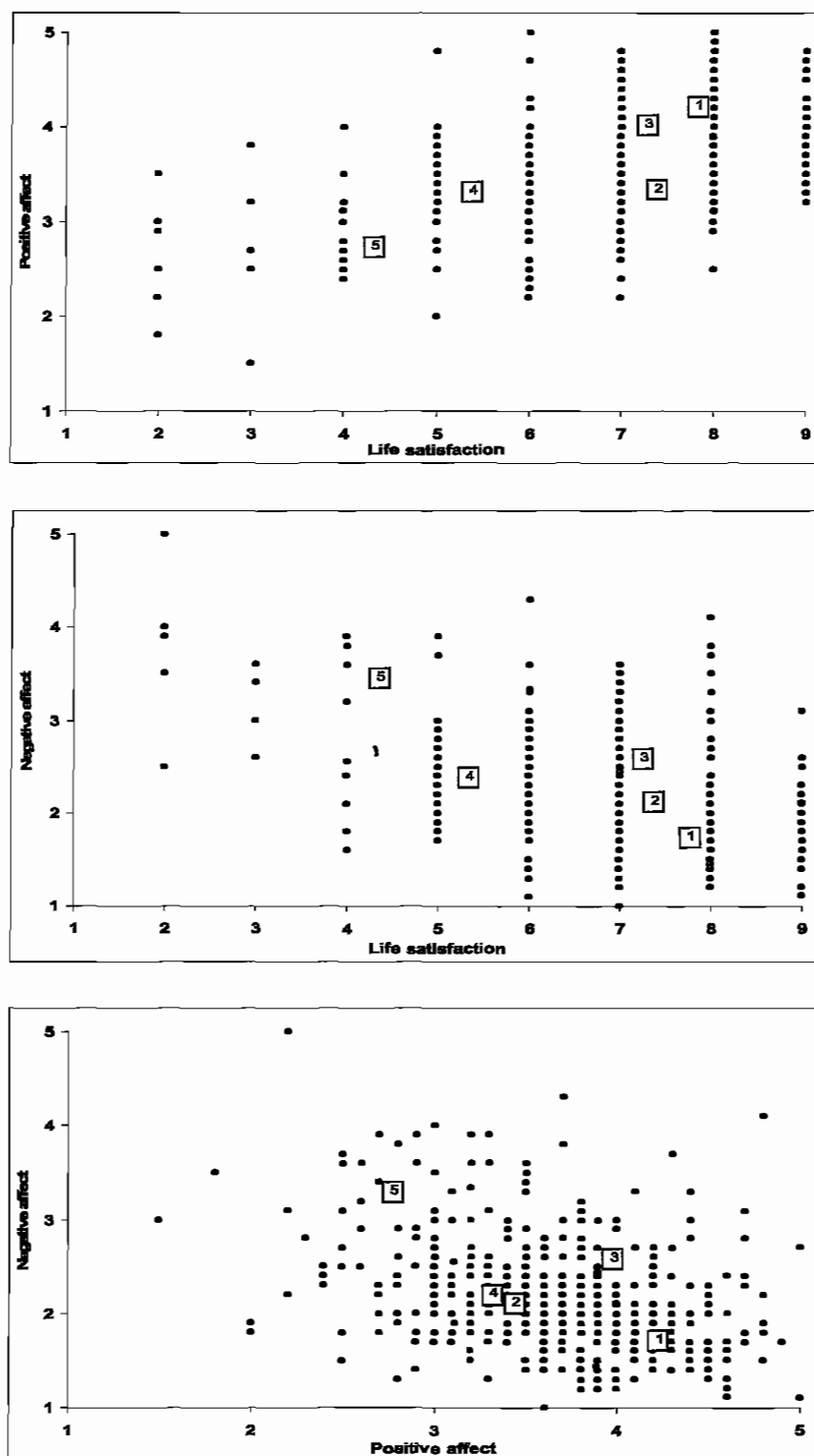
Scatter plots for each pair of SWB components at Wave 1, Wave 2, and Wave 4 are shown below in Figures 1, 2 and 3, respectively.

Figure 1. *Scatter plots for Wave 1 SWB Components.*



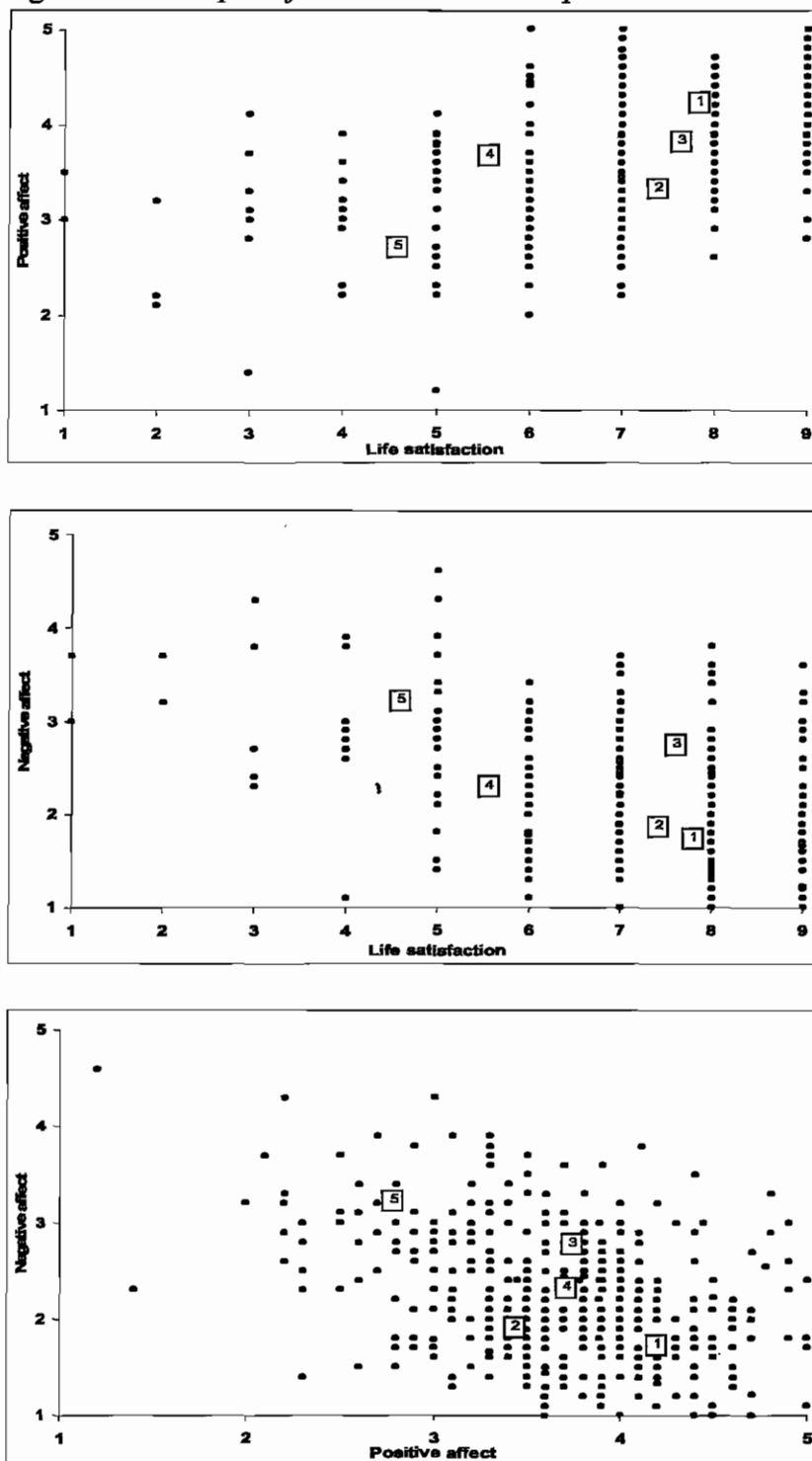
Note. Wave 1 raw cluster means for “high SWB” (labeled 1), “low affect” (2), “high NA” (3), “low LS” (4), and “low SWB” (5) clusters (described below) are indicated.

Figure 2. Scatter plots for Wave 2 SWB Components.



Note. Wave 2 raw cluster means for “high SWB” (labeled 1), “low PA”(2), “high affect” (3), “low LS and PA” (4), and “low SWB” (5) clusters (described below) are indicated.

Figure 3. *Scatter plots for Wave 4 SWB Components.*



Note. Wave 4 raw cluster means for “high SWB” (labeled 1), “low affect (2), “high NA” (3), “low LS” (4), and “low SWB” (5) clusters (described below) are indicated.

To assess overall trends in SWB components across waves, one-way repeated-measures ANOVAs were computed for each SWB component. For LS, there was a small but statistically significant main effect of wave; $F(2,890) = 7.52, p = .001, \eta^2 = .02$ (see means in Table 1, above).⁷ In follow-up pairwise comparisons with Bonferroni corrections, mean LS at Wave 1 was significantly higher than at Wave 2 ($p < .05$) but not at Wave 4 ($p = .06$); mean LS at Wave 2 did not differ significantly from Wave 4 ($p = .51$). For PA, the main effect of wave was non-significant; $F(2,890) = 0.47, p = .63, \eta^2 < .01$. Similarly, the main effect of wave was non-significant for NA; $F(2,890) = 2.67, p = .08, \eta^2 < .01$. In general, therefore, there were no consistent and significant trends in mean levels of LS, PA, and NA over time.

Positive Functioning

Rather than examining the various indicators of mental, physical, and interpersonal functioning separately, I sought to reduce the number of comparison variables using empirical means. First, principal components analyses were conducted separately within mental, physical, and interpersonal functioning domains, and within wave. For both mental and interpersonal functioning domains, one large component (i.e., Eigen value > 1) was observed at each wave, with strong and positive loadings from each of the five mental functioning measures and four interpersonal functioning measures within each domain at each wave. For physical functioning, two large components were observed at Wave 1 and Wave 2, compared to one large component at Wave 4. Of the seven physical functioning measures, two measures (SF-36 role physical and SF-36 physical functioning) loaded inconsistently on the first and second factors between

⁷ All group comparisons, associations, and any other inferential tests were considered statistically significant at $p < .05$. Where possible, exact p-values, or the upper limit of the relevant p-values (e.g., $p < .001$) are reported.

waves. When these two measures were removed, however, the remaining five measures of physical functioning loaded strongly onto one large component at each wave.

Second, a principal components analysis (with promax rotation) was conducted within each wave for measures from all three functioning domains simultaneously, after excluding the two physical functioning measures noted above. As shown in Table 3 below, three large components with Eigen values greater than 1 were observed at each wave. Further, each component had strong loadings from measures of either mental, physical, or interpersonal functioning, with few substantial cross-loadings from measures of the other functioning domains.

Table 3. *Results from Principal Components Analysis of Functioning Measures by Wave*

Measure	Wave 1			Wave 2			Wave 3		
	1	2	3	1	2	3	1	2	3
Mental health	0.64	0.06	0.23	0.57	-0.04	0.45	0.66	0.29	-0.03
Role emotional	0.88	-0.23	-0.13	0.73	-0.06	0.06	0.84	-0.05	-0.13
Vitality	0.40	0.23	0.22	0.50	0.18	0.22	0.54	0.15	0.22
Social functioning	0.76	0.06	-0.01	0.82	-0.02	0.01	0.83	0.01	0.01
Stress	-0.59	-0.11	-0.03	-0.70	-0.05	-0.06	-0.61	-0.09	-0.04
General health	0.01	0.82	0.09	-0.05	0.85	0.18	-0.01	0.11	0.83
Bodily pain	0.20	0.48	-0.04	0.38	0.50	-0.24	0.42	-0.16	0.43
Symptoms	-0.42	-0.48	0.20	-0.37	-0.54	0.21	-0.41	0.04	-0.38
Health/fitness	-0.25	0.81	0.19	-0.31	0.88	0.25	-0.25	0.25	0.81
Health-care utilization	0.01	-0.76	0.27	-0.21	-0.58	0.23	-0.21	0.30	-0.66
Support network	-0.05	-0.13	0.70	-0.13	-0.08	0.76	-0.16	0.77	0.11
Support satisfaction	-0.18	0.08	0.82	0.03	0.10	0.68	0.04	0.74	0.03
Attachment avoidance	-0.18	0.07	-0.59	-0.19	0.02	-0.57	-0.20	-0.69	0.15
Attachment anxiety	-0.35	0.04	-0.53	-0.24	0.04	-0.61	-0.13	-0.66	-0.01
Eigen value	4.72	1.59	1.14	5.25	1.63	1.08	5.48	1.58	1.01
Variance explained	34%	11%	8%	37%	12%	8%	37%	11%	7%

Note. $N = 446$. Results from the rotated pattern matrices are shown.

Based on these results, composite functioning scores were computed for mental, physical, and interpersonal functioning domains separately at each wave by averaging the scores within each domain, after rescaling (described next) and reverse-scoring as required. Given the range of rating scales used to measure the various aspects of mental, physical, and interpersonal functioning, a common metric was sought in order to allow for (a) aggregation of scores within functioning domain, and (b) assessment of trends in levels of functioning across waves. Although a standardization approach (i.e., converting to z-scores) would allow for aggregation across different measurement scores, any mean changes in the levels of functioning across waves would be lost, because the resulting composite would have a mean of zero at each wave. Thus, all of the scale scores were first converted to a common 0 to 100 metric, consistent with the SF-36 scoring approach (Ware et al., 1993), prior to combining scores within functioning domain at each wave.

Means, standard deviations, internal consistency estimates, and correlations between these composite functioning scores are shown at each wave in Table 4 below. Moderate to strong, positive correlations among composite functioning scores were observed at each wave. Further, substantial stability (as indicated by the cross-time correlations) was observed for each functioning measure, across each pair of waves.

Table 4. Means, Standard Deviations, Internal Consistency Estimates, and Correlations Between Composite Functioning Scores by Wave

Composite functioning score	α	M	SD	1	2	3	4	5	6	7	8
1. W1 mental functioning	.74	71.82	15.07	--							
2. W1 physical functioning	.74	69.85	13.63	.49	--						
3. W1 interpersonal functioning	.64	69.82	13.37	.50	.30	--					
4. W2 mental functioning	.78	68.02	17.53	.58	.45	.38	--				
5. W2 physical functioning	.76	67.17	13.71	.39	.74	.25	.57	--			
6. W2 interpersonal functioning	.67	71.57	13.21	.49	.28	.73	.50	.32	--		
7. W4 mental functioning	.79	65.43	19.23	.46	.40	.27	.55	.41	.34	--	
8. W4 physical functioning	.77	62.83	15.17	.41	.62	.24	.46	.64	.28	.62	--
9. W4 interpersonal functioning	.73	73.80	13.89	.41	.30	.55	.36	.29	.65	.49	.39

Note. $N = 446$. W = survey wave. All $ps < .05$.

To assess overall trends in functioning across survey wave, a three (Wave 1, Wave 2, and Wave 4) by three (functioning domain: mental, physical, interpersonal) repeated-measures ANOVA was computed. There was a significant main effect of wave in which mean levels of functioning (averaged across domain) decreased over time; $F(2,1780) = 22.78, p < .001, \eta^2 = .05$; $Ms = 70.50, 68.92$, and 67.35 for Wave 1, Wave 2, and Wave 4, respectively. The main effect of domain also was significant, such that the mean level of functioning (averaged across wave) was highest for interpersonal functioning, followed by mental functioning, and physical functioning; $F(2,1780) = 38.72, p < .001, \eta^2 = .08$; $Ms = 68.42, 66.61$, and 71.73 for mental, physical, and interpersonal functioning respectively.

These main effects were qualified by a significant interaction between wave and functioning domain; $F(4,1780) = 65.27, p < .001, \eta^2 = .13$. Follow-up one-way repeated-measures ANOVAs were used to examine trends across wave for each functioning domain. A significant main effect of wave was found for mental functioning in which mean levels of functioning decreased significantly over time; $F(2,890) = 31.89, p < .001, \eta^2 = .07$; see Table 4 for functioning means by wave. Similarly, a significant main effect of wave was found for physical functioning in which mean levels of functioning decreased significantly over time; $F(2,890) = 82.23, p < .001, \eta^2 = .16$. The main effect of wave on interpersonal functioning also was significant, such that mean levels of functioning increased over time; $F(2,890) = 27.09, p < .001, \eta^2 = .06$. Note that for each ANOVA model, all post hoc pair wise comparisons were significant ($ps < .002$). Overall, therefore, whereas mean levels of mental and physical functioning decreased over time, mean levels of interpersonal functioning increased between Wave 1 and Wave 4.

Objective 1:

Longitudinal Replicability of SWB Configurations

The first objective of the present study was to determine the longitudinal replicability of the SWB configurations. Hypothesis 1 stated that the same five cluster configurations identified by Busseri et al. (2009a) based on the baseline sample from which the longitudinal sample examined in the present work was drawn would replicate at all three waves.

Determining the Optimal Cluster Solution

Cluster analyses were employed to determine the optimal number of SWB clusters at each wave using a multi-stage cluster analytic approach drawn from previous research (Asendorpf, 2003; Asendorpf et al., 2001; Busseri et al., 2009a; Caspi & Silva, 1995; Costa et al., 2002). Three steps were taken with the Wave 1 SWB scores:

1. Because clustering procedures are sensitive to differences among variables in scaling and variances, LS, PA, and NA scores were standardized and a small number of extreme scores (i.e., ± 3.00 , less than 1% of scores) were recoded into values of +3 or -3 respectively.
2. An agglomerative hierarchical cluster analysis was performed using Ward's method and squared Euclidean distance as the dissimilarity measure. A number of solutions were estimated, ranging from two up to 10 clusters.
3. The mean values of the standardized LS, PA, and NA scores for each cluster (i.e., the cluster 'centers') from each of these solutions were used as start values for a series of k-means cluster analyses, again comprising between two and 10 clusters. Cluster centers from the final five-cluster solution reported in Busseri et al. (2009a) also were

used as start values in an additional k-means cluster analysis. With this two-stage clustering approach, assignments of participants to clusters based on the specified start values were optimized using the k-means procedure by maximizing both the separation among clusters and homogeneity within clusters.

A good-fitting cluster solution was expected to explain a substantial proportion of the variances in LS, PA, and NA. Further, the amount of incremental variance explained by the extraction of additional clusters was expected to asymptote following the optimal number of clusters. As shown in Table 5 below (see columns labeled “Total” and “Incremental”), the amount of variance explained in the Wave 1 SWB scores increased as the number of clusters extracted increased. At least 60% of the variance was explained by five or more clusters. Further, after extracting a fifth cluster using start values taken from Busseri et al. (2009a), the amount of incremental variance explained by additional clusters asymptoted.

Cluster analysis continued with the Wave 2 and Wave 4 SWB scores.

Specifically:

4. The first three steps outlined above were repeated using the Wave 2 and Wave 4 SWB scores instead of the Wave 1 SWB scores. As shown in Table 5 below, at Wave 2 and Wave 4 at least 60% of the variance in the SWB components was explained by solutions comprising five or more clusters, and the amount of incremental explained variance asymptoted after extracting a fifth cluster.

Table 5. *Total and Incremental Explained Variance in SWB Scores by Cluster Solutions, and Replicability in Cluster Configurations*

Solution	Wave 1		Wave 2			Wave 4		
	Total	Incremental	Total	Incremental	Replicability	Total	Incremental	Replicability
2 clusters	.33	.33	.38	.38	1.00	.38	.38	1.00
3 clusters	.43	.10	.49	.11	0.86	.49	.11	0.89
4 clusters	.54	.11	.57	.08	0.70	.58	.09	0.85
5 clusters	.59	.05	.62	.06	0.88	.64	.06	0.89
5 clusters _a	.61 _a	.07 _b	.63 _a	.06 _b	0.98 _a	.62 _a	.04 _b	0.93 _a
6 clusters	.64	.05 _c	.67	.05 _c	0.67	.67	.03 _c	0.79
7 clusters	.68	.04	.70	.03	0.55	.70	.03	0.73
8 clusters	.71	.03	.73	.03	0.61	.73	.03	0.78
9 clusters	.73	.02	.75	.02	0.61	.74	.01	0.66
10 clusters	.76	.03	.77	.02	0.57	.76	.02	0.49

Note. $N = 446$. Total = total explained variance by Wave-specific cluster solutions. Incremental = incremental explained variance. Replicability = kappa values from cross-tabulation of cluster assignments based on wave-specific start values vs. start values from the final Wave 1 cluster solutions and the final five-cluster solution reported by Busseri et al. (2009a). _aResults are based on start values from the final five-cluster solution reported by Busseri et al. (2009a) based on the full baseline sample, rather than on the start values from the five-cluster solution derived from the present longitudinal sample. _bIncremental explained variance results are in comparison to the 4 cluster solution. _cIncremental explained variance results are in comparison to the first 5 cluster solution.

To evaluate whether the types of SWB configurations identified at Wave 1 were consistent with the configurations identified at Wave 2 and Wave 4, several additional steps were taken:

5. To determine the short-term replicability of the Wave 1 cluster patterns, the cluster centers resulting from Step 3 above based on the Wave 1 SWB scores were used as start values for a series of k-means cluster analyses using the Wave 2 SWB ratings. The resulting cluster assignments were then cross-tabulated with cluster assignments obtained from Step 4 above using the Wave 2-specific start values.

6. To determine the longer-term replicability of the Wave 1 cluster patterns, the cluster centers resulting from Step 3 above based on the Wave 1 SWB scores were used as start values for a series of k-means cluster analyses using the Wave 4 SWB ratings. The resulting cluster assignments were then cross-tabulated with cluster assignments obtained from Step 4 above using the Wave 4-specific start values.

Consistent with previous person-centered investigations (e.g., Asendorpf et al., 2001), in Steps 5 and 6 cluster configuration replicability was indexed by the kappa coefficient. As shown in Table 5 above (see column labeled "Replicability"), kappa values at Wave 2 were highest for the two- and five-cluster solutions. Of note, the cluster configurations specified by the five-cluster solution resulting from k-means analysis based on the start values from the final five-cluster solution reported by Busseri et al. (2009a) had near perfect replicability between Wave 1 and Wave 2. Similarly, replicability between Wave 1 and Wave 4 was highest for the two- and five-cluster solutions, with the cluster configurations derived based on the start values from the final five-cluster solution from Busseri et al. (2009a) having very high replicability.

Thus, joint consideration of (i) the total and (ii) incremental variances explained in the SWB scores at Wave 1, Wave 2, and Wave 4 by the two- through 10-cluster solutions, as well as (iii) the short-term and longer-term replicabilities of the cluster configurations resulting from each of the Wave 1 solutions, converged on one optimal solution: the five-cluster k-means solution derived using the cluster centers from the final five-cluster solution presented in Busseri et al. (2009a) as start values. Given the robust nature of these findings, this five-cluster solution was deemed optimal at all three waves. Thus, all subsequent analyses involving the SWB clusters were based on the five-cluster solution derived at each wave using the cluster centers from the final five-cluster model reported by Busseri et al. (2009a) as start values.

Cluster Descriptions

Cluster descriptives for the final five-cluster solution, including raw means and standard deviations for LS, PA, and NA scores are shown in Table 6 below for each cluster at each wave. Cluster means for LS, PA, and NA from Wave 1, Wave 2, and Wave 4 are also provided for each cluster on the bivariate scatter plots shown above in Figures 1, 2 and 3. Plots of the cluster centers based on standardized SWB scores are shown by cluster and by SWB component at each wave in Figure 4 below.

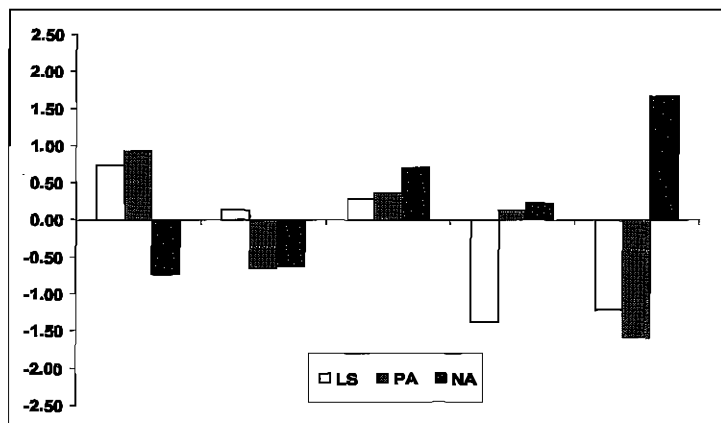
Table 6. *Cluster Descriptives for the Final Five-Cluster Solution by Cluster by Wave*

Cluster and label	Cluster size	SWB component		
		LS	PA	NA
<i>Wave 1</i>				
1. High SWB	113	8.16 (0.71)	4.19 (0.33)	1.81 (0.31)
2. Low affect	124	7.38 (0.76)	3.26 (0.33)	1.88 (0.32)
3. High NA	114	7.57 (0.72)	3.86 (0.38)	2.71 (0.41)
4. Low LS	53	5.36 (0.90)	3.72 (0.44)	2.40 (0.42)
5. Low SWB	42	5.50 (1.71)	2.70 (0.47)	3.32 (0.44)
<i>Wave 2</i>				
1. High SWB	127	7.76 (0.75)	4.17 (0.31)	1.70 (0.28)
2. Low PA	128	7.41 (0.60)	3.31 (0.32)	2.15 (0.34)
3. High affect	83	7.30 (0.74)	3.99 (0.39)	2.64 (0.44)
4. Low LS, low PA	82	5.43 (0.79)	3.26 (0.44)	2.24 (0.41)
5. Low SWB	26	4.31 (1.62)	2.72 (0.50)	3.54 (0.52)
<i>Wave 4</i>				
1. High SWB	127	7.92 (0.77)	4.22 (0.32)	1.74 (0.35)
2. Low affect	115	7.25 (0.71)	3.37 (0.36)	1.85 (0.32)
3. High NA	103	7.60 (0.69)	3.69 (0.44)	2.75 (0.37)
4. Low LS	54	5.59 (0.69)	3.69 (0.35)	2.34 (0.41)
5. Low SWB	47	4.55 (1.60)	2.79 (0.56)	3.23 (0.52)

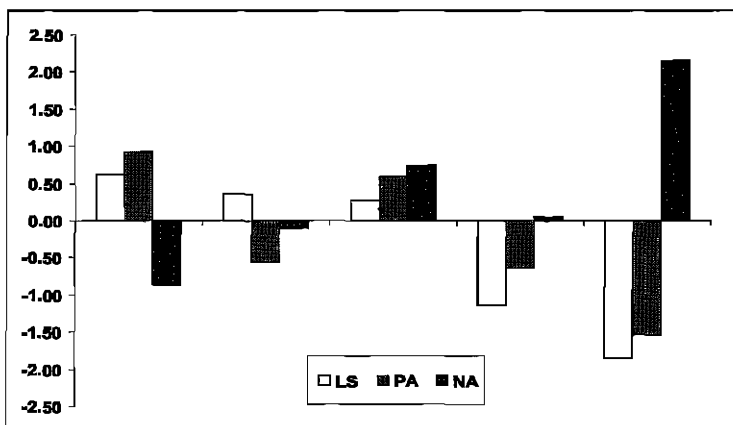
Note. $N = 446$. W = survey wave. SWB = subjective well-being. LS = life satisfaction. PA = positive affect. NA = negative affect. Raw means (and standard deviations) are shown by SWB component (column variable) by cluster (row variable).

Figure 4. *Cluster Centers from the Optimal Five-Cluster Solution by Cluster by Wave.*

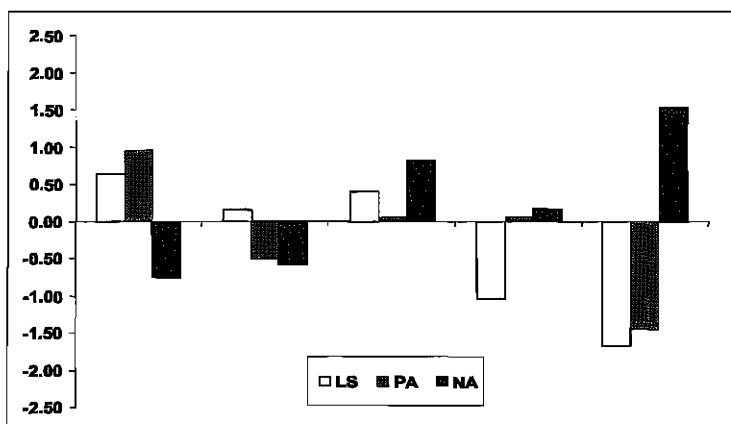
Wave 1



Wave 2



Wave 4



Note. Plots for Wave 1, Wave 2, and Wave 4 clusters are shown using standardized LS, PA, and NA scores.

At Wave 1, Cluster 1 was characterized by a combination of high LS (i.e., standardized cluster center greater than 0.50; see Figure 4 above), high PA, and low NA (i.e., standardized cluster center less than -0.50), reflecting a profile of “high SWB” (25% of sample), as conceptualized by Diener (1984). Cluster 2 was characterized by moderate LS scores (i.e., standardized cluster center between -0.50 and 0.50), in combination with low levels of PA and NA, indicating a profile of “low affect” (28% of sample).⁸ Cluster 3 was typified by a combination of moderate levels of LS and PA, and high NA scores, reflecting a profile of “high NA” (26%). Cluster 4 was typified by low LS, in combination with moderate PA and NA, reflecting a profile of “low LS” (12%). Cluster 5 was characterized by low LS, low PA, and high NA scores, reflecting a “low SWB” profile (9%), as described by Diener and Seligman (2002).

Cluster descriptions at Wave 2 were generally consistent with these patterns. Cluster 1 was characterized by a combination of high LS, high PA, and low NA, reflecting a profile of “high SWB” (28% of sample). Cluster 2 was characterized by moderate LS scores in combination with low levels of PA and moderate levels of NA (rather than low NA, as at Wave 1), indicating a profile of “low PA” (29% of sample). Cluster 3 was typified by a combination of moderate levels of LS, in combination with high PA (rather than moderate, as at Wave 1) and high NA scores, reflecting a profile of “high affect” (19%). Cluster 4 was typified by low LS, in combination with moderate PA and low NA (rather than moderate, as at Wave 1), reflecting a profile of “low LS and

⁸ Rather than incorporating the names of all three SWB components into each cluster label, for ease of communication the labels for Cluster 2, Cluster 3, and Cluster 4 refer only to the defining feature or features of that cluster (e.g., low affect for Cluster 1, high NA for Cluster 2). SWB components that are not included in the cluster label were moderate and non-defining.

PA” (18%). Cluster 5 was characterized by low LS, low PA, and high NA scores, reflecting a “low SWB” profile (6%).

Cluster descriptions for Wave 4 clusters were highly consistent with the patterns observed at Wave 1. Cluster 1 was characterized by a combination of high LS, high PA, and low NA, reflecting a profile of “high SWB” (28% of sample). Cluster 2 was characterized by moderate LS scores in combination with low levels of PA and NA, indicating a profile of “low affect” (26%). Cluster 3 was typified by a combination of moderate levels of LS and PA, in combination with high NA scores, reflecting a profile of “high NA” (23%). Cluster 4 was typified by low LS, in combination with moderate PA and NA, reflecting a profile of “low LS” (12%). Cluster 5 was characterized by low LS, low PA, and high NA scores, reflecting a “low SWB” profile (11%).

Consistency in Cluster Assignments Between Full Sample and Longitudinal Sample

Cluster assignments at Wave 1 for the longitudinal sample based on the optimal five-cluster solution were cross-tabulated with cluster assignments derived using the same start values from Busseri et al. (2009a) with the full Wave 1 sample ($N = 771$). As shown in Table 7 below, there was a high degree of correspondence; $\chi^2 = 1487.00$, $df = 16$, $p < .001$; kappa = .91, $p < .001$. Overall, 93% of longitudinal respondents were classified into the same clusters, evidencing a high degree of consistency in cluster assignments between the full sample and longitudinal sample at Wave 1.

Table 7. *Cross-Tabulations of Wave 1 Cluster Assignments Derived Using Full Versus Longitudinal Samples*

Full sample assignments	Longitudinal sample assignments at Wave 1				
	1. High SWB (<i>n</i> = 113)	2. Low affect (<i>n</i> = 124)	3. High NA (<i>n</i> = 114)	4. Low LS (<i>n</i> = 53)	5. Low SWB (<i>n</i> = 42)
1. High SWB (<i>n</i> = 104)	104	0	0	0	0
2. Low affect (<i>n</i> = 130)	8	114	8	0	0
3. High NA (<i>n</i> = 104)	0	1	103	0	0
4. Low LS (<i>n</i> = 60)	1	8	0	51	0
5. Low SWB (<i>n</i> = 48)	0	1	3	2	42

Note. *N* = 446. SWB = subjective well-being. LS = life satisfaction. PA = positive affect. NA = negative affect. The cell entries display the number of participants cross-tabulated into the same or different clusters based on full sample versus longitudinal sample cluster assignments.

Summary

The first objective of Part 1 was to evaluate the longitudinal replicability of SWB configurations. Hypothesis 1 stated that the five SWB clusters identified by Busseri et al. (2009a) would replicate at all three waves. This hypothesis was largely supported, particularly at Wave 1 and Wave 4.

Based on multiple criteria, the five-cluster solution employed by Busseri et al. (2009a) was deemed optimal at all three waves. The clusters comprising this five-cluster solution included a relatively consistent set of SWB configurations across the three survey waves – particularly at Wave 1 and Wave 4. Of the five clusters, one cluster at each wave reflected Diener's (1984) definition of high SWB as the combination of high

LS, frequent PA, and infrequent NA. A second consistent configuration observed at all three waves represented the mirror-image of this pattern, that is, low LS, infrequent PA, and frequent NA, which we have labeled “low SWB”. Three other patterns were observed consistently at Wave 1 and Wave 4 (and overlapped to a great degree with the Wave 2 patterns): a cluster characterized primarily by relatively low levels of both affective components (“low affect”); another defined primarily by high levels of NA (“high NA”); and an additional pattern characterized primarily with respect to low levels of LS (“low LS”). These five configurations, and the resulting assignments of individuals to clusters, showed a high degree of correspondence with the cluster configurations reported by Busseri et al. (2009a) based on the full Wave 1 sample.

Objective 2:

Longitudinal Stability in Cluster Assignments

My second objective was to examine the longitudinal stability in assignment of individuals to SWB clusters. Hypothesis 2 stated that stability in SWB cluster membership would be moderate, overall, but relatively highest among individuals characterized by high SWB, followed by the low affect cluster, intermediate for the high NA cluster, followed by the low LS cluster, and lowest among members characterized by low SWB.

Stability versus Instability in Longitudinal Cluster Assignments

Overall, 47% of respondents were classified into the same (vs. different) clusters at Wave 1 and Wave 2. Further, chi-squared analyses comparing Wave 1 SWB configuration by stable/instable status indicated that clusters differed with respect to stability between Wave 1 and Wave 2 ($\chi^2 = 22.09$, $df = 4$, $p < .001$). Of the five clusters,

stability was statistically greater than expected due to chance only for the “high SWB” cluster (as indicated by large standardized residuals from the comparison between the observed and expected cell counts, i.e., standardized residual greater than or less than 2.0, $p < .05$), among whom 65% were classified into the same cluster at Wave 1 and Wave 2.

Between Wave 1 and Wave 4, 42% of respondents were classified into the same (vs. different) clusters. Further, clusters also differed with respect to stability versus instability over time ($\chi^2 = 22.97$, $df = 4$, $p < .001$). Again, stability was statistically greater than expectation for the “high SWB” cluster, among whom 54% were classified into the same cluster at Wave 1 and Wave 4, and significantly less than expected for the “high LS” cluster, among whom only 17% were classified into the same cluster at Wave 1 and Wave 4.

Cross-Tabulations in Longitudinal Cluster Assignments

To examine the assignment of participants to each of the five clusters across waves, the five Wave 1 cluster assignments were cross-tabulated with the five Wave 2 and Wave 4 cluster assignments. Chi-square tests indicated statistically significant relations between Waves 1 and Wave 2 ($\chi^2 = 240.80$, $df = 16$, $p < .001$) and Wave 1 and Wave 4 cluster assignments ($\chi^2 = 120.80$, $df = 16$, $p < .001$). Cell counts and percentages are shown in Table 8 below. Although statistically significant, the overall level of stability in same-cluster membership for all five clusters was moderate, as reflected by kappa coefficients of .32 and .22 ($ps < .001$) for comparisons between Wave 1 and Wave 2, and between Wave 1 and Wave 4, respectively.

Table 8. *Cross-Tabulations of Cluster Assignments Across Waves*

Clusters	Wave 2 clusters					Wave 4 clusters				
	1. High SWB (<i>n</i> = 127)	2. Low PA (<i>n</i> = 128)	3. High Affect (<i>n</i> = 83)	4. Low LS + PA (<i>n</i> = 82)	5. Low SWB (<i>n</i> = 26)	1. High SWB (<i>n</i> = 127)	2. Low affect (<i>n</i> = 115)	3. High NA (<i>n</i> = 103)	4. Low LS (<i>n</i> = 54)	5. Low SWB (<i>n</i> = 47)
<i>Wave 1</i>										
1. High SWB (<i>n</i> = 113)	73* (65%)	15* (13%)	18 (16%)	7* (6%)	0* (0%)	61* (54%)	21 (19%)	20 (18%)	5* (4%)	6 (5%)
2. Low affect (<i>n</i> = 124)	26 (21%)	57* (46%)	6* (5%)	31 (25%)	4 (3%)	24 (19%)	53* (43%)	19 (15%)	18 (15%)	10 (8%)
3. High NA (<i>n</i> = 114)	17* (15%)	27 (24%)	48* (42%)	20 (18%)	2 (2%)	31 (27%)	18* (16%)	39* (34%)	18 (16%)	9 (7%)
4. Low LS (<i>n</i> = 53)	10 (19%)	15 (28%)	6 (11%)	17* (32%)	5 (9%)	9 (17%)	17 (32%)	11 (21%)	9 (17%)	7 (13%)
5. Low SWB (<i>n</i> = 42)	1* (2%)	14 (33%)	5 (12%)	7 (17%)	15* (36%)	2* (5%)	6 (14%)	14 (33%)	4 (10%)	16* (38%)

Note. *N* = 446. SWB = subjective well-being. LS = life satisfaction. PA = positive affect. NA = negative affect. Results should be read by row. Cell entries show the number of participants from each cluster at a prior Wave assigned to clusters at a future Wave. Numbers in parentheses below the cell entries are percentages associated with each cell count for each row variable. * Cross-wave cluster assignment is significantly different than expectation ($p < .05$).

As indicated by the standardized residuals, stability in same-cluster membership over time was statistically significant for each of the five clusters in each analysis, with one exception (Wave 1 to Wave 4 “low LS”). None of the other combinations of longitudinal cluster assignments (e.g., “low affect” at Wave 1 to “high SWB” at Wave 2) was observed significantly more often than would be expected due to chance.

Summary

The second objective of Part 1 was to examine the longitudinal stability in assignment of individuals to SWB clusters. Hypothesis 2 stated that stability in SWB cluster membership would be moderate overall, but relatively highest among individuals characterized by high SWB and lowest among members characterized by low SWB. This hypothesis was partially supported.

Participants classified into a particular SWB cluster at Wave 1 were statistically more likely to be classified into the corresponding (or most closely corresponding) cluster at Wave 2 or Wave 4 than into any other configuration. Overall, however, stability in longitudinal cluster assignments was moderate between Wave 1 and Wave 2, and Wave 1 and Wave 4. Comparing among the five SWB configurations, individuals classified as “high SWB” at Wave 1 were more likely to be classified into the same cluster at a subsequent wave than were people classified into any of the other four configurations.

Objective 3:

Cross-Sectional Differences Between SWB Configurations in Positive Functioning

The third objective of the present study was to evaluate the differences between SWB configurations in mental, physical, and interpersonal functioning. Hypothesis 3 stated that differences between SWB configurations would be observed at each wave

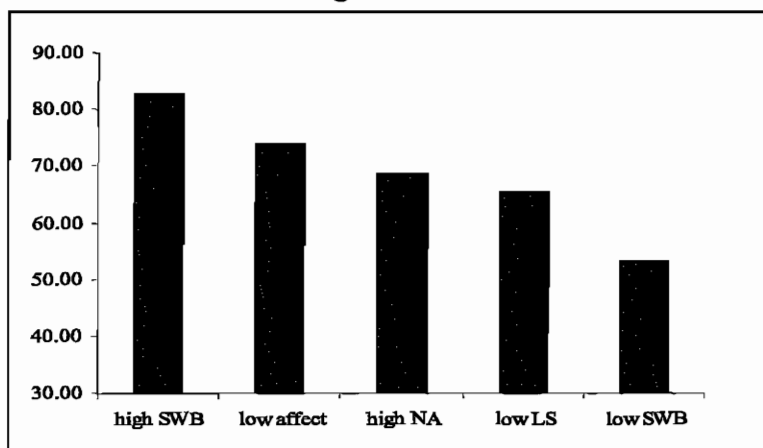
(Hypothesis 3a), that the high SWB and low SWB clusters should be characterized by the relatively most positive and negative levels of functioning, respectively (Hypothesis 3b); but that high and low levels of functioning would be characteristic of other configurations, in particular, the low affect and low LS clusters, respectively (Hypothesis 3c). To assess cross-sectional differences in functioning among SWB clusters, three one-way ANOVAs were computed at each wave, comparing the five SWB clusters on mental, physical, and interpersonal functioning.

Wave 1 Comparisons

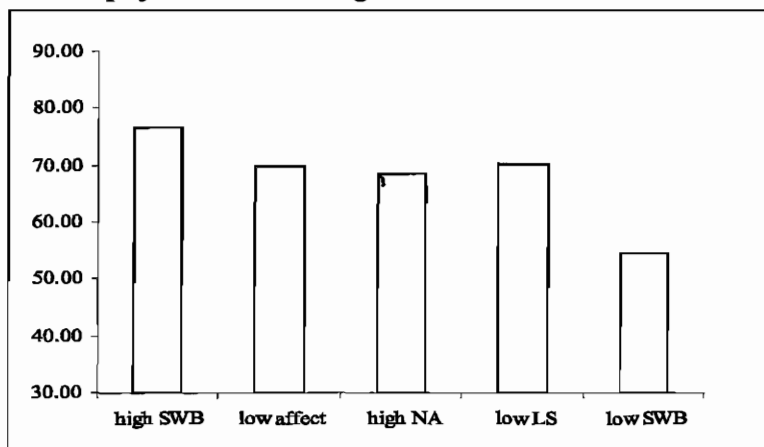
At Wave 1, there was a significant main effect of cluster on mental functioning ($F(4,441) = 50.02, p < .001, \eta^2 = .31$), physical functioning ($F(4,441) = 24.77, p < .001, \eta^2 = .18$), and interpersonal functioning ($F(4,441) = 39.08, p < .001, \eta^2 = .26$). As shown in Figure 5 below, for mental functioning, post hoc pairwise comparisons with Bonferroni correction indicated that the high SWB cluster had the highest level of functioning, followed by the low affect and high NA clusters (these clusters did not differ significantly), followed by the low LS cluster (which did not differ significantly from the high NA cluster), followed by the low SWB cluster; $M_s = 82.57, 74.03, 68.60, 65.35$, and 53.27 , respectively.

Figure 5. *Wave 1 Mental, Physical, and Interpersonal Functioning by Cluster.*

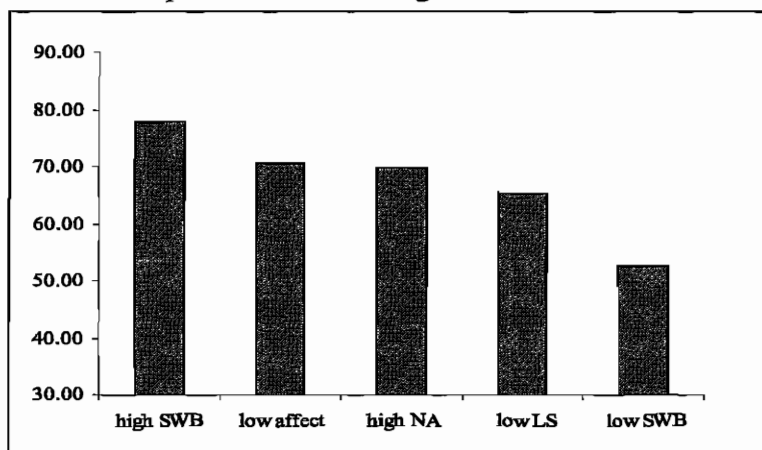
Wave 1 mental functioning



Wave 1 physical functioning



Wave 1 interpersonal functioning



Note. Mean Wave 1 functioning scores are shown by Wave 1 SWB cluster.

For physical functioning, the high SWB cluster had the highest level functioning, followed by the low affect, high NA, and low LS clusters (these three clusters did not differ significantly), followed by the low SWB cluster; $M_s = 76.55, 70.28, 69.92, 68.59$ and 54.50 , respectively. Similarly, for interpersonal functioning, the high SWB cluster had the highest level functioning, followed by the low affect, high NA, and low LS clusters (these three clusters did not differ significantly), followed by the low SWB cluster; $M_s = 77.72, 70.44, 69.80, 65.29$, and 52.49 , respectively.

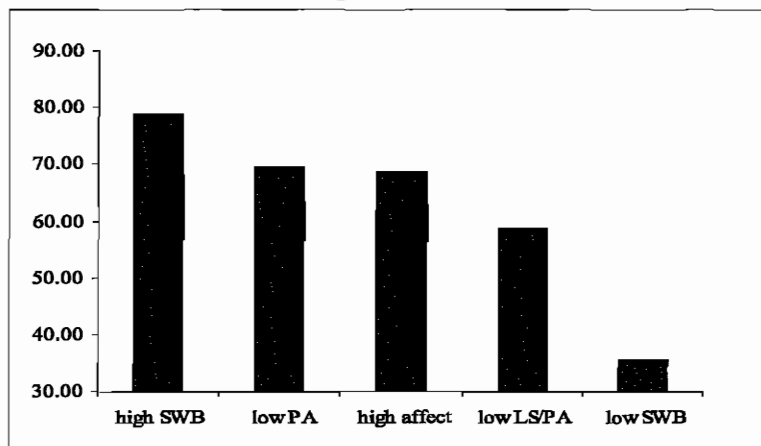
Wave 2 Comparisons

At Wave 2, there was a significant main effect of cluster on mental functioning ($F(4,441) = 63.82, p < .001, \eta^2 = .37$), physical functioning ($F(4,441) = 32.87, p < .001, \eta^2 = .23$), and interpersonal functioning ($F(4,441) = 44.40, p < .001, \eta^2 = .29$). As shown in Figure 6 below, for mental functioning, post hoc pairwise comparisons with Bonferroni correction indicated that the high SWB cluster had the highest level functioning, followed by the low PA and high affect clusters (these clusters did not differ significantly), followed by low LS/low PA cluster, followed by the low SWB cluster; $M_s = 78.90, 69.49, 68.61, 58.61$, and 35.47 , respectively.

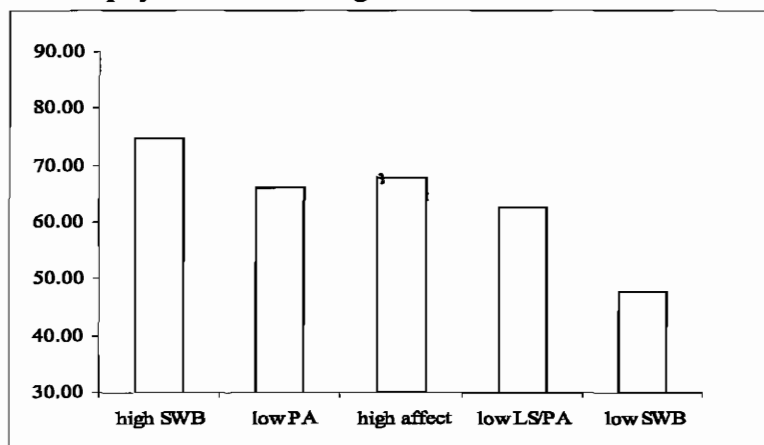
For physical functioning, the high SWB cluster had the highest level functioning, followed by the low PA, high affect, and low LS/low PA clusters (these three clusters did not differ significantly), followed by the low SWB cluster; $M_s = 74.83, 67.83, 66.01, 62.56$ and 47.80 , respectively. Similarly, for interpersonal functioning, the high SWB cluster had the highest level functioning, followed by low PA, high affect, and the low LS/low PA clusters (these three clusters did not differ significantly), followed by the low SWB cluster; $M_s = 79.74, 72.21, 69.11, 69.10$ and 49.62 , respectively.

Figure 6. *Wave 2 Mental, Physical, and Interpersonal Functioning by Cluster.*

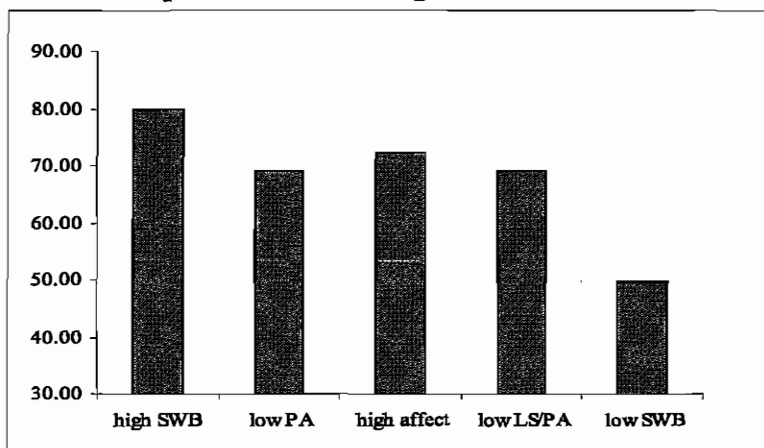
Wave 2 mental functioning



Wave 2 physical functioning



Wave 2 interpersonal functioning



Note. Mean Wave 2 functioning scores are shown by Wave 2 SWB cluster.

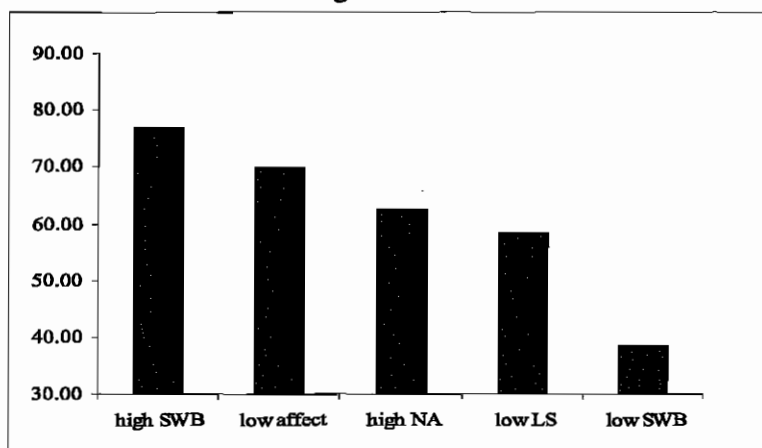
Wave 4 Comparisons

At Wave 4, there was a significant main effect of cluster on mental functioning ($F(4,441) = 57.23, p < .001, \eta^2 = .34$), physical functioning ($F(4,441) = 34.35, p < .001, \eta^2 = .24$), and interpersonal functioning ($F(4,441) = 41.31, p < .001, \eta^2 = .27$). As shown in Figure 7 below, for mental functioning, post hoc pairwise comparisons with Bonferroni correction indicated that the high SWB cluster and the low affect cluster (these clusters did not differ significantly) had the highest levels functioning, followed by the high NA and low LS clusters (these clusters did not differ significantly), followed by the low SWB cluster; $M_s = 76.77, 69.82, 62.52, 58.40$, and 38.47 , respectively.

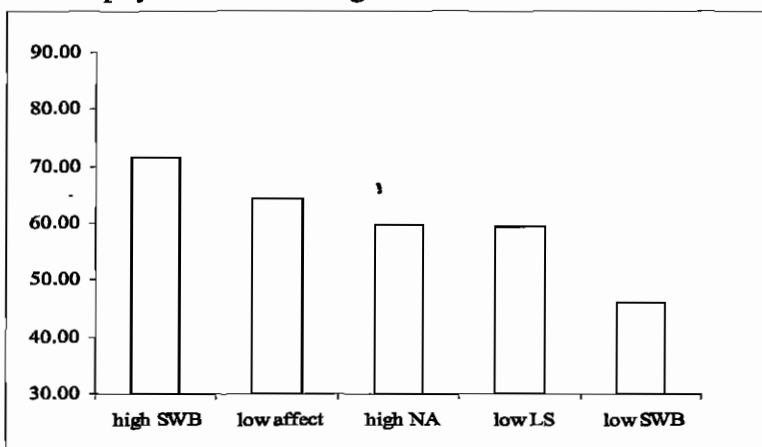
For physical functioning, the high SWB cluster had the highest level functioning, followed by low affect, high NA, and low LS clusters (these three clusters did not differ significantly), followed by the low SWB cluster; $M_s = 71.56, 64.38, 59.85, 59.31$, and 45.98 , respectively. Similarly, for interpersonal functioning, the high SWB cluster had the highest level functioning, followed by low affect, high NA, and low LS clusters (these three clusters did not differ significantly), followed by the low SWB cluster; $M_s = 82.85, 74.68, 70.68, 70.00$, and 58.41 , respectively.

Figure 7. *Wave 4 Mental, Physical, and Interpersonal Functioning by Cluster.*

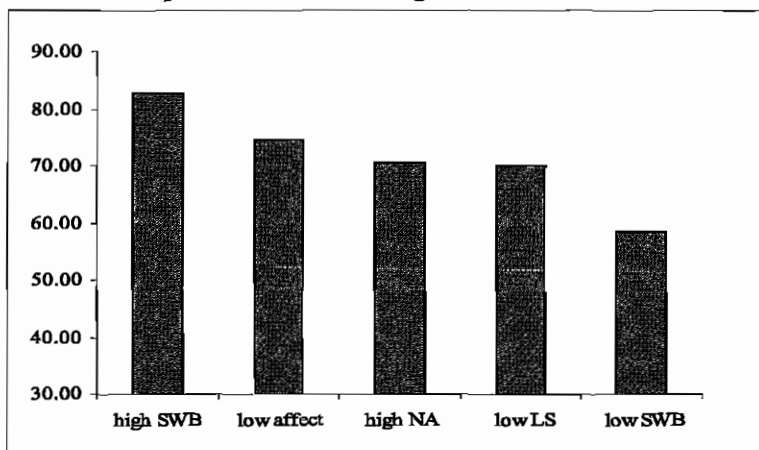
Wave 4 mental functioning



Wave 4 physical functioning



Wave 4 interpersonal functioning



Note. Mean Wave 4 functioning scores are shown by Wave 4 SWB cluster.

Summary

The third objective of Part 1 was to evaluate the differences between SWB configurations in mental, physical, and interpersonal functioning. Differences between SWB configurations were expected at each wave (Hypothesis 3a), high SWB and low SWB clusters were expected to be characterized by the relatively most positive and negative levels of functioning, respectively (Hypothesis 3b); but high and low levels of functioning also were expected to be characteristic of other configurations, in particular, the low affect and low LS clusters, respectively (Hypothesis 3c).

In support of Hypothesis 3a, at all three waves, SWB clusters differed significantly with respect to mental, physical, and interpersonal functioning. Further, a similar pattern of mean differences in functioning among SWB clusters emerged at each wave and for each comparison measure: In support of Hypothesis 3b, the high SWB cluster (“high SWB”) was characterized by the most positive functioning in all three domains, whereas the low SWB cluster was characterized by the least positive functioning. Further, in all but one group comparison, low affect (or low PA at Wave 2), high NA (or high affect at Wave 2), and low LS (or low LS/low PA at Wave 2) each differed significantly from both the high SWB and low SWB clusters. The one exception was that at Wave 4, the high SWB and low affect clusters did not differ significantly on mental functioning. Further, in general, the low affect (or low PA at Wave 2), high NA (or high affect at Wave 2), and low LS (or low LS/low PA at Wave 2) were undifferentiated from each other at each wave with respect to physical and interpersonal functioning. However, the low affect (or low PA at Wave 2) and low LS (or

low LS/low PA at Wave 2) differed significantly from each other at eave wave with respect to mental functioning. Overall, therefore, Hypothesis 3c was not supported.

Objective 4:

Longitudinal Associations Between SWB Configurations and Positive Functioning

The fourth objective was to assess relations between SWB configurations and positive functioning over time. Hypothesis 4 stated that Wave 1 SWB configurations would be related prospectively to functioning in both the short-term (Wave 1 to Wave 2) and longer term (Wave 1 to Wave 4). Hypothesis 5 stated that Wave 1 functioning would be related prospectively to SWB cluster membership in both the short-term (Wave 1 to Wave 2) and longer term (Wave 1 to Wave 4). Bringing together these possibilities in a dynamic formulation, Hypothesis 6 stated that change (vs. stability) in SWB cluster membership would be linked with changes (vs. stability) in functioning over time.

Change in Functioning by Wave 1 SWB Cluster and Cluster Stability

I first examined Wave 1 cluster membership and stability in cluster membership over time as predictors of change in mental, physical, and interpersonal functioning. To index change in functioning, I created residual functioning scores by regressing Wave 2 and Wave 4 functioning scores onto the corresponding Wave 1 functioning scores, and saving the resulting residuals. These residuals thus reflected the degree to which each respondent's Wave 2 and Wave 4 mental, physical, and interpersonal functioning scores were greater or lesser than what was predicted based on their level of Wave 1 functioning (see Table 4 above for auto-correlations between waves for corresponding functioning measures). Positive residuals indicated greater than expected functioning, negative residuals reflected worse then expected functioning, and residuals of zero indicated the

level of functioning that would be anticipated based on Wave 1 functioning. Two-way ANOVAs were then computed for each residual Wave 2 and Wave 4 functioning score, treating Wave 1 SWB cluster membership and stability (vs. instability) in cluster membership between Wave 1 and Wave 2 or Wave 1 and 4 as between-subjects factors.

Note that the residual change score approach has two important advantages compared to more typical approaches, such as using a repeated-measures ANOVA in which Wave 1 and Wave 2 functioning scores are treated as repeatedly-measured outcomes or an ANCOVA model examining Wave 2 functioning as the criterion and treating Wave 1 functioning as a covariate. First, residual change scores remove the need to include Wave 1 functioning as a covariate, or as the first of two repeated measures, thus simplifying the analytic model and interpretation, as well as the number of statistical comparisons computed. Second, the residual change scores facilitate focused contrasts between individual group means and values of 0, which is the expected level of functioning based on stability in functioning alone.

Short-Term Changes in Functioning by Wave 1 SWB Cluster and Cluster

Stability: All Five Clusters

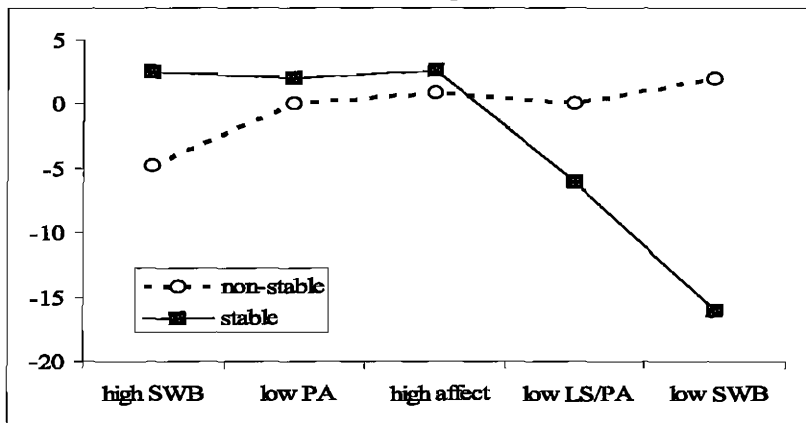
For mental functioning, the main effect of Wave 1 SWB cluster on residual Wave 2 functioning was significant; $F(4, 436) = 3.67, p = .006, \eta^2 = .03$. In follow-up pairwise contrasts with Bonferroni correction, however, none of the pairwise contrasts were significant. The main effect of cluster stability was non-significant; $F(1, 436) = 2.96, p = .09, \eta^2 = .01$. However, the cluster by stability interaction was significant; $F(4, 436) = 6.68, p < .001, \eta^2 = .06$. Two follow-up one-way ANOVAs were used to compare among SWB clusters separately for stable and non-stable participants. The main effect of Wave

1 SWB cluster on residual Wave 2 mental functioning was non-significant for non-stable participants ($F(4,231) = 1.17, p = .33, \eta^2 = .02$), but was significant among stable participants ($F(4,205) = 8.77, p < .001, \eta^2 = .15$). As shown in Figure 8 below, among stable participants, residual Wave 2 mental functioning was highest among the high SWB, low affect, and high NA clusters (these three clusters did not differ significantly from each other), followed by low LS, followed by the low SWB cluster.

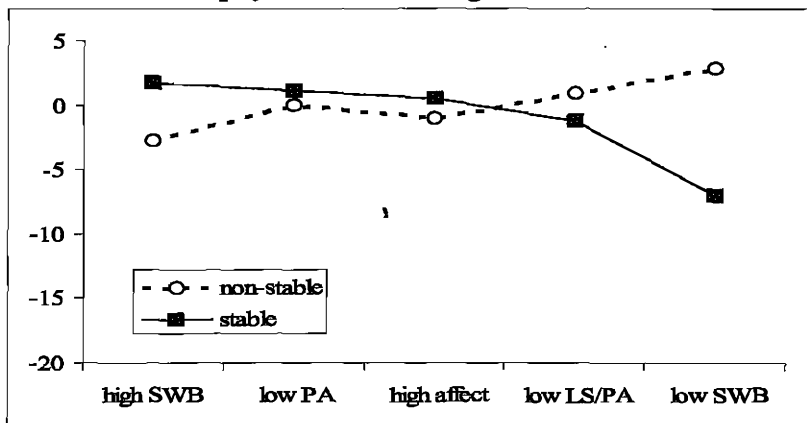
Additional pair-wise comparisons between mean residual Wave 2 mental functioning for each Wave 1 SWB cluster for stable and non-stable groups and residual functioning scores of zero – the latter indicating that Wave 2 functioning was exactly as predicted based on Wave 1 functioning – were significant for two clusters: Wave 1 high SWB cluster among non-stable participants, and Wave 1 low SWB among stable participants both had significantly worse than expected mental functioning at Wave 2 ($ps < .001$).

Figure 8. *Residual Wave 2 Functioning by Wave 1 SWB Clusters by Cluster Stability.*

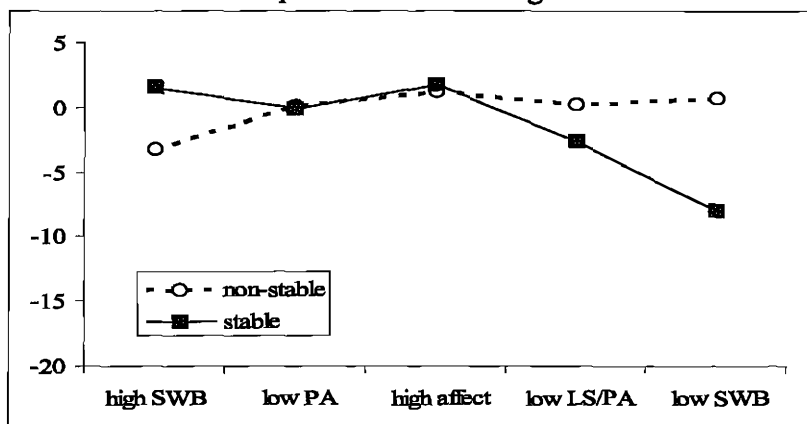
Residual wave 2 mental functioning



Residual wave 2 physical functioning



Residual wave 2 interpersonal functioning



Note. Mean Wave 2 residual mental, physical, and interpersonal functioning scores are shown by Wave 1 SWB cluster for non-stable and stable participants.

For physical functioning, the main effect of Wave 1 SWB cluster on residual Wave 2 functioning was non-significant; $F(4, 436) = 0.64, p = .63, \eta^2 < .01$. The main effect of cluster stability was non-significant; $F(1, 436) = 0.95, p = .33, \eta^2 < .01$. However, the cluster by stability interaction was significant; $F(4, 436) = 4.81, p = .001, \eta^2 = .04$. In follow-up one-way ANOVAs comparing among clusters for stable and non-stable participants separately, the main effect of Wave 1 SWB cluster on residual Wave 2 physical functioning was non-significant for non-stable participants ($F(4,231) = 1.86, p = .12, \eta^2 = .03$), but was significant among stable participants ($F(4,205) = 2.14, p = .02, \eta^2 = .06$). As shown in Figure 8 above, among stable participants, residual Wave 2 physical functioning was higher among the high SWB, low affect, high NA, and low LS clusters (these clusters did not differ significantly from each other), compared to the low SWB cluster. Additional pair-wise comparisons between mean residual Wave 2 physical functioning and scores of zero were significant for two groups: The Wave 1 high SWB cluster unstable group and the Wave 1 low SWB stable group both had significantly worse than expected physical functioning at Wave 2 ($ps < .001$).

For interpersonal functioning, the main effect of Wave 1 SWB cluster on residual Wave 2 functioning was significant; $F(4, 436) = 2.69, p = .03, \eta^2 = .02$. In follow-up pairwise contrasts with Bonferroni correction, however, none of the pairwise contrasts were significant. The main effect of cluster stability was non-significant; $F(1, 436) = 1.78, p = .18, \eta^2 < .01$. However, the cluster by stability interaction was significant; $F(4, 436) = 4.52, p = .001, \eta^2 = .04$. In follow-up one-way ANOVAs comparing among Wave 1 SWB clusters for stable and non-stable participants separately, the main effect of cluster on residual Wave 2 interpersonal functioning was non-significant for non-stable

participants ($F(4,231) = 1.40, p = .24, \eta^2 = .02$), but was significant among stable participants ($F(4,205) = 5.63, p < .001, \eta^2 = .10$). As shown in Figure 8 above, among stable participants, residual Wave 2 interpersonal functioning was highest among the high SWB, low affect, and high NA (these three clusters did not differ significantly from each other), followed by the low LS and low SWB clusters.

Additional pair-wise comparisons between mean residual Wave 2 interpersonal functioning for both stable and non-stable groups and scores of zero were significant for two groups: The Wave 1 high SWB non-stable group and the Wave 1 low SWB stable group both had significantly worse than expected interpersonal functioning at Wave 2 ($ps < .001$).

Short-Term Changes in Functioning by Wave 1 SWB Cluster and Cluster

Stability: Middle Three Clusters

The findings reported above suggest that the cluster membership by stability group interactions were largely a function of the high SWB and low SWB configurations. One limitation of these analyses, however, is that the dichotomization of participants into stable versus non-stable cluster membership groups obscured the fact that for participants in the low affect, high NA, and low LS clusters at Wave 1, instability in cluster membership over time may indicate either a change toward a high or low SWB configuration. In contrast, for participants categorized into the high SWB or low SWB clusters at Wave 1, the direction of cluster membership instability is unambiguous: For those in the high SWB cluster at Wave 1, a change in cluster membership is a change toward a low SWB configuration or any of the other three intervening configurations; for

those in the low SWB cluster at Wave 1, a change in cluster membership is a change toward a high SWB configuration or any of the other three intervening configurations.

To examine this issue, I computed three additional two-way ANOVAs comparing the residual Wave 2 functioning scores as a function of Wave 1 SWB cluster for the low affect, high NA, and low LS clusters only, and cluster stability – coded as ‘upward’ (i.e., a change toward a “high SWB” configuration between Wave 1 and Wave 2), ‘stable’ (i.e., no change in cluster membership), or ‘downward’ (i.e., a change toward a “low SWB” configuration). For participants classified as high NA at Wave 1, for example, and whose cluster membership changed between Wave 1 and Wave 4, those who were classified as either high SWB or low affect at Wave 4 were coded as ‘upward’ on the cluster stability variable, whereas those classified as either low LS or low SWB at Wave 4 were coded as ‘downward’ on the cluster stability variable.⁹

For mental functioning, the main effect of Wave 1 SWB cluster on residual Wave 2 functioning was significant; $F(2, 282) = 8.18, p < .001, \eta^2 = .06$. In follow-up pairwise contrasts with Bonferroni correction, however, none of the pairwise contrasts between clusters were significant. The main effect of cluster stability (upward, stable, or downward) also was significant; $F(2, 282) = 25.11, p < .001, \eta^2 = .15$. In follow-up pairwise contrasts with Bonferroni correction, participants changing cluster membership over time in an ‘upward’ direction ($n = 101$) had significantly higher residual Wave 2 mental functioning scores (collapsing across cluster type) than did ‘stable’ ($n = 122$) or downward groups ($n = 68$); $M_s = 5.58, -0.46, \text{ and } -13.32$, respectively.

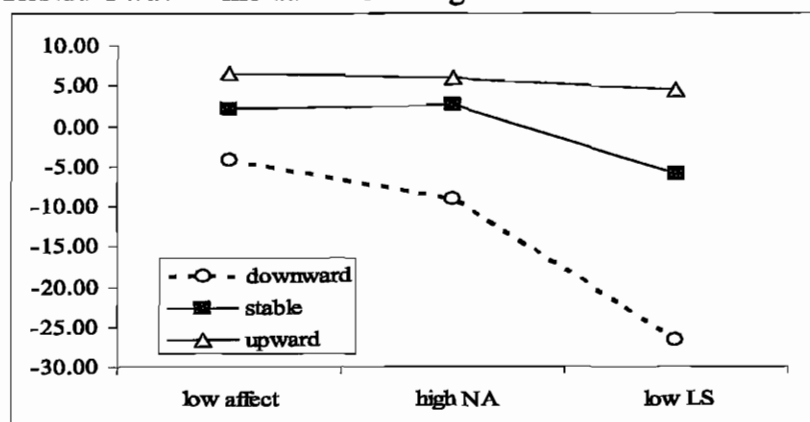
⁹ Because participants classified as either high SWB or low SWB at Wave 1 could not be coded as ‘upward’ or ‘downward’, respectively, participants in these two clusters at Wave 1 ($n = 155$ out of 446) were excluded from the following analyses. Inclusion of the high and low SWB clusters in this analysis would have created an unbalanced ANOVA model and resulted in biased main effects and interactions.

Further, the cluster by stability interaction was significant; $F(4, 282) = 2.41, p < .05, \eta^2 = .03$. Three follow-up one-way ANOVAs were used to compare among SWB clusters separately for upward, stable, and downward participants. The simple effect of Wave 1 SWB cluster on residual Wave 2 mental functioning was significant for ‘downward’ participants ($F(2,65) = 5.94, p = .004, \eta^2 = .15$), marginally significant among ‘stable’ participants ($F(2,119) = 3.02, p = .05, \eta^2 = .05$), and non-significant among ‘upward’ participants ($F(2,98) = 0.20, p = .82, \eta^2 < .01$). As shown in Figure 9 below, both among downward and stable participants, in pairwise comparisons residual Wave 2 mental functioning was lowest among the low LS cluster, compared to the low affect and high NA clusters (these latter two clusters did not differ significantly from each other).

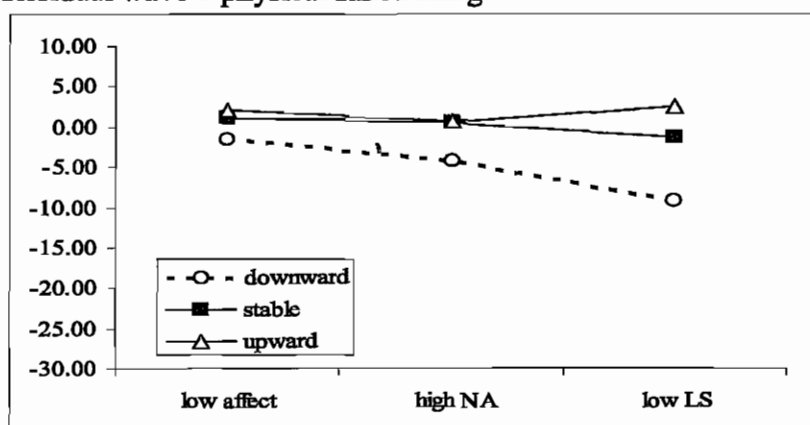
Additional comparisons between cluster means for all clusters from all three stability groups and residual Wave 2 mental functioning scores of zero were significant for five clusters: Among ‘downward’ participants, Wave 1 high NA and low LS clusters had significantly worse than expected functioning at Wave 2 ($ps < .05$); among ‘upward’ participants, all three clusters had significantly higher than expected mental functioning at Wave 2 ($ps < .05$).

Figure 9. *Changes in Wave 1 to Wave 2 Functioning by Wave 1 SWB Cluster and by Direction of Change in Cluster Membership Over Time.*

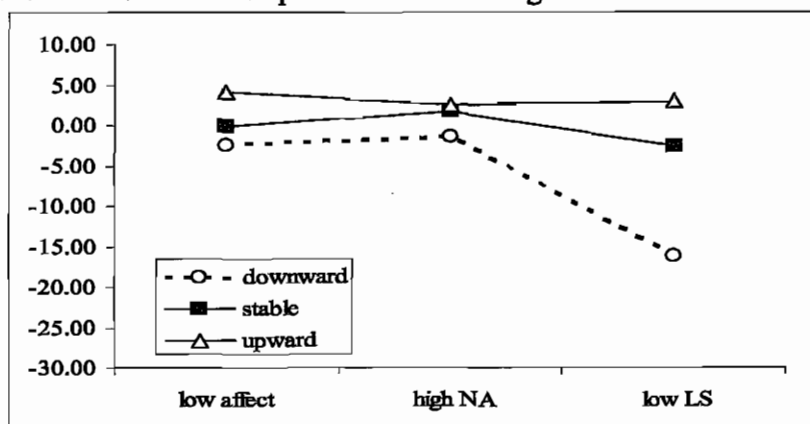
Residual wave 2 mental functioning



Residual wave 2 physical functioning



Residual wave 2 interpersonal functioning



Note. Mean Wave 2 residual functioning scores by Wave 1 SWB cluster and 'direction' of change in cluster membership over time.

For physical functioning, the main effect of Wave 1 SWB cluster on residual Wave 2 functioning was non-significant; $F(2, 282) = 2.02, p = .13, \eta^2 = .01$. The main effect of cluster stability was significant; $F(2, 282) = 7.24, p = .001, \eta^2 = .05$. In follow-up pairwise contrasts with Bonferroni correction, participants changing cluster membership over time in an ‘upward’ direction and stable participants had significantly higher residual Wave 2 physical functioning scores than did downward group ($ps < .005$); $Ms = 1.73, 0.07$, and -5.05 , respectively. Further, the cluster by stability interaction was non-significant; $F(4, 282) = 0.98, p = .42, \eta^2 = .01$. Additional comparisons between cluster means for all clusters from all three stability groups and residual Wave 2 physical functioning scores of zero were significant for just one cluster: Among ‘upward’ participants, the low LS cluster had significantly higher than expected physical functioning at Wave 2 ($p < .05$).

For interpersonal functioning, the main effect of Wave 1 SWB cluster on residual Wave 2 functioning was significant; $F(2, 282) = 6.68, p = .001, \eta^2 = .05$. In follow-up pairwise contrasts with Bonferroni correction, pairwise contrasts between clusters were significant for the low affect and high NA clusters compared to the low LS cluster; $Ms = 0.52, 0.89$, and -5.35 , respectively. The main effect of cluster stability (upward, stable, or downward) also was significant; $F(2, 282) = 16.51, p < .001, \eta^2 = .11$. In follow-up pairwise contrasts with Bonferroni correction between stability groups, participants changing cluster membership over time in an ‘upward’ direction had significantly higher residual Wave 2 interpersonal functioning scores than did stable and downward groups, and these latter two groups also differed significantly (all $ps < .005$); $Ms = 3.15, -0.38$, and -6.71 respectively.

Further, the cluster by stability interaction was significant; $F(4, 282) = 2.95, p = .02, \eta^2 = .04$. In follow-up one-way ANOVAs comparing among SWB clusters separately for upward, stable, and downward participants, the simple effect of Wave 1 SWB cluster on residual Wave 2 interpersonal functioning was significant for 'downward' participants ($F(2,65) = 5.49, p = .006, \eta^2 = .15$), non-significant among 'stable' participants ($F(2,119) = 2.05, p = .13, \eta^2 = .03$), and non-significant among 'upward' participants ($F(2,98) = 0.25, p = .78, \eta^2 < .01$). As shown in Figure 9 above, among downward participants, in pairwise comparisons, residual Wave 2 interpersonal functioning was lowest in the low LS cluster, compared to the low affect and high NA clusters (these two clusters did not differ significantly from each other).

Additional comparisons between cluster means and residual Wave 2 interpersonal functioning scores of zero were significant for two clusters. Among 'downward' participants, the low LS cluster had significantly worse than expected functioning at Wave 2 ($p < .05$); among 'upward' participants, the low affect cluster had significantly higher than expected interpersonal functioning at Wave 2 ($p < .05$).

Longer-Term Changes in Functioning by Wave 1 SWB Cluster and Cluster

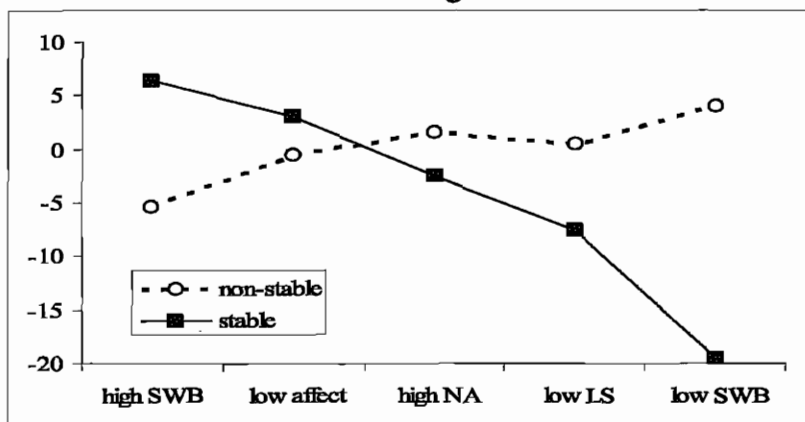
Stability: All Five Clusters

For mental functioning, the main effect of Wave 1 SWB cluster on residual Wave 4 functioning was significant; $F(4, 436) = 2.61, p = .04, \eta^2 = .02$. In follow-up pairwise contrasts with Bonferroni correction, however, none of the pairwise contrasts were significant. The main effect of cluster stability was significant; $F(1, 436) = 4.49, p = .04, \eta^2 = .01$. Overall, participants remaining in the same cluster between Wave 1 and Wave 4 had significantly lower residual Wave 4 mental functioning scores compared to non-stable participants; $M_s = -4.04$ and 0.04 for stable and non-stable participants, respectively.

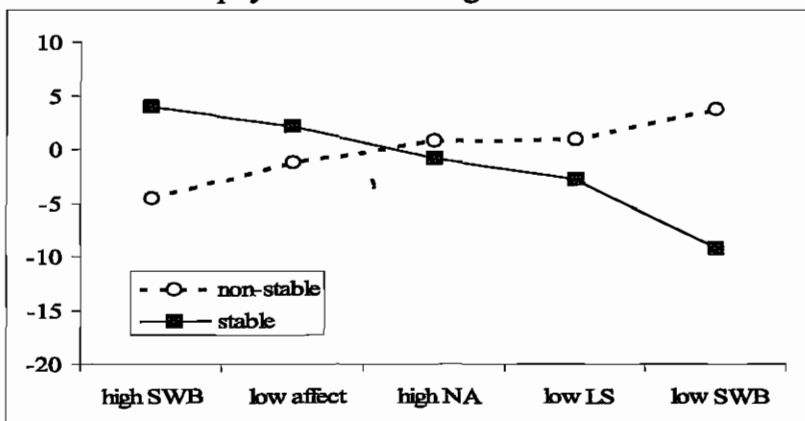
Further, the cluster by stability interaction was significant; $F(4, 436) = 9.80, p < .001, \eta^2 = .08$. In follow-up one-way ANOVAs comparing among Wave 1 SWB clusters for stable and non-stable participants separately, the main effect of cluster on residual Wave 4 mental functioning was non-significant for non-stable participants ($F(4, 263) = 1.71, p = .15, \eta^2 = .03$), but was significant among stable participants ($F(4, 173) = 11.62, p < .001, \eta^2 = .21$). As shown in Figure 10 below, among stable participants, residual Wave 4 mental functioning was highest among the high SWB and low affect clusters (these two clusters did not differ significantly from each other), followed by high NA and low LS clusters (these two clusters did not differ significantly from each other), followed by the low SWB cluster.

Figure 10. *Changes in Wave 1 to Wave 4 Functioning by Wave 1 SWB Cluster for Non-Stable and Stable Participants.*

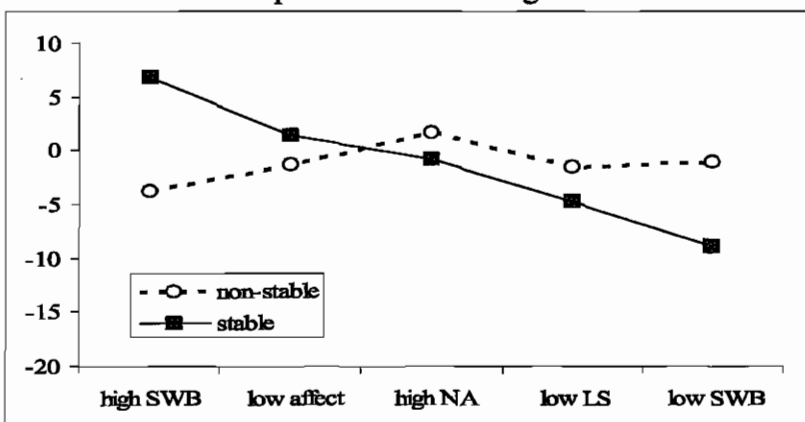
Residual wave 4 mental functioning



Residual wave 4 physical functioning



Residual wave 4 interpersonal functioning



Note. Mean Wave 4 residual mental, physical, and interpersonal functioning scores are shown by Wave 1 SWB cluster for non-stable and stable participants.

Additional pair-wise comparisons between mean residual Wave 4 mental functioning and scores of zero were significant for three groups: Whereas the Wave 1 high SWB cluster unstable group and the Wave 1 low SWB stable group both had significantly worse than expected mental functioning at Wave 4, the Wave 1 high SWB stable group had significantly better than expected mental functioning at Wave 4 ($ps < .001$).

For physical functioning, the main effect of Wave 1 SWB cluster on residual Wave 4 functioning was non-significant; $F(4, 436) = 0.61, p = .66, \eta^2 < .01$. The main effect of cluster stability was non-significant; $F(1, 436) = 0.91, p = .34, \eta^2 < .01$. However, the cluster by stability interaction was significant; $F(4, 436) = 9.80, p < .001, \eta^2 = .06$. In follow-up one-way ANOVAs comparing among clusters for stable and non-stable participants separately, the main effect of cluster on residual Wave 4 physical functioning was significant both for non-stable participants ($F(4, 263) = 2.47, p = .04, \eta^2 = .04$) and stable participants ($F(4, 173) = 5.97, p < .001, \eta^2 = .12$). As shown in Figure 10 above, among non-stable participants, residual Wave 4 physical functioning was highest for low SWB, low LS, high NA, and low affect, and lowest for the high SWB cluster. In contrast, among stable participants, residual Wave 4 physical functioning was higher among high SWB, low affect, high NA, and low LS clusters (these clusters did not differ significantly from each other), compared to the low SWB cluster.

Additional pair-wise comparisons between mean residual Wave 4 physical functioning and scores of zero were significant for four groups. Whereas the Wave 1 high SWB unstable group and the Wave 1 low SWB stable group both had significantly worse than expected physical functioning at Wave 4, the Wave 1 high SWB stable group and

the Wave 1 low SWB unstable group both had significantly better than expected physical functioning at Wave 4 ($ps < .001$).

For interpersonal functioning, the main effect of Wave 1 SWB cluster on residual Wave 4 functioning was significant; $F(4, 436) = 3.16, p = .01, \eta^2 = .03$. In follow-up pairwise contrasts with Bonferroni correction, only the contrast between high SWB and low SWB clusters was significant; $Ms = 1.92, -0.19, 0.81, -2.12, \text{ and } -4.11$, respectively. The main effect of cluster stability was non-significant; $F(1, 436) = 0.91, p = .34, \eta^2 < .01$. However, the cluster by stability interaction was significant; $F(4, 436) = 7.62, p < .001, \eta^2 = .07$. In follow-up one-way ANOVAs comparing among clusters for stable and non-stable participants separately, the main effect of cluster on residual Wave 4 interpersonal functioning was non-significant for non-stable participants ($F(4, 263) = 1.72, p = .15, \eta^2 = .03$), but was significant among stable participants ($F(4, 173) = 10.28, p < .001, \eta^2 = .19$). As shown in Figure 10 above, among stable participants, residual Wave 4 mental functioning was highest among the high SWB cluster, followed by the low affect and high NA clusters (these two clusters did not differ significantly from each other), followed by the low LS and low SWB clusters (these two clusters did not differ significantly from each other).

Additional pair-wise comparisons between mean residual Wave 4 interpersonal functioning and scores of zero were significant for three groups: Whereas the Wave 1 high SWB unstable group and the Wave 1 low SWB stable group both had significantly worse than expected interpersonal functioning at Wave 4, the Wave 1 high SWB stable group had significantly better than expected interpersonal functioning at Wave 4 ($ps < .001$).

Longer-Term Changes in Functioning by Wave 1 SWB Cluster and Cluster Stability: Middle Three Clusters

I computed three additional two-way ANOVAs comparing the residual Wave 4 functioning scores as a function of Wave 1 SWB cluster for the low affect, high NA, and low LS clusters only, and cluster stability – coded as ‘upward’ (i.e., a change toward a high SWB configuration between Wave 1 and Wave 4), ‘stable’ (i.e., no change in cluster membership), or ‘downward’ (i.e., a change toward a “low SWB” configuration).

For mental functioning, the main effect of Wave 1 SWB cluster on residual Wave 4 functioning was significant; $F(2, 282) = 8.69, p < .001, \eta^2 = .06$. In follow-up pairwise contrasts with Bonferroni correction, mean residual functioning scores at Wave 4 (collapsing across stability group) for the low affect and high NA clusters did not differ from each other, but were significantly higher than the low LS cluster; $M_s = 2.20, -1.04$, and -11.01 , respectively. The main effect of cluster stability (upward, stable, or downward) also was significant; $F(2, 282) = 30.09, p < .001, \eta^2 = .17$. In follow-up pairwise contrasts with Bonferroni correction, mean residual functioning scores at Wave 4 differed significantly between all three groups: $M_s = 7.15, -2.38$, and -14.64 , respectively, for upward ($n = 110$), stable ($n = 101$), and downward ($n = 80$) groups.

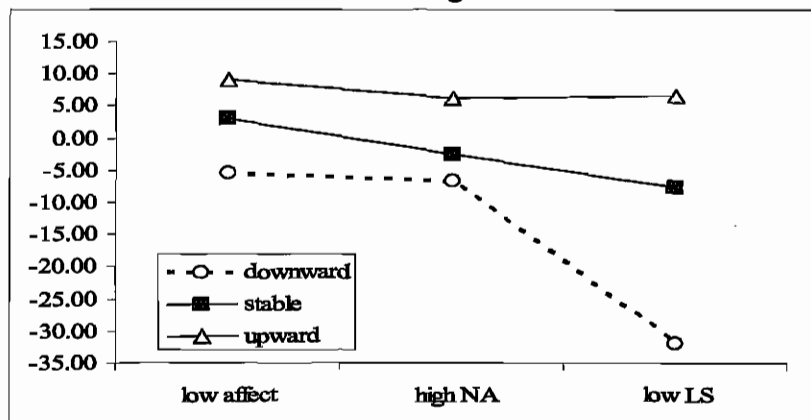
Further, the cluster by stability interaction was significant; $F(4, 282) = 3.21, p = .01, \eta^2 = .04$. Three follow-up one-way ANOVAs were used to compare among SWB clusters separately for upward, stable, and downward participants. The main effect of Wave 1 SWB cluster on residual Wave 4 mental functioning was significant for ‘downward’ participants ($F(2,77) = 6.25, p = .003, \eta^2 = .14$), non-significant among ‘stable’ participants ($F(2,101) = 2.81, p = .07, \eta^2 = .05$), and non-significant among

‘upward’ participants ($F(2,107) = 0.34, p = .71, \eta^2 < .01$). As shown in Figure 11 below, among downward participants, in pairwise comparisons, residual Wave 4 mental functioning was lowest for the low LS cluster, compared to the low affect and high NA clusters (these two clusters did not differ significantly from each other).

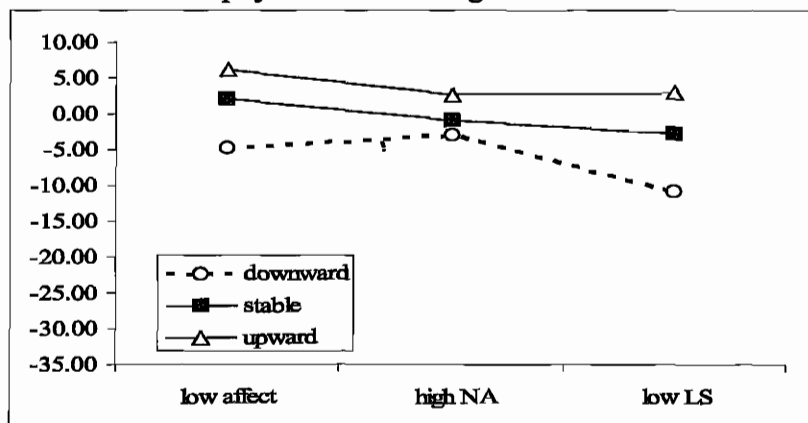
Additional comparisons between cluster means for all three clusters from all three stability groups and residual Wave 4 mental functioning scores of zero were significant for four clusters: Among ‘downward’ participants, the Wave 1 low LS cluster had significantly worse than expected functioning at Wave 4 ($ps < .05$); among ‘upward’ participants, all three clusters had significantly higher than expected mental functioning at Wave 4 ($ps < .05$).

Figure 11. *Changes in Wave 1 to Wave 4 Functioning by Wave 1 SWB Cluster and by Direction of Change in Cluster Membership Over Time.*

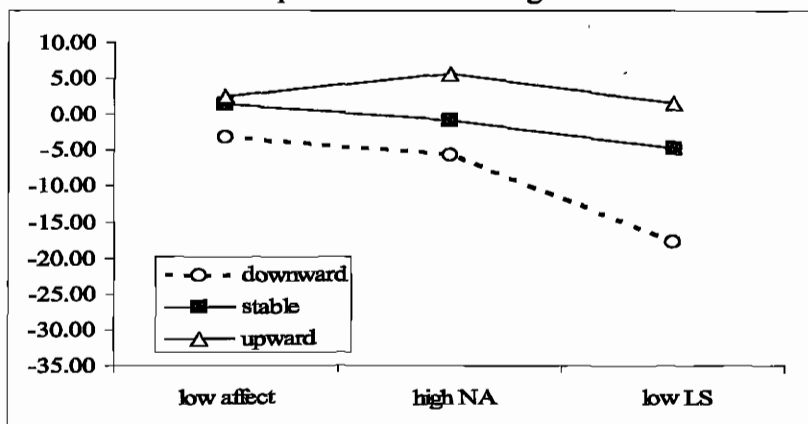
Residual wave 4 mental functioning



Residual wave 4 physical functioning



Residual wave 4 interpersonal functioning



Note. Mean Wave 4 residual functioning scores by Wave 1 SWB cluster and 'direction' of change in cluster membership over time.

For physical functioning, the main effect of Wave 1 SWB cluster on residual Wave 4 functioning was non-significant; $F(2, 282) = 2.24, p = .11, \eta^2 = .02$. The main effect of cluster stability was significant; $F(2, 282) = 13.40, p < .001, \eta^2 = .09$. In follow-up pairwise contrasts with Bonferroni correction, mean residual Wave 4 physical functioning scores differed among all three groups; $M_s = 3.92, -0.56$, and -6.24 for upward, stable, and downward groups respectively. The cluster by stability interaction was non-significant; $F(4, 282) = 0.97, p = .42, \eta^2 = .01$. Residual wave 2 physical functioning means by cluster and stability group are shown in Figure 11 above.

Additional comparisons between cluster means from all groups and residual Wave 4 physical functioning scores of zero were significant for two clusters: Among ‘downward’ participants, the low affect cluster had significantly lower than expected physical functioning at Wave 4 ($p = .002$), whereas among the ‘upward’ participants, the low affect cluster had significantly higher than expected physical functioning at Wave 4 ($p = .005$).

For interpersonal functioning, the main effect of Wave 1 SWB cluster on residual Wave 4 functioning was significant; $F(2, 282) = 6.10, p = .003, \eta^2 = .04$. In follow-up pairwise contrasts with Bonferroni correction, pairwise contrasts between clusters were significant for the low affect and high NA clusters (these two clusters did not differ from each other) compared to the low LS cluster; $M_s = 0.17, -0.32$, and -7.04 , respectively. The main effect of cluster stability also was significant; $F(2, 282) = 20.46, p < .001, \eta^2 = .13$. In follow-up pairwise contrasts with Bonferroni correction between stability groups, participants changing cluster membership over time in an ‘upward’ direction had significantly higher residual Wave 4 interpersonal functioning scores than did stable and

downward groups, and these latter two groups also differed significantly (all $ps < .005$); $Ms = 3.18, -1.36$, and -8.98 respectively. The cluster by stability interaction was non-significant; $F(4, 282) = 1.98, p = .10, \eta^2 = .03$.

Additional comparisons between cluster means and residual Wave 4 interpersonal functioning scores of zero were significant for four clusters: Among 'downward' participants, the low affect, high NA, and low LS clusters all had significantly lower than expected interpersonal functioning at Wave 4 ($ps < .05$), whereas among the 'upward' participants, the high NA cluster had significantly higher than expected interpersonal functioning at Wave 4 ($p < .001$).

Discriminating SWB Cluster Membership Over Time With Wave 1 Functioning and Change in Functioning

Discriminant function analysis was used to compare Wave 2 and Wave 4 SWB cluster membership, treating Wave 1 mental, physical, and interpersonal functioning as predictors, alongside Wave 1 SWB cluster membership. To incorporate the anticipated dynamic relations between functioning and SWB configurations (i.e., change in functioning as a predictor of future SWB configuration) changes in mental, physical, and interpersonal functioning between Wave 1 and Wave 2 (i.e., Wave 2 minus corresponding Wave 1 functioning) or between Wave 1 and Wave 4 (i.e., Wave 4 minus corresponding Wave 1 functioning) were also included in the analyses. To account for stability in SWB configurations over time, and consistent with the categorical nature of the Wave 1 cluster membership variable, four dummy codes were entered simultaneously into the discriminant function analyses, with each code contrasting one Wave 1 SWB

cluster (high SWB, low affect, high NA, or low LS) with the low SWB cluster, which served as the reference category.

Discriminating Among Wave 2 Clusters

The discriminant function analysis explained 66% of the variability among the five Wave 2 SWB clusters; $\chi^2 = 469.71$, $df = 40$, $p < .001$. Four discriminant functions were individually statistically significant ($ps < .001$), however, 75% of the explained variance was attributable to the first function, which amounts to 49% (i.e., 66% x 75%) of the total variance among Wave 2 SWB clusters.

As shown by the function ‘centroids’ (i.e., the mean discriminant function scores for each Wave 2 SWB cluster) in Table 9 below, the first discriminant function differentiated primarily between Wave 2 high SWB versus low SWB clusters, with the other clusters intermediary between these two extremes. Pairwise comparisons of the mean discriminant function scores among Wave 2 SWB clusters indicated that the high SWB cluster had the highest discriminant function score, followed by low PA and high affect (these three clusters did not differ significantly), followed by low PA and low LS/low PA clusters (these two clusters did not differ significantly), followed by the low SWB cluster.

Table 9. Results from Discriminant Function Analysis Predicting Wave 2 Cluster Membership From Wave 1 Cluster Membership, Wave 1 functioning, and Changes in Functioning

Predictors	Function 1		Function 2		Function 3		Function 4	
	SC	SDFC	SC	SDFC	SC	SDFC	SC	SDFC
W1 high SWB vs. low SWB	.46	.79	-.33	.10	-.65	.10	-.02	.64
W1 low affect vs. low SWB	-.08	.33	-.42	.03	.74	1.10	.11	.82
W1 high NA vs. low SWB	.01	.46	.98	1.06	.06	.60	-.06	.55
W1 low LS vs. low SWB	-.12	.25	-.10	.14	.07	.55	.38	.80
W1 mental functioning	.51	.42	-.20	-.09	.12	.43	-.15	-.91
W1 physical functioning	.44	.28	.01	.05	-.12	-.19	.08	.19
W1 interpersonal functioning	.44	.38	-.05	-.01	.00	-.25	.43	.73
Change mental functioning	.22	.50	.13	-.01	.24	.37	-.32	-.66
Change physical functioning	.09	.23	.04	.08	.06	-.11	-.15	.03
Change interpersonal functioning	.14	.41	.01	-.09	.21	.04	-.06	.40
<i>Function centroids</i>								
W2 high SWB	1.23 _a		-0.29 _b		-0.28 _b		0.02 _{a,b}	
W2 low PA	-0.24 _{b,c}		-0.15 _b		0.45 _a		-0.22 _b	
W2 high affect	0.15 _b		0.80 _a		-0.16 _b		-0.09 _b	
W2 low LS/low PA	-0.71 _c		-0.01 _b		0.17 _{a,b}		0.48 _a	
W2 low SWB	-3.00 _d		-0.39 _b		-0.89 _c		-0.25 _b	

Note. $N = 446$. SC = structure coefficients. SDFC = standardized discriminant function coefficients. Within columns, function centroids with different subscripts differ significantly in Bonferroni-corrected pairwise comparisons ($ps < .05$).

Further, as indicated by the structure coefficients (which reflect the pairwise association between each predictor and the discriminant function), this first discriminant function was positively correlated with the contrast between Wave 1 high SWB versus low SWB clusters, each of the Wave 1 functioning scores, and changes in functioning over time. Together, these results suggest that the primary discrimination among Wave 2 SWB clusters was provided by the contrast between the high SWB and low SWB clusters at Wave 1, along with higher levels of mental, physical, and interpersonal functioning at Wave 1 among participants in high SWB, and greater improvements in function between Wave 1 and Wave 2.

Function 2 accounted for 11% of the explained variance, which amounts to 7% of the total variance between Wave 2 SWB clusters. As indicated by the function centroids, function 2 primarily differentiated between Wave 2 high affect and high SWB clusters. Pairwise comparisons of the mean discriminant function scores among Wave 2 SWB cluster indicated that the high affect cluster had the highest discriminant function score, followed by the other four clusters (these clusters did not differ significantly). As indicated by the structure coefficients, this second discriminant function was most closely associated with a greater contrast between the high NA and low SWB clusters at Wave 1, along with less positive levels of mental functioning at Wave 1, and improvements in mental functioning over time.

Function 3 accounted for 10% of the explained variance, or 7% of the total variance among Wave 2 SWB clusters. As indicated by the function centroids, function 3 differentiated primarily between the Wave 2 low PA and low SWB clusters. Pairwise comparisons of the discriminant function scores among Wave 2 clusters indicated that

low PA and low LS/low PA clusters had the highest discriminant function scores (these clusters did not differ significantly), followed by the high SWB, high affect, and low LS/low PA clusters (these three clusters did not differ significantly), followed by the low SWB cluster. As indicated by the structure coefficients, this third discriminant function was most strongly associated with a greater contrast between the low affect and low SWB clusters at Wave 1, a lesser contrast between high SWB and low SWB clusters, along with greater increases in mental and interpersonal functioning between Wave 1 and Wave 2.

Function 4 accounted for 4% of the explained variance, or 3% of the total variance among Wave 2 SWB clusters. This function differentiated primarily between Wave 2 low LS/low PA, and low PA and the low SWB cluster. Pairwise comparisons of the discriminant function scores among Wave 2 SWB cluster indicated that low LS/low PA and high SWB clusters had the highest discriminant function scores (these two clusters did not differ significantly), followed by high affect, low PA, and low SWB (these three clusters did not differ significantly). As indicated by the structure coefficients, this fourth discriminant function was most closely associated with a greater contrast between low LS and low SWB clusters at Wave 1, along with more positive interpersonal functioning at Wave 1, and a greater decrease in mental functioning between Wave 1 and Wave 2.

Discriminating Among Wave 4 Clusters

The discriminant function analysis explained 53% of the variability among the five Wave 4 SWB clusters; $\chi^2 = 335.33$, $df = 40$, $p < .001$. Although three discriminant functions were statistically significant ($ps < .05$), most of the explained variance was

associated with the first discriminant function: 81% of the explained variance was attributable to the first function, which amounts to 44% (i.e., 53% * 81%) of the total variance among Wave 4 SWB clusters.

As shown by the function centroids in Table 10 below, function 1 primarily differentiated between Wave 4 high SWB versus low SWB clusters. Pairwise comparisons of the mean discriminant function scores among Wave 4 SWB clusters indicated that the high SWB cluster had the highest discriminant function score, followed by the low affect cluster, followed by the high NA and low LS clusters (these clusters did not differ significantly), followed by the low SWB cluster. As indicated by the structure coefficients, function 1 was strongly and positively correlated with the contrast between Wave 1 high SWB versus low SWB clusters, each of the Wave 1 functioning scores, and (less strongly but) positively correlated with changes in functioning over time. Together, these results suggest that the primary discrimination among Wave 4 SWB clusters was between the high SWB cluster and low SWB clusters, and that this discrimination was most strongly associated with the contrast between the high SW and low SWB clusters at Wave 1, higher levels of mental, physical, and interpersonal functioning at Wave 1, and greater increases in function in each domain between Wave 1 and Wave 4.

Table 10. *Results from Discriminant Function Analysis Predicting Wave 4 Cluster Membership From Wave 1 Cluster Membership, Wave 1 functioning, and Changes in Functioning Between Wave 1 and Wave 4*

Predictors	Function 1		Function 2		Function 3	
	SC	SDFC	SC	SDFC	SC	SDFC
W1 high SWB vs. low SWB	.32	0.41	-.55	-0.02	-.45	-0.38
W1 low affect vs. low SWB	.00	0.23	.77	0.96	-.26	-0.19
W1 high NA vs. low SWB	-.01	0.28	-.24	0.22	.81	0.72
W1 low LS vs. low SWB	-.09	0.18	.23	0.56	-.02	0.08
W1 mental functioning	.48	0.51	-.03	0.25	.16	0.78
W1 physical functioning	.44	0.28	-.19	-0.30	-.04	-0.25
W1 interpersonal functioning	.35	0.39	.06	0.02	-.08	-0.34
Change mental functioning	.33	0.55	.24	0.36	.03	0.36
Change physical functioning	.23	0.26	.23	0.04	-.01	-0.21
Change interpersonal functioning	.29	0.50	-.14	-0.23	-.08	-0.30
<i>Function centroids</i>						
W4 high SWB	1.04 _a		-0.30 _c		-0.12 _{b,c}	
W4 low affect	0.18 _b		0.52 _a		-0.09 _{a,b,c}	
W4 high NA	-0.30 _c		-0.17 _{b,c}		0.35 _a	
W4 low LS	-0.52 _c		0.22 _{a,b}		0.11 _{a,b}	
W4 low SWB	-2.01 _d		-0.32 _c		-0.34 _c	

Note. $N = 446$. SC = structure coefficients. SDFC = standardized discriminant function coefficients. Within columns, function centroids with different subscripts differ significantly in Bonferroni-corrected pairwise comparisons ($ps < .05$).

Function 2 accounted for 12% of the explained variance, which amounts to 6% total variance among Wave 4 SWB clusters. Pairwise comparisons of the discriminant function scores among Wave 4 SWB cluster indicated that the low affect and low LS cluster had the highest discriminant function scores (these clusters did not differ significantly), followed by the high NA and low LS clusters (these clusters did not differ significantly), followed by high SWB, high NA, and low SWB (these clusters did not differ significantly). As indicated by the structure coefficients, function 2 was most closely associated with a greater contrast between the low affect and low SWB clusters at Wave 1, a smaller contrast between the high SWB and low SWB clusters at Wave 1, less positive physical functioning at Wave 1, and greater increases in mental and physical functioning between Wave 1 and Wave 4.

Function 3 accounted¹ for 5% of the explained variance, or 3% of the total variability among Wave 4 SWB clusters. Pairwise comparisons of the discriminant function scores among Wave 4 SWB cluster indicated that the low affect, high NA, and low LS clusters had the highest discriminant function scores (these clusters did not differ significantly), followed by high SWB, low affect, and low LS (these clusters did not differ significantly), followed by high SWB, low affect, and low SWB (these clusters did not differ significantly). As indicated by the structure coefficients, function 3 was most strongly correlated with the contrast between the high NA and low SWB clusters at Wave 1, along with higher levels of mental functioning at Wave 1.

Summary

The fourth objective of Part 1 was to assess relations between SWB configurations and positive functioning over time. Hypothesis 4 stated that Wave 1 SWB

configurations would be related to functioning over time. Hypothesis 5 stated that Wave 1 functioning would be related prospectively to SWB cluster membership over time. Hypothesis 6 stated that change in SWB cluster membership would be linked with changes in functioning over time.

Concerning the relation between Wave 1 SWB cluster membership and changes in functioning over time, there was inconsistent evidence for a main effect of Wave 1 SWB configurations. In the models comprising all five SWB clusters, only one main effect was significant out of six models tested. However, of the six models testing using the ‘middle three’ clusters, four models revealed a main effect of SWB cluster. All of these significant main effects of cluster concerned mental and interpersonal functioning, rather than physical functioning. Further, whereas the main effect of cluster stability (vs. instability) was non-substantive in each of the models comprising the five clusters, the main effect of change in cluster ‘direction’ (upward, stable, downward) was significant and substantial in each model comprising the three middle clusters. Further, across all 12 of these models, the cluster by stability interaction was significant in nine models.

In particular, in the models predicting Wave 2 residual functioning, individuals consistently categorized in the low LS and low SWB cluster had significantly lower residual mental, physical, and interpersonal functioning compared to the other three clusters – these three clusters did not differ significantly from each other. In the models predicting Wave 4 residual functioning, individuals consistently categorized in the low LS cluster had significantly lower residual mental, physical, and interpersonal functioning compared to the high SWB, low affect, and high NA clusters; for

interpersonal functioning, the low SWB and low LS clusters did not differ significantly from each other.

The most consistent finding based on all five clusters was that participants classified into low SWB both at Wave 1 and Wave 2, and at Wave 1 and Wave 4 were characterized, on average, by less positive functioning than anticipated in each domain functioning. In contrast, participants classified into the high SWB cluster both at Wave 1 and Wave 4 were characterized by more positive levels of functioning than expected at Wave 4 in each domain. However, participants classified into the high SWB cluster at Wave 1 but a different cluster at a subsequent wave were characterized by less positive levels of functioning than expected in each domain at that subsequent Wave. In summary, stability of cluster membership in the high SWB cluster was associated with greater than expected functioning over time, as was change in cluster membership away from the low SWB configuration. In contrast, change in cluster membership away from a high SWB configuration was associated with worse than expected functioning over time.

In the analysis of the middle three clusters, examination of the direction of change in cluster membership among participants in the middle three clusters also revealed several consistent patterns. In particular, participants in the low affect, high NA, or low LS clusters at Wave 1 who changed cluster membership in an ‘upward’ direction were characterized by significantly more positive mental functioning than expected both at Wave 2 and Wave 4. In contrast, participants in the low LS cluster at Wave 1 and who changed cluster membership in a ‘downward’ direction were characterized by significantly less positive mental and interpersonal functioning than expected both at Wave 2 and Wave 4. Thus, among participants in these middle three clusters, change in

cluster membership between waves, rather than stability over time, was most consistently associated with significant greater or lesser changes in functioning over time than expected.

Therefore, with respect to Hypothesis 4, there was inconsistent evidence for a main effect of Wave 1 SWB configuration on future functioning, and the significant effects that were observed were found with respect to the middle three (rather than all five) SWB configurations. However, Hypothesis 6 was partially supported, particularly with respect to the direction of change among the middle three SWB configurations.

Concerning the predictive relations between Wave 1 functioning, change in functioning, and future cluster membership, substantial variability among Wave 2 and Wave 4 SWB clusters was explained by the combination of Wave 1 cluster membership, Wave 1 functioning, and changes in functioning over time. Among the Wave 2 SWB clusters, the clearest differentiation was between the high SWB and low SWB clusters, with the strongest predictors being the contrast between these two clusters at Wave 1, more positive levels of Wave 1 functioning in each domain, and greater improvements in mental and physical functioning over time. The additional three significant discriminant functions explained substantially less of the total variability among Wave 4 SWB clusters, and primarily reflected differences between either the low affect, high NA, or low LS clusters, respectively, and the low SWB cluster.

Among the Wave 4 SWB clusters, the clearest differentiation was between the high SWB and low SWB clusters, with the strongest predictors being the contrast between these two clusters at Wave 1, more positive levels of Wave 1 functioning in each domain, and greater improvements in each domain of functioning over time. The

additional two significant discriminant functions explained substantially less of the total variability among Wave 4 SWB clusters, and reflected primarily differences between the low affect or high NA clusters, respectively, and the low SWB cluster. Thus, Hypothesis 5 and Hypothesis 6 both were supported by these findings.

Objective 5:

Comparing Person-Centered and Variable-Centered Approaches

The fifth objective of the present study was to compare the relative predictive utilities of SWB configurations versus SWB components. Hypothesis 7 stated that the person-centered approach based on SWB configurations would reveal greater predictive utility than the variable-centered approach.

A series of hierarchical multiple regression models were tested. The first set of regression models treated residual Wave 2 and Wave 4 mental, physical, and interpersonal functioning scores as criteria. Note that because these residuals are statistically independent of the corresponding Wave 1 functioning scores, the baseline functioning measure corresponding to the residual functioning criterion measure was not included in the predictive model. The residual Wave 2 and Wave 4 functioning scores were regressed onto four dummy codes contrasting Wave 1 high SWB, low affect, high NA, and low LS clusters to the low SWB cluster (step 1), followed by the addition of the dimensional LS, PA, and NA scores (step 2). To account for potential non-linear effects of the SWB components which could be reflected in SWB cluster membership but not in the linear effects of LS, PA, and NA, three curvilinear terms (LS^2 , PA^2 , NA^2), three two-way interactions (LS x PA, LS x NA, PA x NA), and one three-way interaction (LS x PA x NA) were added to the model (step 3).

To account for the anticipated dynamic relations between SWB cluster membership, stability versus change in cluster membership, and changes in functioning over time, effects representing stability (vs. change) in cluster membership for each Wave 1 SWB cluster were also added as predictors. That is, a dummy code representing stable (vs. unstable) cluster membership between Wave 1 and Wave 2 (or between Wave 1 and Wave 4) was added to the model (step 4), along with four interaction terms computed between this cluster stability dummy code and each of the Wave 1 SWB cluster dummy codes (step 5). Change scores for each SWB component (i.e., Wave 2 or Wave 4 minus Wave 1) for LS, PA, and NA were added to the models (step 6).

Further, in order to determine the unique variance accounted for by the SWB configurations after first accounting for the SWB dimensions, these regression models were then re-estimated by switching the order of step 1 with steps 2 and 3, as well as the order of steps 4 and 5 with step 6, such that the Wave 1 LS, PA, and NA components and the associated non-linear effects were entered prior to the Wave 1 SWB cluster dummy codes, and the changes in LS, PA, and NA components were entered prior to the dummy codes for cluster stability and the interactions between Wave 1 cluster membership and cluster stability.¹⁰ This approach allowed a comparison between (a) the unique variance accounted for in the functioning measures by the SWB dimensions after controlling for the SWB configurations versus (b) the unique variance accounted for by the SWB configurations after accounting for the SWB dimensions.

¹⁰ All continuous variables were standardized prior to analysis (including the criteria), and dummy codes were coded as 0 or 1. Interaction terms were computed using the standardized continuous scores and dummy codes.

Predicting Wave 2 Functioning

Results are summarized in Table 11 below. As indicated by the changes in R^2 values between steps, steps 1 through 4 did not add a significant amount of explained variance to the model. The inclusion of the four cluster stability by Wave 1 SWB cluster interactions in step 5, however, did result in a significant increase in explained variance for each residual Wave 2 functioning measure, as did the subsequent inclusion of the three SWB component change scores in step 6. In the second set of regression models in which the ordering of the steps in the hierarchical regression models was switched, only the inclusion of the three SWB component change scores in step 4 resulted in a significant increase in explained variance for each residual Wave 2 functioning measure.

Table 11. *Summary of Results from Hierarchical Regression Models Testing Wave 1 SWB Clusters, SWB Components, and Changes in Clusters and Components as Predictors of Residual Wave 2 Functioning*

Step	Predictors	Wave 2 residual functioning		
		Mental	Physical	Interpersonal
1	W1 SWB cluster dummy codes	.02	<.01	.01
2	W1 LS, PA, NA components	.01	<.01	.01
3	W1 non-linear LS, PA, NA effects	.01	<.01	.01
4	W1 to W2 cluster stability	<.01	<.01	<.01
5	W1 cluster dummy codes x stability	.06*	.04*	.04*
6	W1 to W2 LS, PA, NA change scores	.24*	.08*	.18*
1	W1 LS, PA, NA components	.01	.01	.01
2	W1 non-linear LS, PA, NA effects	.01	<.01	.01
3	W1 SWB cluster dummy codes	.01	<.01	.02
4	W1 to W2 LS, PA, NA change scores	.29*	.11*	.21*
5	W1 to W2 cluster stability	<.01	<.01	<.01
6	W1 cluster dummy codes x stability	.01	<.01	<.01
<i>Total explained variance (Step 6)</i>		.33	.13	.24

Note. $N = 446$. Cell entries display changes in model R^2 values for each step in the hierarchical multiple regression models predicting each criterion (column variable). W1 = Wave 1. * $p < .05$.

The final regression models (i.e., at step 6 from both models) predicting residual Wave 2 mental functioning explained a total of 33% of the variance. Unique predictive effects were found for Wave 1 LS and NA, and each of the SWB component change scores. That is, more positive than expected mental functioning at Wave 2 was predicted by higher LS and lower NA at Wave 1 ($bs = .24$ and $-.22$, respectively, $ps < .05$), along with greater increases both in LS and PA, and greater decreases in NA between Wave 1 and Wave 2 ($bs = .40$, $.16$, and $-.29$, respectively, $ps < .05$).

The final regression models predicting residual Wave 2 physical functioning explained a total of 13% of the variance. Unique predictive effects were found for change in LS and NA: More positive than expected physical functioning at Wave 2 was predicted by greater increases in LS and greater decreases in NA between Wave 1 and Wave 2 ($bs = .25$, and $-.14$, respectively, $ps < .05$).

The final regression models predicting residual Wave 2 interpersonal functioning explained a total of 24% of the variance. Unique predictive effects were found for Wave 1 NA, and change in PA and NA: More positive than expected interpersonal functioning at Wave 2 was predicted by lower Wave 1 NA ($b = -.21$, $p < .05$), along with greater increases in PA and greater decreases in NA between Wave 1 and Wave 2 ($bs = .30$, and $-.32$, respectively, $ps < .05$).

Predicting Wave 4 Functioning

Results are summarized in Table 12 below. As indicated by the changes in R^2 values between steps, with two exception (step 1 and step 4 predicting interpersonal functioning only), steps 1 through 4 did not add a significant amount of explained variance to the model. The addition of the four cluster stability by Wave 1 SWB cluster interactions in step 5, however, did result in a significant increase in explained variance for each residual Wave 4 functioning measure, as did the subsequent inclusion of the three SWB component change scores in step 6. In the second set of regression models in which the ordering of the steps in the hierarchical regression models was switched, with one exception (step 1 predicting interpersonal functioning), steps 1 through 3 did not add a significant amount of explained variance to the model. The inclusion of the three SWB

component change scores in step 4, however, did result in a significant increase in explained variance for each residual Wave 4 functioning measure.

Table 12. *Summary of Results from Hierarchical Regression Models Testing Wave 1 SWB Clusters, SWB Components, and Changes in Clusters and Components as Predictors of Residual Wave 4 Functioning*

Step	Predictors	Wave 4 residual functioning		
		Mental	Physical	Interpersonal
1	W1 SWB cluster dummy codes	.01	<.01	.02*
2	W1 LS, PA, NA components	<.01	.01	.01
3	W1 non-linear LS, PA, NA effects	.03	.01	.01
4	W1 to W4 cluster stability	<.01	<.01	.01*
5	W1 cluster dummy codes x stability	.07*	.06*	.05*
6	W1 to W4 LS, PA, NA change scores	.20*	.11*	.19*
1	W1 LS, PA, NA components	.01	.01	.03*
2	W1 non-linear LS, PA, NA effects	.02	.01	.01
3	W1 SWB cluster dummy codes	.01	.01	<.01
4	W1 to W4 LS, PA, NA change scores	.27*	.16*	.25*
5	W1 to W4 cluster stability	<.01	<.01	<.01
6	W1 cluster dummy codes x stability	.01	.01	<.01
<i>Total explained variance (Step 6)</i>		.32	.19	.30

Note. $N = 446$. Cell entries display changes in model R^2 values for each step in the hierarchical multiple regression models predicting each criterion (column variable).

* $p < .05$.

The final regression models (i.e., at step 6 from both models) predicting residual Wave 4 mental functioning explained a total of 32% of the variance. Unique predictive effects were found for stability in cluster membership, stability by membership in the low affect versus low SWB cluster, stability by membership in the high NA versus low SWB clusters, and each of the SWB component change scores. That is, more positive than

expected mental functioning at Wave 4 was predicted by *instability* in cluster membership between Wave 1 and Wave 4 ($b = -0.76, p < .05$), stable membership in the low affect or high NA versus low SWB clusters ($bs = 0.78$ and 0.83 , respectively, $ps < .05$), along with greater increases in LS and PA, and greater decreases in NA between Wave 1 and Wave 4 ($bs = .23, .18$, and $-.38$, respectively, $ps < .05$).

The final regression models predicting residual Wave 4 physical functioning explained a total of 19% of the variance. Unique predictive effects were found for wave 1 NA, stability by membership in the high SWB, low affect, or high NA versus low SWB cluster interactions, and change in PA and NA. That is, more positive than expected physical functioning at Wave 4 was predicted by stable membership in the high SWB, low affect, or high NA versus low SWB cluster ($bs = 0.85, 0.88$, and 0.84 , respectively, $ps < .05$), along with lower levels of NA at Wave 1, and greater increases in PA and greater decreases in NA between Wave 1 and Wave 4 ($bs = -.22, .21$, and $-.28$, respectively, $ps < .05$).

The final regression models predicting residual Wave 4 interpersonal functioning explained a total of 30% of the variance. Unique predictive effects were found for wave 1 LS and change in each of the SWB components. That is, more positive than expected interpersonal functioning at Wave 4 was predicted by higher Wave 1 LS ($b = .19, p < .05$), along with greater increases in LS and PA, and greater decreases in NA between Wave 1 and Wave 4 ($bs = .18, .30$, and $-.30$, respectively, $ps < .05$).

Summary

The fifth objective of Part 1 was to compare the relative predictive utilities of SWB configurations versus SWB components. Hypothesis 7 stated that the person-

centered approach based on SWB configurations would reveal greater predictive utility than the variable-centered approach. This hypothesis was not supported.

Neither the set of Wave 1 SWB cluster membership dummy codes nor the set of Wave 1 SWB components added a significant amount of explained variability to the models residual Wave 2 functioning. Rather, the cluster stability by cluster membership interactions added significant explained variability to the prediction of each residual Wave 2 functioning measure, as did the set of SWB component change scores. Of these two latter sets of effects, only the SWB component change scores added significant explained variability after all of the other effects were included in the regression models. Results from the prediction of the residual Wave 4 functioning measures were consistent with these patterns, with one exception: When entered in the first step in the model predicted residual Wave 4 interpersonal functioning, both the Wave 1 SWB cluster dummy codes and the Wave 1 SWB component scores added a significant amount of explained variance. However, neither of these sets of effects added significant explained variance once the other set was already entered in the predictive model.

In the final predictive models for each of the residual Wave 2 and residual Wave 4 functioning measures, the most consistent unique predictive effects were found for the individual Wave 1 SWB component scores and the corresponding change scores. With respect to relative predictive utility, therefore, the separate Wave 1 SWB component scores and accompanying change scores in LS, PA, and NA were more useful unique predictors than SWB cluster membership and stability in cluster membership over time.

SWB and Positive Functioning

The final objective of Part 1 was to evaluate the relative differences among SWB configurations with respect to mental, physical, and interpersonal functioning. Hypothesis 8 stated that connections with SWB would be stronger for measures of mental and interpersonal functioning, compared to indicators of physical functioning; and that the relative rank ordering of the SWB clusters for each type of functioning also would be consistent across domains of functioning. This hypothesis was supported.

Across the various types of analyses reported above, a consistent pattern was found with respect to the relative strength of associations between SWB configurations and domains of functioning: Associations and effect sizes were larger for mental and interpersonal functioning than for physical functioning. This pattern was observed in (1) cross-sectional comparisons in functioning between SWB clusters at each wave; (2) longitudinal models comparing Wave 2 or Wave 4 residual functioning with respect to Wave 1 SWB configurations and cluster stability; (3) discriminant function analyses comparing Wave 2 or Wave 4 SWB configurations on Wave 1 functioning and change in functioning over time; and (4) hierarchical multiple regression models predicting Wave 2 or Wave 4 residual functioning based on a combination of person-centered and variable-centered statistical effects. Further, in each analysis comparing the SWB clusters, a consistent pattern in the rank ordering of the clusters was found for each type of functioning (from most to least positive levels of functioning): high SWB, low affect (low PA at Wave 2), high NA (high affect at Wave 2), low LS (low LS/low PA at Wave 2), and low SWB.

Discussion of Part 1

A summary of the hypotheses from Part 1, along with an indication of whether each hypothesis was supported, partially supported, or not supported by the present findings is provided in Table 13 below. Implications of the present findings with respect to these hypotheses, and each of the main objectives of Part 1 more generally, are considered below.

Table 13. *Summary of Part 1 Hypotheses.*

Hypothesis	Result
1 The five cluster configurations identified by Busseri et al. (2009a) will replicate at all three waves in the longitudinal sample.	Supported
2 Stability in SWB cluster membership will be moderate overall, but relatively highest among individuals characterized by high SWB and lowest among members characterized by low SWB.	Partially supported
3a Differences in functioning between SWB configurations will be observed at each wave.	Supported
3b High SWB and low SWB clusters will be characterized by the relatively most positive and negative levels of functioning, respectively.	Supported
3c High and low levels of functioning will be characteristic of other configurations, in particular, the low affect and low LS clusters.	Not supported
4 Wave 1 SWB configurations will be related prospectively to functioning in both the short-term and longer term.	Partially supported
5 Wave 1 functioning will be related prospectively to SWB cluster membership in both the short-term and longer term.	Supported
6 Change in SWB cluster membership will be linked with changes in functioning over time.	Supported
7 The person-centered approach based on SWB configurations will provide greater predictive utility than the variable-centered approach based on dimensional scores for LS, PA, and NA.	Not supported
8 SWB configurations will be more strongly associated with mental and interpersonal functioning than physical functioning, with the relative rank ordering of the clusters for each type of functioning being high SWB, low affect, high NA, low LS, and low SWB.	Supported

Longitudinal Replicability of SWB Configurations

My first objective was to examine the longitudinal replicability of SWB configurations. In support of Hypothesis 1, the present findings provide strong support for the anticipated replicability of the SWB clusters over short and longer-term intervals (i.e., four months and 31 months, respectively). Consistent with our preliminary study on SWB configurations (Busseri et al., 2009a), I found five replicable clusters at Wave 1 and at Wave 4: high SWB, low affect, high NA, low LS, and low SWB. The identification of groups of individuals at each wave characterized by the combination of high LS, high PA, and low NA is consistent with the anticipated “high SWB” profile – a popular, but rarely tested notion among SWB researchers. Together with the results from the preliminary study (Busseri et al., 2009a), present findings provide strong support for this particular configuration of SWB components. Only one-quarter of respondents at each wave were characterized by this particular combination of SWB components, however, suggesting great variability with respect to how SWB components may be internally organized within individuals, as proposed in Shmotkin’s (2005) dynamic modular framework.

At the other extreme, the identification of a group of individuals characterized by the combination of low LS, low PA, and high NA supports the notion of a “low SWB” profile (Diener & Seligman, 2002). Roughly one-tenth of the sample at each wave was characterized by this particular combination of SWB components. Although considerably less prevalent than the high SWB combination, finding a low SWB configuration at each wave suggests that ratings of LS, PA, and NA contain important information about both well-being and ill-being (Busseri et al., 2009a). Indeed, although the concept of SWB has

been discussed almost exclusively with respect to the positive life evaluations and affective experiences (e.g., Diener, 1984, 2008), the ‘negative’ side of SWB should not be ignored – at the very least because different SWB configurations may indicate both positive and negative functioning, as discussed further below.

In addition to the high SWB and low SWB configurations, I anticipated configurations characterized primarily by heightened (or dampened) levels of one or two SWB components, rather than an indiscriminant ‘moderate SWB’ group. Present findings support this prediction. As in Busseri et al. (2009a), in the present study the optimal five-cluster solution at each wave included three incongruous SWB configurations dominated, respectively, by low levels of affect (particularly low NA), high levels of NA, and extremely low levels of LS at Wave 1 and Wave 4. At Wave 2, a slightly different pattern was observed in which the three middle three clusters were dominated, respectively, by low PA, high affect, and both low LS and low PA. These patterns support Shmotkin’s (2005) proposal that rather than reflecting only a single continuum of low to high SWB, the SWB system is organized within individuals in various ways, including both congruous (i.e., high SWB, low SWB) and incongruous (e.g., low LS despite moderate PA and NA) configurations.

Furthermore, from the perspective of Shmotkin’s (2005) model, the slight discrepancy between cluster characterizations for the middle three clusters at Wave 2 versus Wave 1 and Wave 4 suggests that the organization of SWB components within individuals at Wave 2 was not consistent with the other two waves. Yet, as can be seen in Table 6 and Figure 4, the differences did not represent any major reorganizations of the SWB system, or dramatically different configurations. Rather, instead of a cluster

characterized primarily by low affect (as in Wave 1 and at Wave 4), at Wave 2 the corresponding cluster was characterized primarily by low PA. Further, instead of a cluster characterized primarily by high NA (as in Wave 1 and at Wave 4), at Wave 2 the corresponding cluster was characterized primarily by high PA and NA. Finally, instead of a cluster characterized primarily by low LS (as in Wave 1 and at Wave 4), at Wave 2 the corresponding cluster was characterized primarily by low LS and low PA. Thus, in each case, the discrepancies resulted from somewhat dampened or elevated levels of one of the affective components (PA or NA). Further, subsequent analyses revealed that the differences in mental, physical, and interpersonal functioning between the five clusters were consistent at each wave. Together, these findings suggest that the slight differences in SWB configurations at Wave 2 versus Wave 1 and Wave 4 did not appear to be consequential, at least with respect to the issues examined in this part of the dissertation.

The utility of the multi-stage cluster analytic approach employed in the present study has been established in previous person-centered research (e.g., Asendorpf, 2003; Busseri et al., 2009a; Caspi & Silva, 1995; Costa et al., 2002). Under this approach, both the validity and reliability of the resulting cluster solutions are evaluated. Cluster analytic approaches have been criticized, however, for being indeterminate with respect to the ‘true’ number of distinct sub-groups within any population, and the assumption (rather than empirical verification) that the system of variables of interest is, in fact, categorically structured, as opposed to purely dimensional (e.g., Meehl, 1992; Vermunt & Magidson, 2003). Newer statistical techniques such as latent class analysis are based on ‘model-based’ estimation, which includes assigning probabilities of class membership to each individual across all estimated classes, and evaluating empirically the fit of models

comprising alternative numbers of classes based on statistical discrepancy functions (Eid, Langeheine, & Diener, 2003; Muthen & Muthen, 2000; Ruscio & Ruscio, 2008; Vermunt & Magidson, 2003). Application of such approaches may provide more robust procedures both for identifying the optimal number of configurations within a given sample, and for comparing the viability of dimensional versus categorical/class-based models (e.g., Krueger, Markon, Patrick, & Iacono, 2005; Markon & Krueger, 2005). Thus, a valuable step for future research on SWB employing a person-centered perspective is to apply these alternative statistical approaches as further tests of the reliability of the five-cluster solution described here, as well as the appropriateness of assuming a categorical (vs. purely dimensional) structure of SWB.

An additional caveat is that the present findings were based on a single-item measure of LS. Although this approach has a long and established psychometric record (beginning with Kilpatrick & Cantril, 1960), the presence of random measurement error inherent in single-item measures raises questions concerning the reliability and validity of the SWB cluster results based on this LS rating. Perhaps the most popular contemporary SWB measure is Diener et al.'s (1985) multi-item *Satisfaction With Life Scale* which, with its demonstrated record of high internal consistency, would provide a stronger measure of LS from which SWB configurations could be derived in future research.

Notwithstanding these limitations, the fact that the same five configurations were observed both repeatedly over time in the present longitudinal study sample of university students and in an sample of young community adults in the preliminary study suggests that these five clusters are not sample specific, nor time dependent. It would be premature, however, to draw conclusions concerning the universality of these particular

configurations, and the likelihood of finding the same configurations in other populations, without first exploring a person-centered perspective on SWB in more diverse samples. In this regard, the present findings provide a useful benchmark for future investigations of SWB from a person-centered perspective, providing a foundation for hypotheses concerning which specific SWB configurations might be expected.

Longitudinal Stability of SWB Cluster Assignments

The second objective was to evaluate the extent to which individuals were characterized by the same SWB configurations over time. In support of Hypothesis 2, the longitudinal stability of cluster membership was moderate. Roughly 45% of individuals were characterized by the same SWB configurations across short-term and longer-term intervals. According to Shmotkin (2005), SWB configurations are flexible modes, rather than fixed dispositions; the moderate level of longitudinal stability in cluster assignments observed in the present study is consistent with this notion.

Also as anticipated, the relative degree of stability in SWB cluster assignments varied systematically across the anticipated SWB configurations. In Shmotkin's (2005) framework, SWB configurations function to promote and maintain positive functioning. Consistent with the link between high levels of mental, physical, and interpersonal functioning and a high SWB configuration reported by Busseri et al. (2009a), of the five anticipated clusters, I expected that individuals in the high SWB configuration would be most likely to maintain this optimal organization of SWB components. At the other extreme, given the link between low levels of mental, physical, and interpersonal functioning and a low SWB configuration reported by Busseri et al. (2009a), I expected that individuals with a low SWB configuration would be most likely to change from this

particular organization of SWB components. In support of both expectations, the high SWB configuration was the most stable configuration at both longitudinal intervals (65% between Wave 1 and Wave 2; 54% between Wave 1 and Wave 4), whereas the low SWB configuration was among the least stable (36% and 38%, respectively), along with the low LS configuration (32% and 17%, respectively).

Particularly noteworthy with respect to Diener's (1984) three-component model of SWB and Shmotkin's (2005) framework, is the relatively high levels of stability in cluster assignment to the high SWB configuration. From a statistical standpoint, one might expect individuals reporting more extreme levels of LS, PA, and NA at one point in time to report less extreme levels at a subsequent point simply due to regression to the mean.¹¹ Yet, of the five SWB configurations, longitudinal stability (vs. instability) in cluster assignments was significantly greater than expected for only the high SWB cluster.

One possibility, therefore, is that this particular combination of extreme levels of all three SWB components may have unique significance. In dynamic systems theories, stability of this sort is discussed as a 'steady state', that is, a particular organization of a complex system that is accompanied by equilibrium or homeostasis (e.g., Howe & Lewis, 2005; Thelen & Smith, 2006). From the perspective of Shmotkin's (2005) framework, high SWB may be a steady state not only because it represents a congruous alignment of LS, PA, and NA components signaling self-coherence and internal psychological consistency, but also because it is may be closely associated with optimal functioning, which the SWB system functions to maintain over time. Thus, this relatively high level of

¹¹ Given the extremely low levels of LS characterizing the low LS cluster (compared even to the low SWB cluster), regression to the mean may explain, at least in part, the relatively lowest levels of stability in cluster assignment for individuals in this incongruous configuration.

stability in SWB cluster assignment over time should also be linked with sustained levels of positive functioning – evidence with respect to which I discuss in a subsequent section below.

In contrast, although a low SWB configuration would also be experienced as internally consistent, according to Shmotkin (2005), “a low level of SWB (unhappiness) means a failure to manage one’s psychological environment favorably” (p. 296). The low level of functioning associated with this particular alignment of SWB components is likely to prompt a response from the SWB system in order to improve functioning, or adjust to the adversity presumably creating the low levels of SWB and functioning. Thus, among individuals characterized by low SWB, the impetus should be toward change in configuration, as supported by present findings indicating a low level of stability among individuals characterized by a low SWB configuration.

An interesting consideration for future research is with respect to temporal versus situational consistency in SWB configurations. In Shmotkin’s (2005) model, emphasis is given to overall evaluations of LS, and generalized PA and NA reactions. Consistent with this global focus, the SWB system – and SWB configurations in particular – are discussed at a global level, that is, with respect to one’s life overall. From this perspective, stability in SWB configurations over time are of particular relevance. Yet research on SWB has also focused on “domain” satisfactions, that is, individuals’ evaluations of the lives within specific areas of functioning, such as family, leisure, or work (for reviews, see Diener, 1984; Schimmack, 2008). It is possible, therefore, that individuals may also be characterized by domain-specific SWB configurations, comprising judgments of satisfaction and affective experiences within particular life

domains. From this perspective, stability in domain-specific SWB configurations across situations or life domains would be of particular interest, along with stability over time in domain-specific SWB configurations, and convergence (vs. divergence) between global and domain-specific SWB configurations. Whereas SWB research based on domain satisfaction has not addressed domain-specific PA and NA (but rather focuses on the satisfaction judgment only), an interesting direction for future research would be to extend the concept of SWB configurations to cross-situation/domain stability.

Cross-Sectional Differences Between SWB Configurations in Positive Functioning

The third objective was to evaluate differences between SWB configurations in mental, physical, and interpersonal functioning at each wave. In support of Hypothesis 3a, significant differences between SWB configurations were observed for each domain of functioning at each wave. The consistency of these findings over time is consonant with Shmotkin's (2005) contention that SWB configurations are associated with adaptive functioning, and suggests that the cross-sectional differences between configurations reported by Busseri et al. (2009a) are not specific to a given assessment point.

Furthermore, comparisons at all three waves verify the general pattern of results reported by Busseri et al. (2009a) concerning differences among the five SWB configurations. More specifically, in support of Hypothesis 3b, the highest and lowest levels of functioning were found, respectively, for the high SWB and low SWB configurations in each comparison at each wave. These findings are consistent with the popular notion among SWB researchers that high SWB is a sign of optimal human functioning (e.g., Keyes, 2005; Ryan & Deci, 2001) and may be a precondition for a positive quality of life (Diener et al., 1998). The present results also extend previous

SWB research based on variable-centered analyses by showing that the high SWB group, in particular, was characterized by the most positive levels of functioning. At the other extreme, the low SWB configuration was consistently associated with the most negative levels of mental, physical, and interpersonal functioning. These results highlight the importance of recognizing a low SWB profile as a distinctive marker of heightened distress and dysfunction across multiple life domains. Indeed, without diminishing the importance of emphasizing ‘positive’ findings linking higher levels of SWB and healthier modes of functioning, a more complete understanding of the connection between SWB and optimal human functioning is likely to require a more nuanced analytic and conceptual approach in which the significance of ‘high SWB’ and ‘low SWB’ is considered.

In addition to comparisons between high SWB and low SWB configurations, of interest was whether any other SWB clusters demonstrated levels of functioning comparable to either the high or low SWB clusters. Consistent with Shmotkin’s (2005) proposals concerning the processes of compensation and strain characteristic of incongruous SWB profiles, and based on results presented by Busseri et al. (2009a), I expected that the low affect and low LS clusters would be characterized by levels of functioning comparable, respectively, to the high SWB and low SWB configurations. Present results, however, did not support this hypothesis (i.e., Hypothesis 3c). Rather, in all but one comparison (i.e., Wave 4 mental functioning) among the five SWB clusters at each wave, the high SWB cluster was characterized by significantly more positive levels of functioning than the other configurations. Further, the low SWB cluster was

characterized by significantly less positive levels of functioning compared to any of the other configurations.

These results raise questions concerning the compensation and strain processes proposed by Busseri et al. (2009a), and derived from Shmotkin (2005), to explain the comparably high levels of functioning reported in the preliminary study between high SWB and low affect clusters, and the comparably low levels of functioning observed in that study between the low SWB and low LS clusters. An important difference between studies, however, is that whereas the present work employed composite measures of mental, physical, and interpersonal functioning, Busseri et al. (2009a) compared SWB clusters using individual measures of each domain of functioning. Whereas for some measures comparability between high SWB and low affect clusters was observed (e.g., stress, emotional functioning, physical symptoms, satisfaction with social support), and comparability between low SWB and LS clusters was observed (e.g., emotional functioning, social support network size), for other measures it was not. It is possible, therefore, that the psychological compensation afforded by having very low levels of NA (as in the low affect cluster) is specific to particular facets of functioning such as stress or the avoidance of emotional interference in one's day to day life. Similarly, the negative consequences resulting from the psychological strain of extremely low levels of LS (as in the low LS cluster) may be more likely in particular sub-domains of functioning than in others. If so, the use of composite functioning scores in the present study may have obscured evidence in support of the hypothesized compensation and strain processes.

The choice to employ composite measures of functioning in the present dissertation was guided by three related considerations. First, there was a substantial

degree of overlap among indicators of the three domains of functioning, as evidenced by the results from the principle components analyses conducted at each wave based on joint examination all of the individual indicators of function. Second, use of the composite scores limited the number of statistical comparisons required to address the several hypotheses of interest. Simply put, use of the individual indicators would have resulted in roughly five times the number of statistical comparisons (i.e., 14 individual measures of functioning versus 3 composite scores). Third, none of the present hypotheses were specific to particular indicators of functioning. That is, my goal was to evaluate SWB configurations in relation to the three global components of healthy functioning proposed by the World Health Organization (1996), rather than specific facets or theoretically relevant indicators of functioning from within each domain of functioning (e.g., depression, physical pain, or social support network size).

Nonetheless, in future research a productive approach may be to compare congruous (i.e., high and low SWB) and incongruous (low affect, high NA, low LS) SWB configurations on particular (rather than composite) measures of functioning chosen specifically to reflect the anticipated compensation and strain processes. For example, factors such as sense of coherence, attitudinal ambivalence toward one's life, and need for cognitive consistency may be relevant to comparisons between incongruous versus congruous SWB configurations. Further, coping skills, perceived threat, and positive and negative life events may be informative with respect to the compensation and strain processes proposed by Shmotkin (2005). Further research is needed to examine these possibilities.

Longitudinal Associations Between SWB Configurations and Positive Functioning

The fourth objective was to evaluate the predictive relations between SWB configurations and positive functioning over time. In Shmotkin's (2005) framework, maintaining and promoting a positive psychological environment are important functions of SWB configurations, as is adaptation to changes in life circumstances, adversity, and threat. Two main approaches were employed to test these notions.

SWB Configurations as Predictors of Future Functioning

The first approach treated SWB configurations as predictors of change in mental, physical, and interpersonal functioning over time. Hypothesis 4 – which stated that Wave 1 SWB configurations would be uniquely predictive of short-term and longer term changes in functioning – was not supported. Rather, the main effects of Wave 1 SWB configurations on residual Wave 2 and Wave 4 functioning were non-significant. In support of Hypothesis 6, however, there was some evidence that change (or stability) in SWB cluster membership was linked with changes (or stability) in functioning over time. More specifically, in each model involving all five clusters, significant interactions were observed between Wave 1 SWB cluster and cluster stability, and simple effects analyses indicated consistent differences among the stable (rather than the non-stable) participants. In particular, low levels of (residual) functioning was observed among participants consistently categorized into the low SWB cluster.

Additional information was provided by the comparisons between each cluster mean (in both stable and non-stable groups) to a value of 0 – representing future functioning that was not different from expectation based on stability in functioning over time. These comparisons revealed three consistent trends: worse than expected Wave 2

and Wave 4 functioning among participants consistently categorized in the low SWB cluster; worse than expected Wave 2 and Wave 4 functioning among participants categorized in the high SWB cluster at Wave 1 and at different cluster at a subsequent wave; better than expected Wave 4 functioning among participants consistently categorized in the high SWB cluster. Taken together, these results suggest that (1) stability in a low SWB configuration is consistently associated with lower than expected levels of future functioning; (2) instability in a high SWB configuration is associated with significantly worse than expected functioning in the future; and (3) stability in a high SWB configuration is associated with higher than expected functioning at Wave 4.

These patterns are consistent both with Shmotkin's (2005) characterization of SWB configurations as flexible modes, rather than fixed dispositions, and with the notion that change or stability in SWB configurations is linked with positive functioning. Therefore, a dynamic conceptualization of SWB configurations was clearly supported. The consistent pattern of findings involving the high SWB and low SWB configurations are consonant with Shmotkin's (2005) proposal concerning the "double-edged sword" (p. 309) of congruous SWB profiles.

Congruity may be advantageous due to complementarity among components when configured as a high SWB profile, but particularly debilitating when low levels of LS and PA coincide with high NA (i.e., low SWB). In the present study, participants characterized by the combination of low LS, low PA, and high NA at Wave 1, and who were unable to modify this internal organization of components over time may have experienced exaggerated dysfunction in other areas of their lives. For example, the persistent lack of life satisfaction in combination with the preponderance of NA over PA

may have amplified problems in mental, physical, and interpersonal domains. At the other extreme, participants characterized by the combination of high LS, high PA, and low NA at Wave 1 who were able to maintain this internal organization of components over time (e.g., through finding continued high levels of satisfaction in their lives, and a preponderance of positive affective experiences) may have benefited from positively amplified functioning in other areas of their lives. In contrast, participants who are unable to maintain a high SWB configuration over time appear to have experienced increased dysfunction in other areas of their lives.

Whereas these findings all pertain to the high SWB and low SWB configurations, in analyses testing only the middle three clusters in relation to Wave 2 and Wave 4 residual functioning, consistent statistical effects were found for the ‘direction’ of change in cluster membership over time. Participants changing cluster membership in an upward direction (i.e., toward a high SWB configuration) were characterized by higher levels of (residual) functioning at Wave 2 and Wave 4, compared to participants remaining in the same cluster over time, or those moving in a ‘downward’ direction (i.e., toward a low SWB configuration). Given that the cluster by direction of change interactions were not significant, the effect of change in cluster direction generalized to all three of the middle clusters.

These results highlight the importance of accounting for the direction of change in cluster membership when examining SWB configurations from a dynamic perspective. Further, they suggest that a movement toward either a high SWB or low SWB configuration is an indicator of significant positive or negative changes, respectively, in other life domains. Perhaps the most parsimonious explanation, therefore, is that a high

SWB configuration represents an optimal state of functioning toward which the SWB system moves either as a impetus for, or a result of, positive changes in mental, physical, and interpersonal functioning over time. At the other extreme, a low SWB configuration may represent a heightened state of dysfunction toward which the SWB system is propelled either as an cause or result of negative changes in mental, physical, and interpersonal functioning.

Whether these relations reflect truly prospective effects, however, cannot be ascertained. All of the links summarized above are based on ‘dynamic’ statistical effects, that is, change in cluster membership in relation to change in functioning over similar periods. Consequently, the temporal separation between predictors and criteria was not maintained. It is uncertain, therefore, whether the observed statistical effects reflect the impact of changes in SWB configurations on subsequent changes in functioning, or co-occurring changes in the SWB system and other life domains.

Another important caveat is that the sizes of some of the comparison groups, when divided by cluster and stability combinations, were quite modest. In particular, the stable/low SWB combination was found among only 15 and 16 participants out of 446 (i.e., 3% or 4%) between Waves 1 and 2, and Wave 1 and Wave 4, respectively. Although the sample size was adequate to identify such combinations, the small size of these groups underscores the importance of confirming the consistency of these findings in subsequent research in order to establish whether these particular cluster/stability combinations represent reliable phenomena.

SWB Configurations as Outcomes of Functioning

The second approach treated SWB configurations as outcomes of functioning over time. In support of Hypothesis 5, Wave 1 functioning was related prospectively to SWB cluster membership both at Wave 2 and Wave 4. Levels of mental, physical, and interpersonal functioning each contributed to discriminating between the five configurations at Wave 2 and Wave 4 – particularly on the first (and dominant) discriminant function on which the clusters were ordered monotonically from high SWB to low SWB. Similarly, in support of Hypothesis 6, changes in functioning were linked with SWB cluster membership at Wave 2 and Wave 4. That is, independent of the level of functioning at Wave 1, increases in mental, physical, and interpersonal functioning each were related to the discrimination among SWB configurations at Wave 2 and Wave 4 – particularly on the first (and dominant) discriminant function.

These findings are strongly supportive of Shmotkin's (2005) proposal that SWB configurations are flexible modes of self-integration which respond systematically to changes in an individual's life. In the present study, SWB configurations reflected changes in mental, physical, and interpersonal functioning in a particular pattern: Higher functioning, and greater increases in functioning, discriminated primarily between high versus low SWB configurations. Thus, the relative rank ordering of the SWB configurations on concurrent measures of functioning observed at each wave (i.e., high SWB > low affect, high NA, low LS > low SWB), was consistent with the relative rank ordering of the predictive effects of Wave 1 functioning (and change in functioning) on the SWB configurations at subsequent waves. Thus, there appears to be a straightforward correspondence – both concurrently and prospectively – between more versus less

positive levels of functioning and ‘higher’ versus ‘lower’ SWB configurations. These findings are consistent with the notion that changes in SWB configurations occur, in part, as a response to changes in functioning in other life domains. From this perspective, one’s SWB configuration is a by-product of the challenges and adversity, and the successes and thriving, in mental, physical, and interpersonal domains.

Collectively, these findings are consistent with prospective (functioning → SWB configurations) and reciprocal (functioning ↔ SWB configurations) relations between SWB configurations and positive functioning as predicted by Shmotkin’s (2005) model. In contrast, there was little evidence indicating that Wave 1 SWB configurations were uniquely predictive of subsequent functioning (SWB configurations → functioning). This latter aspect of Shmotkin’s (2005) framework, therefore, in which SWB configurations are conceptualized as a vehicle through which the SWB system promotes positive functioning over time, was not supported.

Comparing Person-Centered and Variable-Centered Approaches

The fifth objective of the present study was to compare the relative predictive utilities of SWB configurations versus SWB components. Neither the Wave 1 SWB configurations nor the separate SWB components were consistent unique predictors of Wave 2 or Wave 4 residual functioning. Neither approach, therefore, had unique prospective predictive ability.

However, when statistical effects reflecting the dynamic nature of SWB were added to the model (i.e., cluster by stability interactions; component change scores), significant predictive effects were found for both SWB configurations and components. Of the two approaches, unique predictive effects were found primarily for the three

separate SWB components rather than the SWB cluster configurations. These findings do not support Hypothesis 7, which stated that the person-centered approach would provide greater unique predictive utility than the variable-centered approach. Rather, superior predictive utility was achieved through examining LS, PA, and NA and the accompanying change scores from a variable-centered perspective, rather than as SWB configurations.

Proponents of person-centered approaches have noted that predictive utility is not the only criteria against which the value of a configural approach should be judged (Asendorpf & Denissen, 2006; Bergman & Trost, 2006). In the present case, for example, SWB is described in Shmotkin's (2005) third module as an integrated system, organized within individuals in terms of distinct configurations of components. Indeed, the functionality of SWB in maintaining or promoting positive functioning is thought to stem, at least in part, from the flexibility implied by these configurations. From this perspective, studying the SWB components as separate but joint predictors is inconsistent with the underlying conceptual model. What remains to be demonstrated, however, is that this person-centered approach to SWB has a pragmatic advantage with respect to predicting future functioning compared to more typical variable-centered approaches.

Present results suggesting that indicators of positive functioning were more closely associated over time with the LS, PA, and NA dimensions than with the SWB configurations may reflect the fact that the SWB configurations accounted for roughly 60% of the total variance in the SWB components – leaving a substantial amount of unique variance in the components not explained by the clusters that could covary with mental, physical, and interpersonal functioning. In contrast, because the SWB clusters

were formed based on the three components, the dimensions collectively accounted for most of the variability between clusters, leaving little unique variance in positive functioning that could be accounted for by the SWB clusters independent of the SWB components.¹²

Another possibility is that the dimensional nature of the criteria examined increased the likelihood of finding stronger relations involving dimensional versus categorical predictor variables. Accordingly, the SWB configurations may be stronger predictors than SWB dimensions for categorical indicators of functioning – such as configurations of positive functioning, or high versus low functioning groups.

Alternatively, computing dimensional ‘prototypicality’ scores (e.g., Asendorpf, 2006; Hart, Eisenberg, & Valiente, 2007) for each configuration, in which each participant is scored according to his or her similarity to each of the cluster configurations (rather than categorized into one cluster), may provide a more robust predictive approach to operationalizing SWB configurations. These possibilities deserve attention in future studies before firm conclusions can be drawn concerning the relative predictive utilities of person-centered and variable-centered approaches to SWB.

SWB and Positive Functioning

Although SWB configurations differed at each wave on (and were predicted over time by) all three domains of functioning, SWB configurations were most closely associated with mental and interpersonal, compared to physical, functioning – as predicted in Hypothesis 8. These patterns are consistent previous research demonstrating relatively stronger associations between SWB components and indicators of psychological and social functioning (e.g., Cairney, Corna, Veldhuizen, Herrman, &

¹² At each wave, the LS, PA, and NA dimensions explained at least 95% of the variability between clusters.

Striener, 2008; DeNeve & Cooper, 1999; Diener & Seligman, 2002; Uchida et al., 2008), compared to associations with physical health (e.g., Okun & George, 1984; LaPierre et al., 1997).

One interpretation of the differential effect sizes is that the measures of physical functioning – which included indicators physical limitations, symptoms, and health-care utilization – are somewhat less subjective than the other measures. Because all of the criteria measures were based on self-report, however, the associations between SWB configurations and each domain of positive functioning may reflect a global, underlying tendency toward positive (versus negative) life evaluations (Cummins & Nistico, 2002; Robinson et al., 2004; Vitterso & Nilson, 2002). Clearly, corroborating evidence – including more objective indicators of physical health and observer reports of interpersonal functioning – is needed to test this possibility. Further, emerging research concerning a “halo” bias in self-reports of personality (Anusic, Schimmack, Pinkus, & Lockwood, in press) may provide another useful method for distinguishing a generalized positivity in self-evaluation from specific relations between SWB and domains of functioning.

Additional consideration should be given to the comparison variables not examined in the present study. Previous research employing a categorical approach to well-being has evaluated differences between SWB profiles in terms of sociodemographic factors such as age, sex, education, and income, as well as personality factors, and other aspects of mental functioning, including cognitive performance measures (e.g., Lachman et al., 2008; Shmotkin, 1998). The inclusion of such subjective

and objective factors in future research examining SWB configurations would provide a more complete description of the similarities and differences between SWB clusters.

Conclusions

Drawing on Diener's (1994) three-component model of SWB and the third module from Shmotkin's (2005) dynamic modular framework, in the present study I examined the connection between SWB configurations and positive functioning in a longitudinal study of university students. Present results inform several key features of Shmotkin's (2005) model.

First, with respect to basic issue of operationalizing SWB configurations, distinct patterns of SWB components could be reliably identified over time. These patterns included what is perhaps the most widely discussed configuration in SWB research, "high SWB" (i.e., the combination of high LS, high PA, and low NA). SWB configurations were moderately stable over time and this stability was systematic, with the highest and lowest stabilities observed among participants characterized by high SWB and low SWB, respectively.

Second, the anticipated dynamic links between SWB configurations and positive functioning were found. Changes in SWB configurations in the direction of a high SWB pattern, or stability among participants already characterized by high SWB, coincided with better than expected mental, physical, and interpersonal functioning over time. Similarly, more positive levels of functioning, and improvements in functioning over time, discriminated SWB configurations over time – particularly with respect to high SWB and low SWB configurations. Both types of associations were found over shorter and longer-term longitudinal intervals in the present sample of university students.

Together, these findings suggest that the person-centered approach to SWB comprising the third module of Shmotkin's (2005) framework can be used to examine novel issues concerning both the internal structure of SWB as an integrated system, and potential links between this system and positive functioning over time. Short-comings of this perspective also were identified, most notably with respect to the relative predictive utility of the person-centered (versus variable-centered) approach to SWB. Further, the anticipated prospective effect of SWB configurations on subsequent functioning was not observed.

Without downplaying the importance of these challenges, and the several limitations discussed above, the SWB system may indeed be conceptualized and operationalized as integrated configurations within individuals. These flexible modes appear to reflect the ebb and flow of life's challenges and rewards, particularly in psychological and interpersonal domains. In conclusion, therefore, SWB configurations may function both as thermometers for mental, physical, and interpersonal functioning, reflecting personal toils and triumphs in various life domains, as well as barometers, sensitive to positive and negative changes in 'pressure systems' across the psychosocial landscape of one's life.

Having examined the third module of Shmotkin's (2005) framework based on SWB configurations in Part 1 of this dissertation, in Part 2 I consider the fourth module in this framework which addresses individuals' personal narratives for their well-being through time. In particular, the replicability, stability, bias, and implications of subjective temporal perspective trajectories for LS are examined.

PART 2

Objectives and Hypotheses

In this part of the dissertation, I investigate a subjective temporal perspective (STP) on LS based on the fourth module of Shmotkin's (2005) dynamic modular framework. As I have reviewed above, this module addresses individuals' personal narratives for their well-being through time. These personal narratives, or subjective "trajectories", are thought to have functional significance. More specifically, in Shmotkin's model a subjective trajectory for LS provides opportunities for self-enhancement, for example, through evaluating one's life in the past as less satisfying than at present, implying subjective growth in LS over time, or through enjoyable self-simulation (e.g., enjoying a satisfying and desired future in the 'here and now'). Subjective trajectories are also thought to support optimal functioning through motivating efficacious behavior aimed at achieving the desired future, and undoing negative thoughts and experiences, thereby helping the individual feel better about his or her life, perhaps as a reaction against threat or negative experiences (Shmotkin, 2005). Collectively, therefore, subjective trajectories should play a functional role in promoting and maintaining positive functioning.

As described above, in a preliminary study, Busseri et al. (2009b) employed latent growth curve modeling to estimate individual differences in subjective LS trajectories in a two-wave, five-year longitudinal study of young community adults. In cross-sectional and prospective predictive models, higher levels of the latent LS intercept (reflecting participants' overall level of present LS) were related to more positive indicators of mental, physical, and interpersonal functioning. In contrast, steeper upward STP LS

trajectories (reflecting the degree to which individuals were characterized by an upward subjective trajectory) were related to lower LS intercepts and predicted less positive functioning. Steeper upward trajectories were also strongly related to greater overestimation of future LS. Extending this preliminary work, objectives and hypotheses for the present study are detailed below.

Objective 1:

Longitudinal Replicability and Stability of Subjective LS Trajectories

The first objective of the present study was to describe the longitudinal replicability of the STP LS trajectories over three waves, and evaluate the stability of these trajectories over a shorter period (i.e., a period of four months between Wave 1 and Wave 2) and longer-term periods (e.g., a period of roughly two and a half years between Wave 1 to Wave 4). Previous research has shown that upward mean-level trends in ratings of past, present, and anticipated future LS are normative among all ages groups except the 'very old' (i.e., 75 years or greater). These upward subjective trajectories are particularly steep, however, among youth (e.g., Andrews & Withey, 1976; Ryff, 1991; Shmotkin, 1991; Staudinger et al., 2003). This pattern has been interpreted as evidence for a commonly-held and culturally-shared belief about human development specifying positive growth throughout early and middle adulthood, and eventual decline in old age (Fleeson & Baltes, 1998; Heckhausen et al., 1989; Lacey et al., 2006; Rocke & Lachman, 2008; Staudinger et al., 2003).

Based on mean-level trends and latent trajectory models, Busseri et al. (2009b) reported that upward subjective LS trajectories (i.e., past < present < anticipated future LS) were normative at two time points separated by five years, in a sample of community

adults. Given that this preliminary study was the first to report these patterns using an individual differences approach and longitudinal results, I sought to replicate and extend both of these patterns. The present study comprised the sample of university students reported in Part 1, the majority of whom were less than 20 years old at the first assessment. Thus, I predicted that upward STP LS trajectories would be normative at all three waves, as revealed in the mean trends for the STP LS ratings and the latent trajectory models (Hypothesis 1).

With respect to stability of the subjective trajectories, LS ratings typically show a significant degree of autocorrelation over time. For example, estimates of year-to-year correlations of single-item LS ratings based on longitudinal panel studies typically range from .50 to .70 (Andrews, 1991; Anusic et al., in press). In comparison, Busseri et al. (2009b) reported a stability of .39 in the latent intercept factor over a five-year period (standardized β , controlling for the latent trajectory, $p < .05$). The stability in the latent trajectory factor was more modest ($\beta = .19$, controlling for the latent intercept, $p < .05$). Only one other study has examined the longitudinal stability of subjective LS trajectories. In a nationally representative sample of middle-aged American adults, Rocke and Lachman (2008) used cluster analysis to categorize individuals into one of three distinct patterns of subjective LS trajectories at each of two waves: ‘continuous high’, ‘incremental’ (i.e., an upward trajectory), and ‘present low/decremental’. Stability in the cluster assignments over a nine-year period was moderate overall (54%, $\kappa = .28$), but varied by trajectory pattern: 80% for the ‘continuous high’ pattern, 37% for the ‘incremental’ cluster, and 35% for the ‘present low/decremental’ pattern. Based on findings from these previous studies, in the present investigation I predicted that stability

in the latent intercept would be significant and substantial over time (Hypothesis 2a), whereas the stability in the latent trajectory factor would be significant but modest (Hypothesis 2b).

Objective 2:

Longitudinal Relations Between Subjective LS Trajectories and Positive Functioning

The second objective of the present study was to assess prospective relations between subjective LS trajectories and positive functioning over time, treating the subjective LS trajectories both as predictors of future functioning and outcomes of functioning. According to the fourth module of Shmotkin's (2005) dynamic framework, SWB trajectories provide opportunities for self-enhancement and self-simulation, and support optimal functioning through motivating efficacious behavior and undoing negative thoughts and experiences. In the preliminary study on subjective trajectories for LS among community adults, however, we found that upward subjective LS trajectories were associated not only with lower levels of present LS, but also with lower levels of mental, physical, and interpersonal functioning concurrently and prospectively, for indicators of physical and interpersonal functioning, over a five-year period (Busseri et al., 2009b). In contrast, the latent intercept was uniquely associated with more positive levels of functioning. That is, the relatively highest levels of functioning were found among individuals reporting high levels of LS and flatter (rather than steeper) subjective trajectories.

As a possible explanation for these patterns, we suggested that individuals characterized by higher LS may have been motivated to maintain positive levels of functioning through adaptive forms of affective, cognitive, and behavioral self-regulation.

In contrast, we speculated that rather than serving as a motivating form of self-enhancement, steeper upward subjective LS trajectories may have been a sign of disappointment with one's life, accompanied by complacency and a failure to act in one's best interests, ultimately leading to less positive functioning in the future (Busseri et al., 2009b). Consistent with these proposals, in the present sample of university students I anticipated that higher levels of LS would predict more positive levels of functioning, both concurrently and prospectively (Hypothesis 3a), whereas steeper upward subjective LS trajectories would predict less positive levels of functioning (Hypothesis 3b).

Another key feature of the latent subjective trajectories reported by Busseri et al. (2009b) was the negative correlation between latent intercept and latent trajectory factors. At both waves in the preliminary study, individuals characterized by higher latent intercepts also reported less steep upward trajectories. Stated differently, individuals reporting higher levels of LS at present tended to report flatter, rather than steeper subjective improvements in LS over time. Although this negative correlation may represent a statistical scaling artifact (i.e., a ceiling effect), it could also have substantive significance: Whereas individuals who are highly satisfied with their life at present do not anticipate that the future will be any 'brighter', people who are dissatisfied with their current lives may be more likely to dream of a better days ahead. Consistent with this latter interpretation, in the present study, I predicted that correlations between latent intercept and trajectory factors would be negative at each wave (Hypothesis 4).

Although the preliminary study examined the subjective LS trajectories as predictors of future functioning (i.e., trajectories \rightarrow future functioning), the reciprocal relation (i.e., functioning \rightarrow future trajectories) was not examined. In the present study, I

was also interested in the potential prospective effects of present functioning on future subjective trajectories. If, as proposed by Busseri et al. (2009b), upward subjective LS trajectories are a defensive reaction against current disappointment with one's life (Higgins, 1987; Michalos, 1980) and a way of mentally escaping present life difficulties (Sanna et al., 2005), then steeper upward trajectories may become a habitual response to (if not a product of) current dysfunction across various life domains. This proposal is consistent with previous research suggesting that self-enhancement, including positively biased cognitions and overly favorable self-evaluations are often inflated, at least temporally, in response to negative feedback or other self-threatening information (Taylor & Armor, 1996). Thus, consistent with these notions, I hypothesized that lower levels of present LS and less positive levels of functioning would predict steeper upward LS trajectories in the future (Hypothesis 5).

Objective 3:

Determining Bias in Subjective LS Trajectories

The third objective of the present study was to determine the bias in the subjective LS trajectories. Research on affective forecasting (e.g., Wilson & Gilbert, 2003) has shown that people typically misestimate both the duration and intensity of the impact of future emotional events, for example, expecting that the impact of positive events will last longer, and feel better than it actually does. Other work suggests that individuals are motivated to systematically under-evaluate past emotional experiences or events in order to enhance one's present self (Ross, 1989; Wilson & Ross, 2001). In Shmotkin's (2005) framework, constructing positively self-biased subjective well-being trajectories is one way for an individual to undo negative thoughts and experiences, and motivate oneself to

act in one's personal best interest. In this regard, a moderate degree of positive illusion may be psychologically healthier than either a completely realistic view or completely unwarranted optimism (Baumeister, 1989; Taylor & Armor, 1996; Taylor & Brown, 1988) as overly distorted subjective trajectories may "drive people into a risky fools' paradise that is easily shattered by harsh reality" (Shmotkin, 2005, p. 299). The bias in individual's subjective trajectories, therefore, should be relevant to their functional significance.

In our preliminary study on subjective trajectories (Busseri et al., 2009b), despite the fact that mean levels of present LS did not change substantially over time, upward subjective LS trajectories were normative at each wave. Further, we found that steeper upward LS trajectories at Wave 1 were strongly associated with greater prospective bias. That is, individuals with steeper upward trajectories at Wave 1 tended to more grossly overestimate future LS. Further, greater prospective bias was consistently associated with less (rather than more) positive functioning at Wave 2. In this preliminary study, therefore, steeper upward subjective trajectories appeared to be an unproductive form of fantasizing and wishful thinking.

The three-wave panel design of the present study provided an unique opportunity to extend our previous work by examining the bias in individuals' ratings both of their anticipated future LS and their recollected past LS – thereby permitting the assessment both of retrospective and prospective bias. I expected that the steeper upward subjective trajectories would be characterized by greater bias, both with respect to recollections of the past and predictions for the future. More specifically, consistent with previous research on temporal self-comparisons (e.g., Ross, 1989; Wilson & Gilbert, 2003; Wilson

& Ross, 2001), I predicted that steeper upward subjective LS trajectories would be associated with more positive prospective bias, that is, a stronger tendency to *overestimate* future LS (Hypothesis 6a) and a more negative retrospective that is, a stronger tendency to *underestimate* past LS (Hypothesis 6b).

I further anticipated that retrospective biases would be motivated by the need to boost present self-evaluations among individuals who are currently struggling, through promoting a sense of self-improvement (Ross, 1989; Wilson & Ross, 2001). If so, individuals whose lives are characterized by greater distress and dysfunction at present should report more negative retrospective bias (Hypothesis 7a) and greater prospective bias (Hypothesis 7b).

In addition, consistent with Shmotkin's (2005) model, I expected that the bias in the subjective LS trajectories' would have implications for future functioning. Based on our preliminary study (Busseri et al., 2009b), I predicted that more positive prospective bias would be associated with less positive functioning in the future (Hypothesis 8a) because individuals holding such illusions would be least likely to act in one's own best interests over time in order to achieved the desired future. Further, in light of Shmotkin's (2005) proposal concerning the functional value of a moderate level of bias, and consistent with previous research suggesting an "optimal margin of illusion" (Baumeister, 1989; see also Busseri et al., 2009b; Taylor & Armor, 1996), I predicted that associations between prospective bias and future functioning would be non-linear in nature, with extremely high levels of bias associated with the poorest outcomes (Hypothesis 8b).

Objective 4:

Comparing the Predictive Utility of Actual versus Subjective LS Trajectories

The fourth objective of the present study was to compare the relative predictive utility of the subjective LS trajectories with the separate ratings of past, present, and anticipated future LS. To do so, I evaluated which of the two approaches – subjective LS trajectories or the three separate LS ratings – explained a greater proportion of unique variance in the mental, physical, and interpersonal functioning. According to Shmotkin's (2005) framework, an individual's well-being trajectory provides a coherent story or meaningful narrative concerning their overall sense of present well-being and their views about how their life is unfolding over time. That is, individuals "mean to achieve something that is beyond the appearance of the report itself" (Shmotkin, 2005, p. 307). From this perspective, subjective trajectories for well-being convey information that is in surplus to, or at least not apparent from analysis of, the separate ratings of one's past, present, and anticipated future well-being.

For example, subjective LS trajectories convey information concerning individual differences in the overall level of LS as well as the direction (upward, downward, flat) and perceived rate of change in one's life narrative for LS that is not apparent from examining the individual LS ratings. Alternatively, examination of the separate ratings of past, present, and anticipated future LS may comprise a simpler and equally (if not more) useful predictive model than the trajectory approach. This may be particularly likely if the individual ratings convey valuable information about one's mental, physical, and interpersonal functioning that is missed if emphasis is given to the shared variance among the ratings, and the discrepancies among the raw values (as in the subjective trajectory

models), rather the unique effects of each of the individual ratings. In the present study, consistent with Shmotkin's (2005) framework, I predicted that the subjective trajectory approach would provide greater predictive utility than a model based on the separate ratings of past, present, and anticipated future LS (Hypothesis 9). With respect to the reciprocal relations with positive functioning, however, no hypotheses were made concerning the relative predictability of the subjective trajectories versus the three separate LS ratings.

Subjective LS Trajectories and Positive Functioning

In the present study, we operationalized positive functioning using multiple self-reported indicators of mental, physical, and interpersonal functioning (1996). As reviewed in Part 1, previous research exploring the correlates and predictors of SWB has indicated that associations between SWB and indicators of mental (i.e., psychological) and interpersonal functioning are generally stronger than associations involving physical functioning, and subjective measures of physical functioning tend to correlate more strongly with SWB than objective physical functioning indicators. One consideration for the present study, therefore, is whether subjective LS trajectories should be differentially associated with self-reports of mental, physical, and interpersonal functioning.

According to Shmotkin's (2005) framework, the SWB system functions to promote a positive psychological environment and maintain and promote positive functioning. Subjective narratives for personal well-being are a major module of Shmotkin's model through which the SWB system operates to offer an enjoyable mental escape (i.e., mental simulation of 'better days'), opportunities for self-enhancement (e.g., arising from the belief that one's life gets better and better over time), and motivation to

pursue the desired future. If so, subjective LS trajectories may be linked most directly with psychological functioning, including improved moods and positive self-regard. Yet subjective trajectories are also expected to have broader functional significance by motivating adaptive self-regulatory behavior which ultimately promotes one's best interests. If so, upward subjective LS trajectories should also be linked with important life outcomes in other domains, including physical and interpersonal functioning. A similar conclusion was reached by Taylor and Brown (1988) concerning links benefits to mental, physical, and interpersonal functioning in their influential review of evidence concerning the functional significance of 'positive illusions', which include the optimistic belief in a brighter future (see also, Taylor & Armor, 1996).

Although few studies have explored subjective LS trajectories based on joint consideration of all three subjective temporal perspectives in relation to other indicators of well-being or positive functioning, results from two recent studies are relevant. First, in our preliminary study of subjective LS trajectories (Busseri et al., 2009b), we found significant concurrent associations between both the latent intercept and trajectory factors and indicators of mental, physical, and interpersonal functioning. With respect to the longitudinal findings, we found unique prospective relations over a five-year period between steeper upward latent subjective LS trajectories and less positive future functioning in the physical and interpersonal domains (e.g., self-rated health, doctors visits, social support network size), but not mental functioning indicators. In contrast, higher levels of the latent intercept factor were uniquely and prospectively related to more positive indicators of functioning in all three domains examined (e.g., depression, daily hassles, self-rated fitness, social support satisfaction, loneliness).

In a second relevant study, Rocke and Lachman (2008) found three different types of perceived LS trajectory patterns, identified through cluster analysis of ratings of past, present, and anticipated future LS (e.g., continuously high, incremental, and decremental trajectories). In cross-sectional and prospective analyses spanning a nine-year period, comparisons between subjective LS trajectory types revealed differences in indicators of psychological functioning (e.g., sense of control, optimism), physical health (e.g., functional limitations, medical conditions), and interpersonal functioning (i.e., social support). Of the three patterns, results were most positive for the continuously high group. With respect to the magnitudes of the differences across domains of functioning, effects were larger in the psychological and interpersonal domains, compared to physical functioning.

Taken together, therefore, the conceptual framework guiding the present study (Shmotkin, 2005) and related empirical evidence (Busseri et al., 2009b; Rocke & Lachman, 2008) suggest that links between subjective LS trajectories and positive functioning may be found across various life domains. Although, as with findings from the broader SWB research literature, associations with subjective LS trajectories may be relatively stronger for indicators of mental and interpersonal functioning, compared to physical functioning. Thus, in the present study, I hypothesized that subjective LS trajectories would be associated with all three domains of functioning, but particularly mental and interpersonal functioning (Hypothesis 10).

Method

Participants and Procedure

Details concerning the participants and procedure are provided in Part 1.

Measures

With the exception of the subjective temporal perspective (STP) life satisfaction (LS) ratings described below, the measures employed in Part 2 were identical to those reported in Part 1.

Subjective Temporal Perspective Life Satisfaction Ratings

Based on Kilpatrick and Cantril's (1960) self-anchoring ladder, participants' past, current, and anticipated future LS were assessed at each time point using three single-item ratings, each ranging from 1-*worst life I could have*, to 9-*best life I could have*. On one page, participants rated their current level of LS, then their LS one year in the past, followed by their anticipated LS five years into the future (see Appendix A). Note that for purposes not of relevance to the present study, the LS rating instructions specified unequal periods of time between ratings of past and present LS (i.e., a one-year difference) and present and future LS (i.e., a five-year difference). As we describe in a subsequent section, an important feature of the latent trajectory modeling approach is that it can accommodate unequal subjective temporal spacing between repeated assessments.

Results

Objective 1:

Longitudinal Replicability and Stability of Subjective LS Trajectories

The first objective was to examine the longitudinal replicability and stability of the anticipated upward subjective LS trajectories. Hypothesis 1 stated that upward STP

LS trajectories would be normative at all three waves. According to Hypothesis 2a, the stability of the latent intercept would be significant and substantial over time, whereas according to Hypothesis 2b, the stability in the latent trajectory factor would be significant but modest.

Mean-Level Trends

Prior to examining the subjective LS trajectories, the individual ratings of past, present, and anticipated future LS were first examined. Means, standard deviations, and correlations among the STP LS ratings are shown in Table 14 below. Mean LS ratings were relatively high for each STP at each wave, averaging between 6.5 and 8.5 on the 9-point LS scale. Further, ratings were positively correlated within each wave such that participants reporting higher levels of present LS also tended to report higher levels of past and anticipated future LS. Moderate correlations also were observed across waves, particularly for corresponding STP ratings (e.g., past LS at Wave 1 with past LS at Wave 2), indicating a modest, but significant degree of consistency over time in the separate LS ratings.

Table 14. *Means, Standard Deviations, and Correlations Among Subjective Temporal Perspective Life Satisfaction Ratings by Wave.*

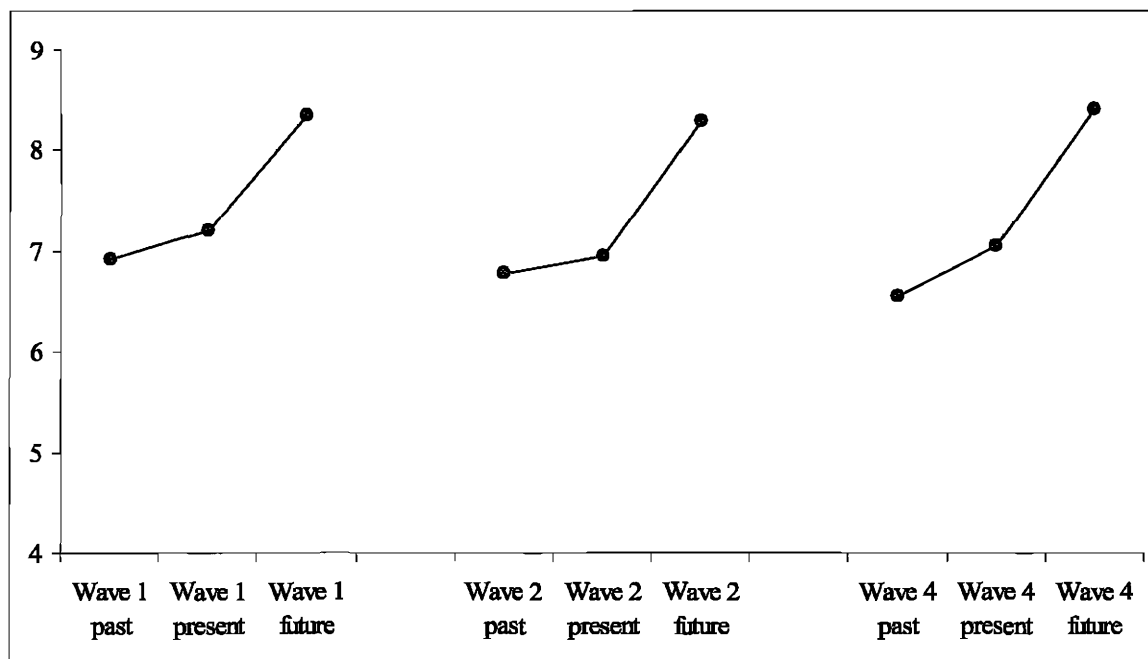
Measure	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. W1 past LS	6.92	1.55	--							
2. W1 present LS	7.21	1.32	.37	--						
3. W1 future LS	8.34	0.99	.18	.33	--					
4. W2 past LS	6.78	1.57	.51	.36	.12	--				
5. W2 present LS	6.94	1.37	.18	.46	.11	.33	--			
6. W2 future LS	8.30	0.94	.16	.39	.28	.30	.40	--		
7. W4 past LS	6.55	1.53	.21	.24	.09	.32	.35	.20	--	
8. W4 present LS	7.04	1.39	.17	.34	.21	.26	.43	.33	.43	--
9. W4 future LS	8.40	0.96	.10	.27	.19	.23	.24	.47	.23	.50

Note. $N = 446$. W = survey wave. LS = life satisfaction. Correlations .10 or greater are significant at $p < .05$.

Hypothesis 1 stated that upward STP LS trajectories would be normative at all three waves. To assess subjective LS trajectories in the mean-level trends, a repeated-measures ANOVA was estimated in which STP (past, present, future) and wave (Wave 1, Wave 2, and Wave 4) were specified as within-subjects factors. The main effect of wave was significant but modest in magnitude; $F(2,890) = 7.17, p = .001, \eta^2 = .02$. In pairwise comparisons, the mean level of LS at Wave 1 was significantly higher than at Wave 2 and Wave 3 ($ps < .01$), whereas the means did not differ at these latter two time points; $Ms = 7.49, 7.34$, and 7.33 for Wave 1, Wave 2, and Wave 4, respectively. The main effect of STP also was significant and substantial; $F(2,890) = 573.54, p < .001, \eta^2 = .56$. In pairwise comparisons, the mean level of past LS was significantly lower than present LS, with both of these means were significantly lower than future LS (all $ps < .001$); $Ms = 6.75, 7.06$, and 8.35 , respectively.

These main effects were qualified by a significant STP by wave interaction; $F(4,1780) = 8.27, p < .001, \eta^2 = .02$. As shown in Figure 12 below, although upward subjective LS trajectories were normative at all three waves, the overall subjective change in LS across STPs was smaller at Wave 1 and Wave 2 compared to Wave 4, as indicated by the relative effect sizes for the simple effect of STP at each wave (η^2 s = .31, .37, and .46 respectively, $ps < .001$). In additional post-hoc analyses, these between-wave differences were found in comparisons of (i) past and present LS (η^2 s = .03, .01, and .09, respectively, $ps < .001$, at Wave 1, Wave 2, and Wave 4), and (ii) present and future LS (η^2 s = .41, .53, and .56, respectively, $ps < .001$); and (iii) past to future LS (η^2 s = .41, .48, and .58, respectively, $ps < .001$).

Figure 12. *Trends in Mean Life Satisfaction Ratings by Subjective Temporal Perspective by Wave.*

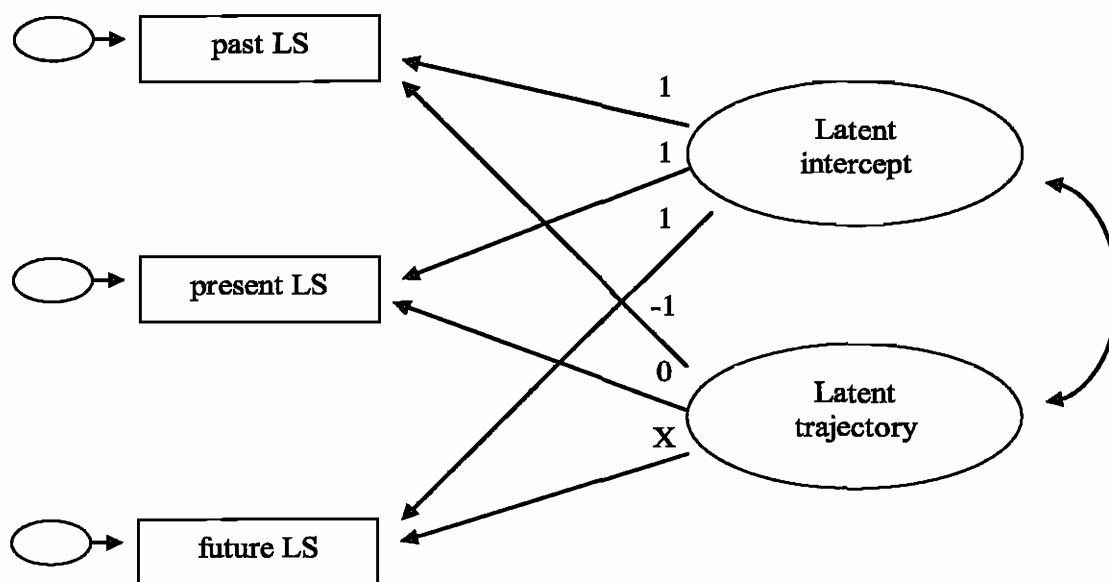


Note. Mean LS ratings (y-axis) by STP (past, present, future) by wave (x-axis).

Latent Trajectory Models

Whereas the above analyses pertained to the subjective LS trajectories in the mean-level trends, a latent trajectory model was used to estimate individual differences in subjective LS trajectories at each wave. As displayed in Figure 13 below, two latent factors were specified. First, a latent intercept factor, reflecting the level of present LS, had fixed (unstandardized) loadings of 1 for each of the three LS ratings. Second, a latent trajectory factor, reflecting individuals' subjective change in LS over time, was indicated by each LS rating. However, whereas factor loadings for ratings of past and present LS were fixed to -1 and 0 respectively, the loading for the rating of anticipated future LS (labeled "X" in Figure 13) was freely estimated (Model 1). This approach allowed the model to statistically account for the unequal temporal spacing between the ratings of present and past LS (a one-year difference), and present and anticipated future LS (a five-year difference) by estimating the best-fitting trajectory "shape" (Duncan et al., 2006).

Figure 13. *Latent STP Trajectory Model.*



Note. Example of the latent trajectory model used to estimate latent STP trajectories at each wave. Rectangles are measured variables, large ovals are latent variables, and small ovals are residual (error) variance terms. Fixed factor loadings are shown. “X” indicates the freely estimated loading. ’

I also tested two additional models in which the factor loading for the rating of anticipated future LS on the latent trajectory factor was fixed to 1 (instead of freely estimated), creating a latent trajectory comprising equal subjective distances between past and present LS and between present and anticipated future LS (Model 2), and another model in which the loading was fixed to 5, creating a latent linear subjective LS trajectory from one year in the past to five years in the future (Model 3). In each model, the latent factor means and variances were estimated, as was the correlation between latent factors.

Evaluating Model Fit

Following conventional practice (Kline, 1998), model fit was evaluated based on joint consideration of several global fit indices: model χ^2 statistic, the comparative fit

index (CFI), and the root mean square error of approximation (RMSEA). The model χ^2 reflects the extent to which there is a statistically significant discrepancy between a perfectly-fitting model (which accounts for all of the observed variances and covariances, as well as perfectly reproduces the mean scores for the observed measures) and the estimated model. A non-significant statistic indicates small (and non-significant) departure from perfect fit. Note that with large sample sizes, the model χ^2 is often statistically significant even in the presence of trivial discrepancies between the estimated and ideal model.

The CFI ranges from 0 to 1 and is interpreted as reflecting the extent to which the estimated model explains the observed data (similar to a model R^2 value), relative to a model specifying complete independence among variables (Kline, 1998). CFI values exceeding .95 are typically interpreted as indicative of excellent fit. RMSEA values reflect the size of the typical discrepancy between the model-implied and observed data, aggregated across all estimated parameters (including variances, covariances, and means). RMSEA values less than .05 typically are interpreted as indicative of excellent fit, although values below .10 are often considered acceptable (particularly in combination with high CFI values). In addition to examining these global fit indices, the standardized residual variance-covariance matrix and standardized residual means also were inspected in order to ensure that the models provided adequate estimates for each individual parameter.

Addressing an Estimation Problem

In the latent trajectory models described below in which the loading for future LS was freely estimated (Model 1) and fixed to 5 (Model 3), the residual variance in the

rating of anticipated future LS (i.e., the variance in this rating not accounted for by the latent intercept and trajectory factors) was non-significant but negative, creating a statistically inadmissible solution. Methodological research has indicated that cases where an estimated variance is negative, but small and non-significant, can be remedied without distortion to parameter estimates or model fit indices by fixing the non-significant negative variance to zero (Chen, Bollen, Paxton, Curran, & Kirby, 2001; Dillon, Kumar, & Mulani, 1987; Gerbing & Anderson, 1987). In the present models, this adjustment has a straightforward interpretation: The latent trajectory model explained all of the variance in the rating of anticipated future LS. To remedy this issue, the residual variance in the rating of future LS was fixed to zero in each model. Following this adjustment, all of the parameter estimates were admissible in each model at each wave. Model fit results for all three (modified) models at each wave are summarized in Table 15 below.

Table 15. *Model Fit Results from Latent Trajectory Models by Wave.*

Model	Model fit indices		
	χ^2 (df)	CFI	RMSEA
<i>Wave 1</i>			
Model 1 (future = free)	0.03 (1)	0.999	<0.001
Model 2 (future = 1)	60.65* (2)	0.492	0.257
Model 3 (future = 5)	0.81 (2)	0.999	<0.001
<i>Wave 2</i>			
Model 1 (future = free)	0.01 (1)	0.999	<0.001
Model 2 (future = 1)	96.02* (2)	0.326	0.325
Model 3 (future = 5)	1.51 (2)	0.999	<0.001
<i>Wave 3</i>			
Model 1 (future = free)	8.40* (1)	0.966	0.129
Model 2 (future = 1)	61.42* (2)	0.726	0.258
Model 3 (future = 5)	20.81* (2)	0.913	0.145

Note. $N = 446$. For each model, the unstandardized factor loading for the rating of anticipated future life satisfaction is shown in brackets. CFI = comparative fit index. RMSEA = root mean square error of approximation. * $p < .05$.

Wave 1 Latent Trajectory Model

At Wave 1, the model in which the factor loading for the rating of anticipated future LS was fixed to 1 (Model 2) resulted in poor fit, whereas both of the other models provided excellent fit. Further, the model in which the factor loading for future LS was constrained to 5 (Model 3) did not result in a significant decrement in model fit compared to the less restrictive model in which this factor loading was freely-estimated (Model 1), as indicated by a non-significant chi-square difference test between these two models; $\Delta\chi^2 = 0.78$, $df = 1$, $p = .78$. Therefore, the most parsimonious, good-fitting Wave 1 latent trajectory model was Model 3, in which the factor loading for the rating of future LS was fixed to 5, creating a linear (per year) latent trajectory in LS ratings across STP.

This latent trajectory model explained 35%, 41% and 100% of the variances in the ratings of past, present, and anticipated future LS, respectively. The estimated latent intercept and trajectory factor means were 7.19 and 0.23 respectively (both $ps < .001$), indicating that the average trajectory at Wave 1 comprised a rating of present LS of 7.19 and a subjective linear increase in LS of 0.23 scale points per year. Statistically significant variances were observed for both latent factors (0.70 and 0.03 respectively, both $ps < .001$), indicating that respondents differed both in the intercepts and steepness of the slopes of their STP trajectories. Further, the correlation between latent intercept and trajectory factors was negative ($r = -.37, p < .001$), indicating that steeper upward STP trajectories were found among individuals reporting lower levels of present LS.

Note that for the majority of individuals, STP trajectories reflected patterns of incline, rather than stability or decline: When computed as the raw difference between ratings of anticipated future and past LS, only 7% of respondents had trajectory slopes that were less than zero (i.e., declining), 22% had slopes equal to zero (i.e., flat), and 71% had slopes that were greater than zero (i.e., inclining).

Wave 2 Latent Trajectory Model

At Wave 2, the model in which the factor loading for the rating of anticipated future LS was fixed to 1 (Model 2) resulted in poor fit, whereas both of the other models provided excellent fit (see Table 15 above). Further, the model in which the factor loading for future LS was constrained to 5 (Model 3) did not result in a significant decrement in model fit compared to the model in which this factor loading was freely-estimated (Model 1), as indicated by a non-significant chi-square difference test between these two models; $\Delta\chi^2 = 1.50, df = 1, p = .22$. Therefore, the most parsimonious, good-

fitting Wave 2 latent trajectory model was Model 3, in which the factor loading for the rating of future LS was fixed to 5, creating a linear (per year) latent trajectory in LS ratings across STP.

The latent trajectory model explained 29%, 37% and 100% of the variances, respectively, in the ratings of past, present, and anticipated future LS. The estimated latent intercept and trajectory factor means were 6.98 and 0.26 respectively (both $ps < .001$), indicating that the average trajectory at Wave 2 comprised a rating of present LS of 6.98 and a subjective linear increase of 0.26 scale points per year. Statistically significant variances were observed for both latent factors (0.64 and 0.02 respectively, both $ps < .001$), indicating that respondents differed both in the intercepts and slopes of their STP trajectories. The typical STP trajectory reflected patterns of incline (75% of respondents), rather than stability or decline (20% and 5% of respondents, respectively). Further, the correlation between latent intercept and trajectory factors was $-.24$ ($p = .06$).

Wave 4 Latent Trajectory Model

At Wave 4, the model in which the factor loading for the rating of anticipated future LS was fixed either to 1 (Model 2) resulted in poor fit, and the model in which this loading was fixed to 5 (Model 3) produced marginal fit. In contrast, the model in which the loading for the rating of future LS was freely estimated (Model 1) provided excellent fit. Note that despite the significant chi-square test for Model 1 (see Table 15 above) none of the residual covariances or residual means differed significantly from zero, suggesting good local fit. Further, Model 3 resulted in a significant decrement in model fit compared to Model 1, as indicated by a significant chi-square difference test between these two models; $\Delta\chi^2 = 12.41$, $df = 1$, $p < .001$. Therefore, the most parsimonious Wave 4 latent

trajectory model was Model 1, in which the factor loading for the rating of future LS was freely estimated.

This latent trajectory model explained 46%, 45% and 100% of the variances, respectively, in the ratings of past, present, and anticipated future LS. The factor loading for anticipated future LS on the latent trajectory factor was 2.49 ($p < .001$), indicating that the anticipated change between present and future LS five years hence was roughly two and half times greater than the perceived change between past LS one year ago and the present – consistent with a non-linear subjective trajectory. The estimated latent intercept and trajectory factor means were 7.07 and 0.54 respectively (both $ps < .001$), indicating that the average trajectory at Wave 4 comprised a rating of present LS of 7.07, a subjective increase from past to present LS of 0.54 scale points, and an anticipated increase from present to future LS five years hence of 1.34 (i.e., $0.54 * 2.49$) scale points.

Statistically significant variances were observed for both latent factors (0.82 and 0.10 respectively, both $ps < .001$), indicating that respondents differed both in the intercepts and slopes of their STP trajectories. The typical STP trajectory reflected a pattern of incline, rather than stability or decline (82%, 15%, and 3% of respondents, respectively). Further, the correlation between latent intercept and trajectory factors was $-.35$ ($p < .001$).

Stability in Latent Trajectories

The latent trajectory results presented above were based on within-time models, pertaining to each of the three waves separately. Hypothesis 2a stated that stability in the latent intercept would be significant and substantial over time, whereas Hypothesis 2b stated the stability in the latent trajectory factor would be significant but modest. To

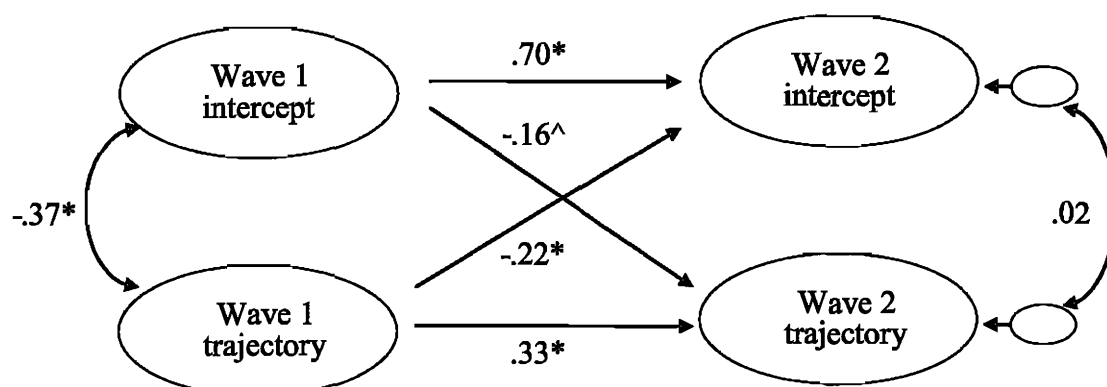
assess the stability of the latent intercept and trajectory factors over time, the models described above were examined in three longitudinal analyses.

First, the Wave 1 latent intercept and trajectory factors were specified as predicting both of the Wave 2 latent factors, resulting in a cross-lagged longitudinal latent trajectory model (see Figure 14 below). Consistent with the within-wave latent trajectory models reported above, the factor loading for the rating of future LS on the latent trajectory factor was fixed to 5 at Wave 1 and at Wave 2. Further, the residuals for the two Wave 2 latent factors were correlated to account for the association between Wave 2 latent factors not explained by the Wave 1 factors. Correlations also were specified between each pair of residual variances in corresponding Wave 1 and Wave 2 measures of past and present LS to account for the anticipated autocorrelation between the same measures taken over time (Duncan et al., 2006; Kline, 1998). Because the residual variances in the ratings of future LS were fixed to zero at both waves, no correlation between these residual variances were specified.

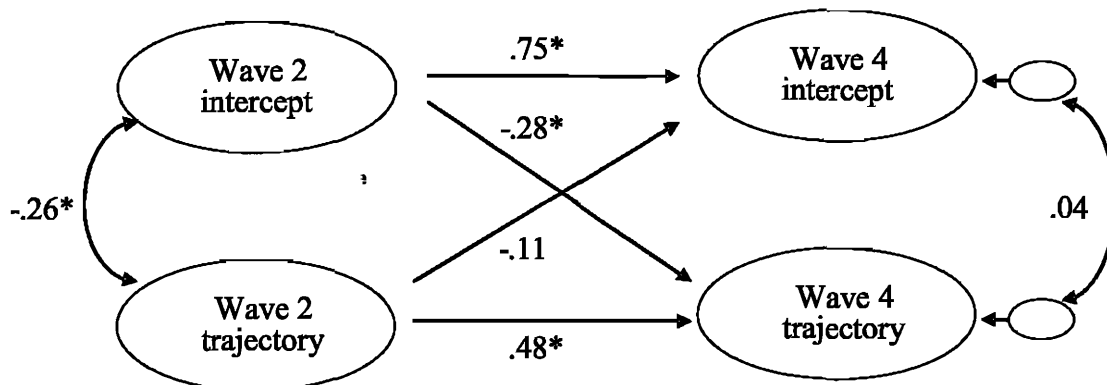
Whereas the above model tested the shorter-term stability of the subjective LS trajectories, longer-term stability was also examined. Using the same specifications, two additional longitudinal models were estimated in which the Wave 4 latent intercept and trajectory factors were regressed onto the Wave 2 latent intercept and trajectory factors and the Wave 1 latent intercept and trajectory factors. In these latter two models, the factor loading for the rating of future LS on the latent trajectory factor was fixed to 5 at Wave 1 and Wave 2, and freely estimated at Wave 4, consistent with the within-wave latent trajectory models reported above.

Figure 14. *Longitudinal Latent Trajectory Models for Wave 1 to Wave 2 (Panel A), Wave 2 to Wave 4 (Panel B), and Wave 1 to Wave 4 (Panel C).*

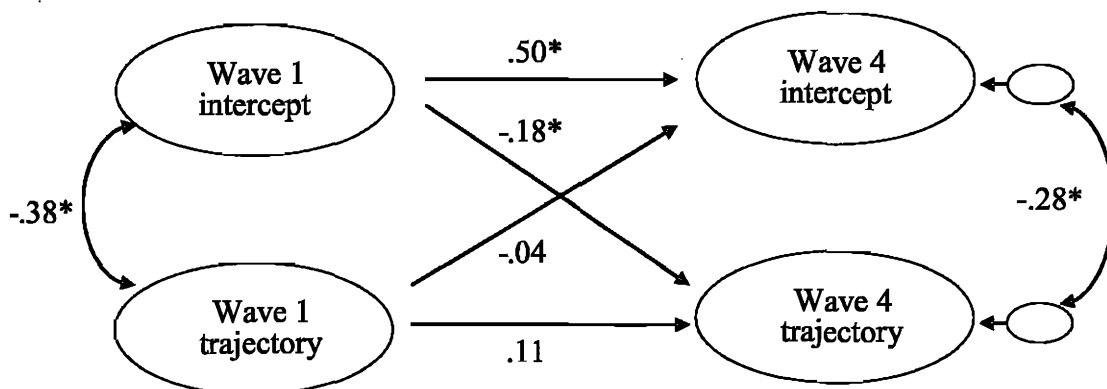
A



B



C



Note. Large ovals are latent variables and small ovals are residual variance terms. The measurement model for the latent intercept and latent trajectory factors, and the autocorrelations between corresponding Wave 1 and Wave 2 ratings of past and present LS are not shown. Standardized path coefficients and correlations are shown.

* $p < .05$. [^] $p = .06$.

Wave 1 to Wave 2 Stability

This model provided good fit ($\chi^2 = 26.80$, $df = 7$, $p < .001$; CFI = .96; RMSEA = .08), and explained 66% and 17% of the variances in the Wave 2 latent intercept and trajectory factors, respectively. As shown in Figure 14A above, significant stability in both latent factors was observed: Higher latent LS intercepts at Wave 1 predicted higher latent LS intercepts at Wave 2, whereas steeper upward latent trajectories at Wave 1 predicted steeper upward latent trajectories at Wave 2. Steeper upward trajectories at Wave 1 also uniquely predicted lower LS intercepts at Wave 2, whereas the cross-lagged effect from Wave 1 latent intercept to Wave 2 latent trajectory only approached significant (i.e., $p = .06$).

Wave 2 to Wave 4 Stability

This model provided excellent fit ($\chi^2 = 13.98$, $df = 6$, $p = .03$; CFI = .99; RMSEA = .06), and explained 62% and 38% of the variances in the Wave 4 latent intercept and trajectory factors, respectively. As shown in Figure 14B above, stability in both latent factors was observed: Higher latent LS intercepts at Wave 2 predicted higher latent LS intercepts at Wave 4, whereas steeper upward latent trajectories at Wave 2 predicted steeper upward latent trajectories at Wave 4. Higher latent intercepts at Wave 2 uniquely predicted less steep LS trajectories at Wave 4, whereas the cross-lagged effect of Wave 2 latent trajectory on the Wave 4 latent intercept was non-significant.

Wave 1 to Wave 4 Stability

This model provided good fit ($\chi^2 = 17.90$, $df = 6$, $p = .006$; CFI = .97; RMSEA = .07), and explained 27% and 6% of the variances in the Wave 4 latent intercept and trajectory factors, respectively. As shown in Figure 14C above, significant stability was

observed for the latent intercept factor (but not the latent trajectory) such that higher latent LS intercepts at Wave 1 predicted higher latent LS intercepts at Wave 4. Similarly, higher latent intercepts at Wave 1 uniquely predicted less steep LS trajectories at Wave 4, whereas the cross-lagged effect of the Wave 1 latent trajectory factor on the Wave 4 latent intercept factor was non-significant.

Additional Stability Analyses

Taken together, the stability results presented above suggest that the stability in the latent STP LS trajectories was moderate between adjacent waves, but non-significant from Wave 1 to Wave 4. To examine this issue further, participants were categorized into one of three STP trajectory patterns at each wave: declining (i.e., raw trajectory, computed as the difference between ratings of future LS and past LS < 0); flat (i.e., raw trajectory = 0); and inclining trajectory (i.e., raw trajectory > 0). These pattern variables were then cross-tabulated across waves.

The association between Wave 1 and Wave 2 trajectory patterns was significant ($\chi^2(4) = 39.90, p < .001$), but modest in magnitude ($\kappa = .24, p < .001$). Overall, 83% of respondents characterized by an upward trajectory at Wave 1 also were characterized by an upward trajectory at Wave 2. However, given the high base rates for inclining trajectories at both waves (i.e., 71% and 75%, respectively), the observed combination of upward/upward subjective trajectories was not greater than what would be expected by chance alone. In contrast, the prevalence of a consistent declining/declining pattern and a inclining/inclining trajectory pattern both were low (13% and 37%, respectively).

Similarly, the association between Wave 2 and Wave 4 trajectory patterns was significant ($\chi^2(4) = 29.47, p < .001$) and modest in magnitude ($\kappa = .14, p < .001$).

Further, although 86% of respondents characterized by an upward trajectory at Wave 2 also were characterized by an upward trajectory at Wave 4, this combination was not greater than what would be expected by chance alone – given the base rates for inclining trajectories at both waves (i.e., 75% and 83%, respectively). In contrast, the prevalence of declining/declining and inclining/inclining trajectory patterns both were low (17% and 25%, respectively).

In contrast, the association between Wave 1 and Wave 4 trajectory patterns was only marginally significant ($\chi^2(4) = 8.92, p = .06$) and modest in magnitude ($\kappa = .10, p < .01$). Whereas 83% of respondents characterized by an upward trajectory at Wave 1 also were characterized by an upward trajectory at Wave 4, this combination was not greater than what would be expected by chance alone (base rates for upward trajectories were 71% and 83%, respectively). In contrast, the prevalence of declining/declining and inclining/inclining trajectory patterns both were low (3% and 21%, respectively).

Summary

The first objective of Part 2 was to describe the longitudinal replicability of the STP LS trajectories over three waves, and evaluate the stability of these trajectories over shorter and longer-term intervals. Hypothesis 1 stated that upward STP LS trajectories would be normative at all three waves. In support of this hypothesis, at each wave, mean ratings of past LS were lower than present LS, and means ratings of present LS were lower than future LS. Similarly, the latent STP LS trajectories at each wave revealed an overall pattern of subjective increases in LS over time.

Interestingly, although the overall pattern of the subjective LS trajectories was consistent at each wave (i.e., steep incline), the shape of the upward subjective

trajectories differed slightly across waves. Whereas the overall latent trajectory was linear at Wave 1 and Wave 2, at Wave 4 a non-linear pattern was observed in which the predicted increase from present LS to five years in the future LS was 2.5 (rather than 5) times larger than the perceived improvement from past LS to present LS.

According to Hypothesis 2a, stability in the latent intercept should be significant and substantial over time, whereas Hypothesis 2b stated that the stability in the latent trajectory factor would be significant but modest. In support of Hypothesis 2a, significant and substantial stability was observed for the latent intercept factor between adjacent and non-adjacent waves. In contrast, moderate stability was observed for the latent trajectory factor between adjacent waves only, and minimal (and non-significant) stability between Wave 1 and Wave 4. Thus, Hypothesis 2b was only partially supported. Yet, subsequent analyses revealed that the instability in latent trajectories did not reflect changes in the direction of the subjective trajectories *per se*, but rather inconsistency in the degree of the upward slope of the subjective LS trajectory.

Objective 2:

Longitudinal Relations Between Subjective LS Trajectories and Positive Functioning

The second objective of the present study was to assess relations between subjective LS trajectories and positive functioning over time. Hypothesis 3a stated that higher levels of LS (as reflected in the latent intercept factor) would predict more positive functioning, both concurrently and prospectively, whereas according to Hypothesis 3b, steeper upward subjective LS trajectories (as reflected in the latent trajectory factor) should predict less positive functioning. Hypothesis 4 stated that correlations between latent intercept and trajectory factors would be negative at each wave. Hypothesis 5

stated that lower levels of present LS and less positive functioning both would predict steeper upward LS trajectories in the future.

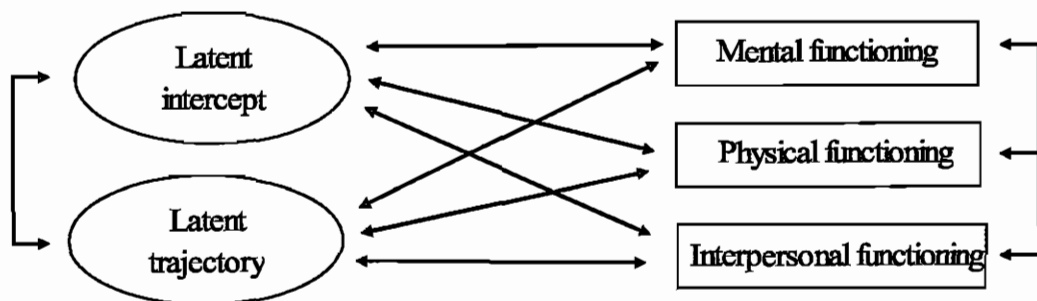
Within-Wave Models

Hypothesis 3a stated that the latent intercept factor (i.e., higher levels of LS) would be positively related to mental, physical, and interpersonal functioning, both concurrently and prospectively. In contrast, according to Hypothesis 3b, upward subjective LS trajectories (as reflected in the latent trajectory factor) should predict less positive functioning. These hypotheses were first tested within each wave, using bivariate and multivariate approaches.

First, correlations were estimated between the latent LS intercept and STP trajectory factors and each of the composite measures of mental, physical, and interpersonal functioning (means, standard deviations, and correlations among functioning measures are presented in Part 1). To do so, correlations were specified between both latent factors and the three functioning measures, as well as between each pair of the functioning measures, as shown in Figure 15 below.¹³

¹³ Note that in these, and all subsequent models involving the latent intercept and trajectory factors, consistent with within-wave findings reported above the loading for the rating of future LS on the latent trajectory factor was fixed to 5 in the Wave 1 and Wave 2 models, and freely estimated in the Wave 4.

Figure 15. *Example of Within-wave Correlation Model.*



Note. Rectangles are measured variables and large ovals are latent variables. For clarity of presentation, the measurement model for the latent intercept and latent trajectory factors is not shown.

At each wave, the correlation models provided adequate overall fit (see Table 16 below). However, at each wave, the residual (unmodeled) covariance between the measure of mental functioning and the residual variance in the rating of present LS was statistically significant – suggesting a unique relation between these two variables that was not account for by the latent intercept and trajectory factors. Thus, each model was modified by including a correlation between these two variables. As shown in Table 16 below, the modified models provided good fit at each wave, and no other residual covariances or means were statistically significant at either wave.

Table 16. *Model Fit Results from Within-Wave Correlations Models*

Model	Model fit indices		
	χ^2 (df)	CFI	RMSEA
<i>Wave 1</i>			
Unmodified	9.51* (5)	.99	.05
Modified	3.31 (4)	>.99	<.01
<i>Wave 2</i>			
Unmodified	32.32* (5)	.96	.11*
Modified	12.50* (4)	>.99	.07
<i>Wave 3</i>			
Unmodified	33.20* (4)	.96	.13*
Modified	19.29* (3)	.98	.11*

Note. $N = 446$. CFI = comparative fit index. RMSEA = root mean square error of approximation. The modified models included a correlation between the measure of mental functioning and the residual variance in the present LS rating ($r_s = .14, .24$, and $.19$ for Wave 1, Wave 2, and Wave 4, respectively, all $ps < .05$). * $p < .05$.

Correlations between latent intercept and trajectory factors with each measure of functioning are shown in Table 17 below. At each wave, both latent factors were associated with each measure of functioning, but in opposite directions. Whereas higher latent LS intercepts (i.e., higher overall levels of LS) were associated with more positive functioning, steeper upward latent subjective LS trajectories (i.e., more positive subjective improvements in LS over time) were associated with less positive functioning.

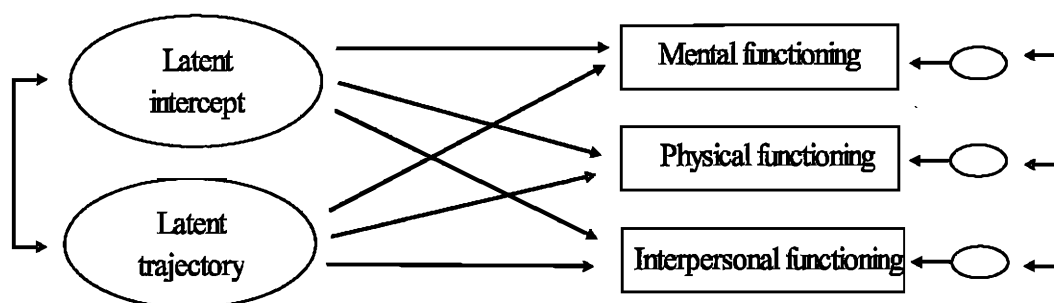
Table 17. *Within-Wave Associations Between Subjective Trajectories and Positive Functioning.*

Correlates / criteria	Correlations		Predictors		R^2
	Latent intercept	Latent trajectory	Latent intercept	Latent trajectory	
<i>Wave 1</i>					
Mental functioning	.52*	-.28*	.49*	-.10	.28
Physical functioning	.43*	-.15*	.43*	.01	.18
Interpersonal functioning	.59*	-.23*	.54*	-.12*	.35
<i>Wave 2</i>					
Mental functioning	.60*	-.32*	.54*	-.17*	.37
Physical functioning	.55*	-.30*	.50*	-.16*	.32
Interpersonal functioning	.65*	-.35*	.59*	-.20*	.45
<i>Wave 4</i>					
Mental functioning	.45*	-.28*	.41*	-.13*	.22
Physical functioning	.46*	-.34*	.38*	-.20*	.24
Interpersonal functioning	.58*	-.32*	.53*	-.12*	.35

Note. $N = 446$. For the predictive models, standardized regression coefficients (β s) are shown by criterion (row variable). * $p < .05$.

The unique and combined predictive relations between the latent intercept and trajectory factors with each measure of functioning were then assessed at each wave using a multivariate model. To do so, the latent LS intercept and STP trajectory factors were specified as simultaneous predictors of each measure of functioning, as shown in Figure 16 below. In these models, a correlation was specified between latent factors, and direct paths were modeled from each latent factor to each measure of functioning. Correlations also were specified between residual variances in each measure of functioning. Further, consistent with the modified models described above, a correlation was included at each wave between the residual variances in the rating of present LS and the residual variance in the measure of mental functioning. Because these models were mathematically equivalent to the corresponding correlation models, fit indices were the same as those shown in Table 17 above.

Figure 16. *Example of Within-wave Predictive Model.*



Note. Rectangles are measured variables, large ovals are latent variables, and small ovals are residual variance terms. For clarity of presentation, the measurement model for the latent intercept and latent trajectory factors is not shown.

Results from the predictive models are presented in Table 17 above. At each wave, both latent factors were uniquely associated with each measure of functioning, with two exceptions: At Wave 1, the latent trajectory factor did not uniquely predict mental or physical functioning. In general, higher latent intercepts were uniquely associated with more positive mental, physical, and interpersonal functioning, whereas steeper slopes uniquely predicted less positive functioning.

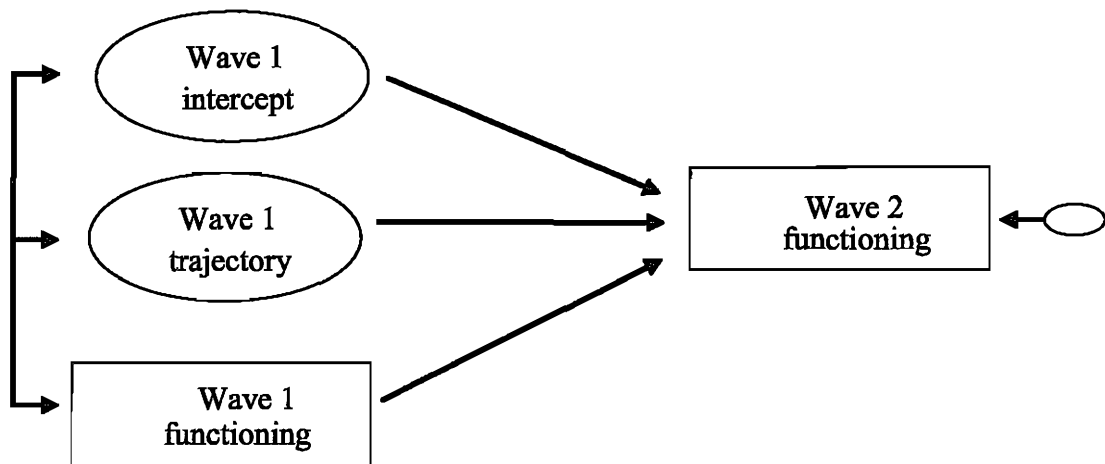
Longitudinal Models

Predicting Positive Functioning

In addition to specifying concurrent relations between subjective LS trajectories and measures of functioning, according to Hypothesis 3a and Hypothesis 3b the latent intercept and latent LS trajectory factors also should be predict, respectively, higher and lower levels of future functioning. To examine the role of the latent intercept and latent trajectory factors as predictors of future functioning, in separate models individual measures of Wave 2 and Wave 4 functioning were regressed onto the corresponding Wave 1 functioning measure and the Wave 1 latent intercept and latent trajectory factors.

As shown in Figure 17 below, correlations were specified between the Wave 1 functioning measure, latent intercept, and latent trajectory factors. In addition, Wave 4 functioning was regressed onto the corresponding Wave 2 functioning measure and the Wave 2 latent intercept and latent trajectory factors. In these models, correlations were specified between the Wave 2 functioning measure, latent intercept, and latent trajectory factors. Further, consistent with the model modifications described above, in each model predicting mental functioning, a within-wave correlation was added between the residual variance in the rating of present LS and mental functioning.

Figure 17. *Example of Longitudinal Model Predicting Mental, Physical, and Interpersonal Functioning.*



Note. Rectangles are measured variables, large ovals are latent variables, and small ovals are residual variance terms. The measurement model for the latent intercept and latent trajectory factors is not shown.

All of the prospective models predicting future functioning from the latent intercept and trajectory factors provided good to excellent model fit, with no indication of significant residual covariances. Results are summarized in Table 18 below.

Table 18. *Results from Longitudinal Models Predicting Future Functioning From Latent Intercept and Trajectory Factors*

Model / criteria	Model fit indices			Predictors			R^2
	χ^2 (df), p -value	CFI	RMSEA	Baseline	Intercept	Trajectory	
W1 to W2 mental functioning	1.02 (3), .80	.99	<.01	.51*	.09	-.10*	(.36) .36
W1 to W2 physical functioning	3.74 (4), .45	.99	<.01	.75*	-.05	-.06	(.55) .55
W1 to W2 interpersonal functioning	2.09 (4), .72	.99	<.01	.71*	.03	.02	(.53) .53
W2 to W4 mental functioning	2.61 (3), .46	.99	<.01	.53*	.05	.01	(.31) .30
W2 to W4 physical functioning	12.63 (4), .01	.98	.07	.54*	.14*	-.06	(.41) .43
W2 to W4 interpersonal functioning	2.31 (4), .68	.99	<.01	.46*	.27*	-.03	(.43) .46
W1 to W4 mental functioning	1.66 (3), .65	.99	<.01	.43*	.07	.00	(.25) .25
W1 to W4 physical functioning	2.70 (4), .61	.99	<.01	.61*	.03	.01	(.38) .38
W1 to W4 interpersonal functioning	2.25 (4), .69	.99	<.01	.37*	.28*	-.06	(.31) .37

Note. $N = 446$. Standardized regression coefficients (β s) are shown by criterion (row variable). For R^2 results, values in parentheses are variances explained by a model comprising only the corresponding baseline functioning measure. * $p < .05$.

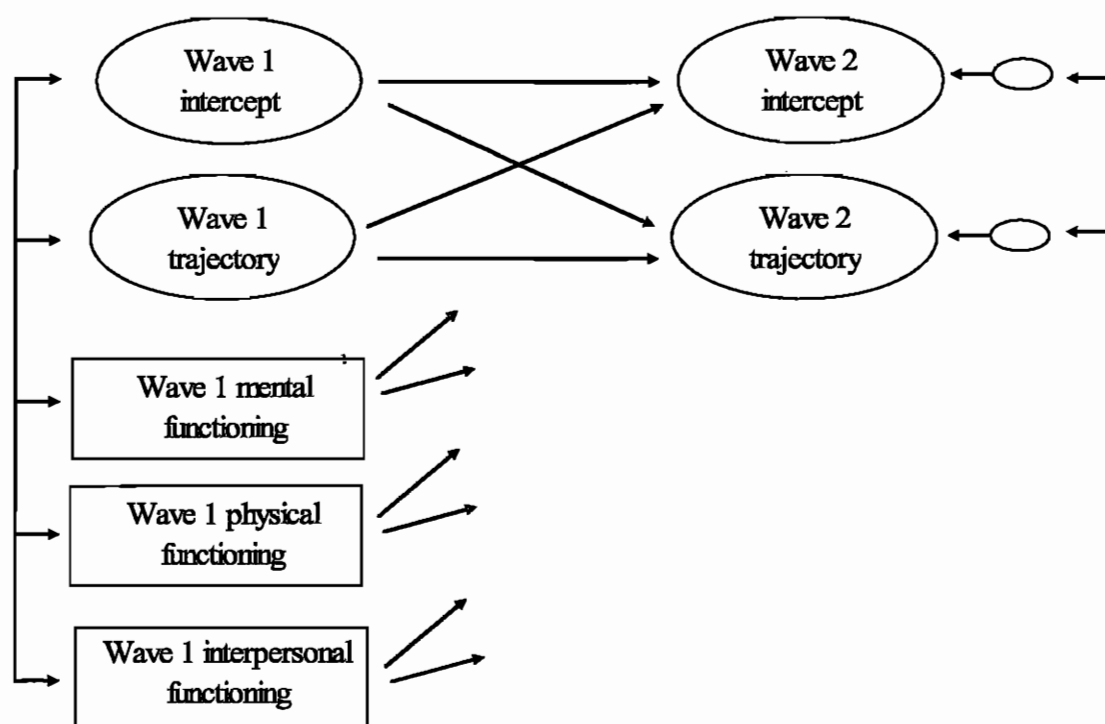
In each model, a strong degree of stability over time was found for each criterion. In contrast, only four significant unique effects were found for the latent intercept and trajectory factors. Higher Wave 1 latent intercepts (i.e., higher levels of LS at Wave 1) uniquely predicted more positive Wave 4 interpersonal functioning, and higher Wave 2 latent intercepts uniquely predicted more positive Wave 4 physical and interpersonal functioning. In addition, steeper Wave 1 latent trajectories (i.e., greater subjective improvements in LS over time) predicted less positive mental functioning at Wave 2. As shown in the final column in Table 18 above, in only the first three of these models was the amount of unique variance explained by the latent intercept and trajectory factors greater than 1%.

Predicting Latent Subjective Trajectories

In addition to anticipating prospective effects of the subjective LS trajectories on future functioning, according to Hypothesis 5 lower levels of present LS and less positive levels of functioning should predict steeper upward LS trajectories in the future. To test these hypothesized relations, the Wave 2 latent intercept and trajectory factors were regressed simultaneously onto the Wave 1 latent intercept and trajectory factors and each Wave 1 measure of functioning. Correlations were specified between the Wave 1 functioning measures, latent intercept, and latent trajectory factors, as well as between corresponding Wave 1 and Wave 4 residual variances in past LS and present LS (to account for measure-specific autocorrelations); a correlation also was included between residual variance in the Wave 2 latent intercept and trajectory factors (see Figure 18 below). Similar models were tested predicting Wave 4 latent intercept and trajectory factors from Wave 1 measures, and predicting Wave 4 latent intercept and trajectory

factors from Wave 2 measures. Note that in each model, a within-wave correlation was included between the residual in the rating of present LS and the mental functioning measure.

Figure 18. *Example of Longitudinal Model Predicting Latent Intercept and Trajectory Factors.*



Note. Rectangles are measured variables, large ovals are latent variables, and small ovals are residual variance terms. The measurement model for the latent intercept and latent trajectory factors is not shown.

All of the prospective models predicting future latent intercept and trajectory factors from positive functioning provided good to excellent model fit, with no indication of significant residual covariances. Results are summarized in Table 19 below.

Table 19. *Results from Longitudinal Models Predicting Subjective Trajectories*

Model / predictors	Model fit indices			Criteria			
	χ^2 (df), <i>p</i> -value	CFI	RMSEA	Latent intercept	R^2	Latent trajectory	R^2
<i>Wave 1 to Wave 2</i>	32.32 (12), .001	.98	.06		(.66) .67		(.17) .22
Latent LS intercept				.56*		.04	
Latent STP LS trajectory				-.19*		.29*	
Mental functioning				.14		-.12	
Physical functioning				.08		-.11	
Interpersonal functioning				.07		-.17	
<i>Wave 1 to Wave 4</i>	30.08 (12), .002	.98	.06		(.27) .29		(.06) .09
Latent LS intercept				.41*		-.08	
Latent STP LS trajectory				-.03		.09	
Mental functioning				.11		-.11	
Physical functioning				.08		-.13	
Interpersonal functioning				.01		.01	
<i>Wave 2 to Wave 4</i>	28.59 (11), .003	.98	.06		(.62) .63		(.38) .37
Latent LS intercept				.90*		-.40	
Latent STP LS trajectory				-.15		.49*	
Mental functioning				.06		-.15	
Physical functioning				-.16		.12	
Interpersonal functioning				-.18		.26	

Note. $N = 446$. Standardized regression coefficients (β s) are shown by criterion (column variable). For R^2 results, values in parentheses are variances explained by a model comprising only the corresponding baseline latent intercept and trajectory factors. * $p < .05$.

A moderate to strong degree of stability over time was found for the latent LS intercept factor in each model, and moderate stability was found for the latent trajectory factor in the Wave 1 to Wave 2, and Wave 2 to Wave 4 models; in contrast, stability in the latent trajectory factor was non-significant in the Wave 1 to Wave 4 model. Only one cross-lagged effect was observed between latent intercept and trajectory factors: Steeper upward latent trajectories (i.e., greater subjective improvements in LS over time) at Wave 1 uniquely predicted lower latent intercepts (i.e., lower levels of present LS) at Wave 2. Further, in each model, the mental, physical, and interpersonal functioning scores were non-significant in predicting future latent intercept and trajectory factors.

In an additional set of analyses, I examined potential non-linear prospective relations between the functioning measures and the subjective trajectories. To do so, the functioning measures were first standardized and quadratic scores (e.g., mental functioning²) were computed for each measure based on the standardized functioning measures. The three quadratic terms were then added to each predictive model as additional predictors of future latent intercept and latent trajectory factors, and correlations were specified between each curvilinear term and all other predictors.

In each model, the inclusion of the three quadratic effects did not result in a substantive change in the explained variance in either latent factor criterion and, with one exception, none of the individual quadratic effects were statistically significant. The one exception was that the quadratic effect of Wave 1 social functioning was a unique predictor of the Wave 4 latent trajectory factor ($b = -.02$, $\beta = -.15$, $p = .03$). Follow-up analyses conducted to determine the nature of this interaction suggested that, holding all other effects constant, among individuals reporting lower levels of Wave 1 social

functioning (e.g., 1 SD below the mean), the relation between Wave 1 social functioning and Wave 4 latent trajectories was positive ($b = .02$, $\beta = .13$), whereas among individuals reporting higher levels of Wave 1 social functioning (e.g., 1 SD above the mean) this relation was negative ($b = -.04$, $\beta = -.17$).

Summary

The second objective of Part 2 was to assess prospective relations between subjective LS trajectories and positive functioning over time, treating the subjective LS trajectories both as predictors of future functioning and outcomes of functioning. According to Hypothesis 3a, higher levels of LS would predict more positive levels of functioning, both concurrently and prospectively. At each wave, higher latent intercepts (i.e., higher levels of present LS) were correlated with more positive mental, physical, and interpersonal functioning; whereas steeper upward trajectories (i.e., greater subjective improvements in LS over time) were associated with less positive functioning. These same patterns were also observed at each wave when the latent intercept and trajectory factors were examined as joint predictors of concurrent functioning. In contrast, results from the longitudinal models predicting future functioning indicated that the unique predictive effects of the latent intercept and trajectory factors were inconsistent and modest. The latent intercept factor was uniquely predictive of more positive future functioning in three models (Wave 2 to Wave 4 physical and interpersonal functioning, Wave 1 to Wave 4 interpersonal functioning). Together with the cross-sectional results, these results provide partial support for Hypothesis 3a.

Hypothesis 3b stated that steeper upward subjective LS trajectories would predict less positive levels of functioning. The latent trajectory factor was uniquely predictive of

(less positive) future functioning in only one longitudinal model (Wave 1 to Wave 2 mental functioning), and was uniquely predictive of lower future latent intercepts in one model (Wave 1 to Wave 2). Thus, present results strongly support the hypothesized concurrent relations between the latent intercept and positive functioning, but provide minimal support for the anticipated prospective relations between steeper upward subjective trajectories and future functioning specified by Hypothesis 3b.

Hypothesis 4 stated that the latent intercept and trajectory factors would be negatively correlated at each wave. In support of this hypothesis, a negative correlation between latent intercept and trajectory factors was observed at each wave. However, cross-lagged effects were not consistently observed. Whereas in two of the three longitudinal stability models, higher latent intercepts predicted less steep trajectories at subsequent waves (Wave 1 to Wave 4, and Wave 2 to Wave 4), a cross-lagged effect for the latent trajectory factor on the latent intercept was observed only in the one model (Wave 1 to Wave 2).

Finally, according to Hypothesis 5, lower levels of present LS and less positive levels of functioning would predict steeper upward LS trajectories in the future. In the longitudinal models examining latent intercept and trajectory factors as potential outcomes of mental, physical, and interpersonal functioning, the unique prospective effects of mental, physical, and interpersonal functioning on the latent intercept and trajectory factors were non-significant, with the exception of one curvilinear effect in one predictive model (Wave 1 social functioning² on Wave 4 latent trajectory). Overall, therefore, the present results do not support the anticipated prospective effects of mental, physical, and interpersonal functioning on future subjective LS trajectories.

Objective 3:

Determining Bias in the Subjective LS Trajectories

The third objective was to examine bias in the subjective LS trajectories.

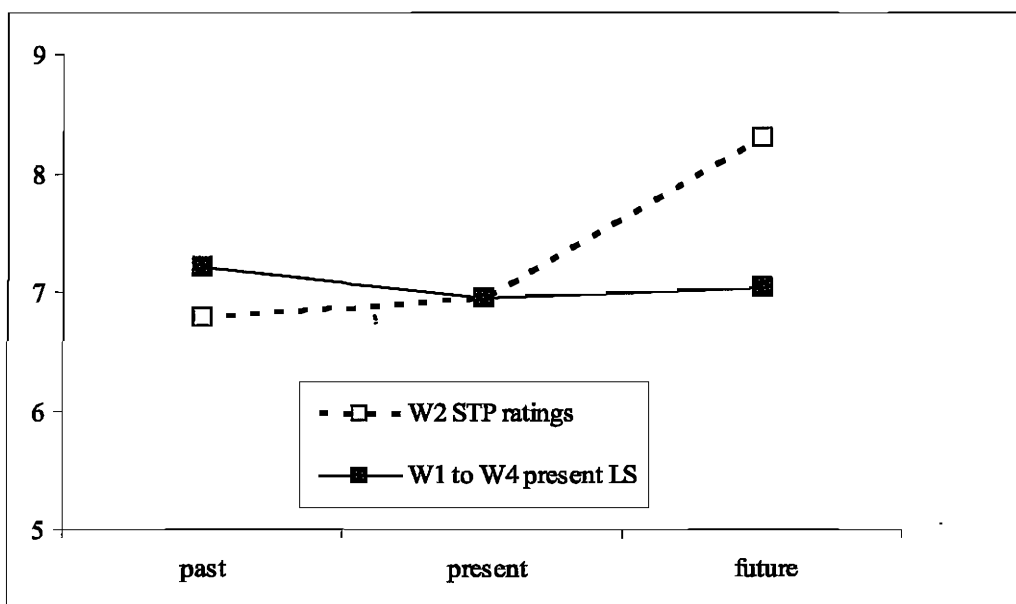
Hypothesis 6a and Hypothesis 6b stated, respectively, that steeper upward subjective LS trajectories would be associated with greater *overestimation* of future LS (i.e., more positive prospective bias) and greater *underestimation* of past LS (i.e., more negative retrospective bias). With respect to bias in the subjective trajectories and positive functioning, Hypothesis 7a and Hypothesis 7b stated that greater current distress and dysfunction would be related to more negative retrospective bias and more positive prospective bias, respectively. Finally, according to Hypothesis 8a, more positive prospective bias should be associated with less positive functioning in the future, and these associations should be non-linear in nature, with extremely high levels of bias associated with the poorest future outcomes (Hypothesis 8b).

Trends in Mean Levels of Present LS Across Waves

Prior to evaluating retrospective and prospective biases in the subjective LS trajectories, I first examined mean trends in ratings of present LS over time. A one-way repeated-measure ANOVA was computed to evaluate the trends in present LS across the three waves (see Table 14 above for means and standard deviations for present LS at each wave). The main effect of wave was significant; $F(2,890) = 7.52, p = .001, \eta^2 = .02$. In follow-up pairwise comparisons, the mean level of present LS at Wave 1 differed significantly both from Wave 2 and Wave 3 (both $ps < .02$), whereas these latter two means did not differ from each other. Taken together, these results suggest a significant, modest, and non-linear trend toward decreasing levels of LS over time, particularly

between Wave 1 and Wave 2. In comparison to this relatively small change in mean levels of present LS across waves, the effect size (η^2) for the main effect of STP at Wave 2 was .37 – suggesting a substantially larger subjective LS trajectory than actual trend in LS over time (see Figure 19 below).

Figure 19. *Comparison Between Actual Trend in Mean Levels of Present LS Over Time versus Wave 2 STP Ratings for Past, Present, and Anticipated Future LS.*



Note. Filled squares show mean levels of present life satisfaction (LS) (y-axis) at Wave 1 (labeled as ‘past’ on the y-axis), Wave 2 (‘present’ on the y-axis), and Wave 4 (‘future’ on the y-axis). Open squares show mean levels of Wave 2 past, present, and anticipated future LS.

Bias in Wave 2 STP Ratings

According to Hypothesis 6a and Hypothesis 6b, steeper upward subjective LS trajectories would be associated, respectively, with more positive prospective and more negative retrospective bias. To assess bias in the STP LS ratings, bias scores were computed both for the Wave 2 retrospective ratings of past LS and prospective ratings of

future LS. Two types of bias were determined. First, a ‘retrospective bias’ score was computed for each respondent by taking the raw difference between the Wave 2 rating of past LS (i.e., the recollected past) and the Wave 1 rating of present LS (i.e., the actual past). Whereas positive scores indicate overestimation of past LS, negative scores indicate underestimation of past LS. Second, a ‘prospective bias’ score was computed for each respondent by taking the difference between the Wave 2 rating of future LS (i.e., the anticipated future) and the Wave 4 rating of present LS (i.e., the actual future). Whereas positive scores indicate overestimation of future LS, negative scores indicate underestimation of future LS.

A limitation of this approach arises from the mismatch between the spacing of the Wave 2 subjective ratings of past and future LS (i.e., one year in the past, five years in the future) and the actual spacing between longitudinal assessments, which was roughly four months (i.e., 0.33 years) between Wave 1 and Wave 2, and two and 1/3rd years (i.e., 2.33 years) between Wave 2 and Wave 4. Without make some correction, therefore, the retrospective and prospective bias scores would not be contrasting subjective versus actual levels of LS for corresponding time points in the past or future.

To address this issue, the retrospective and prospective bias scores were adjusted in the following manner. First, an adjusted score for Wave 2 past LS was computed using the following formula: ‘adjusted Wave 2 past LS’ = [Wave 2 present LS – ((Wave 2 present LS – Wave 2 past LS) * 0.33)]. This score represented what the Wave 2 rating of past LS might have been had participants been asked to rate their LS “4 months” in the past instead of one year in the past. Then an adjusted retrospective bias score was

computed as follows: ‘adjusted retrospective bias’ = adjusted Wave 2 past LS – Wave 1 present LS.

Second, an adjusted score for the rating of Wave 2 future LS was computed using the following formula: ‘adjusted Wave 2 future LS’ = [Wave 2 present LS + ((Wave 2 future LS – Wave 2 present LS) * (2.33/5))]. This score estimated what the Wave 2 rating of future LS might have been had participants been asked to rate their LS “2 and 1/3rd years in the future” instead of 5 years in the future. Then an adjusted prospective bias score was computed as follows: ‘adjusted prospective bias’ = adjusted Wave 2 future LS – Wave 4 present LS.¹⁴

On average, participants underestimated the level of past LS. The adjusted retrospective bias score had a mean of -0.32 ($SD = 1.23$), and ranged from -5 to +5. Participants also overestimated, on average, the level of future LS. The adjusted prospective bias score had a mean of 0.54 ($SD = 1.28$), and ranged from -3 to +6.¹⁵ Further, the correlation between adjusted retrospective and prospective bias scores was significant but small in magnitude ($r = .14, p < .001$), suggesting a weak association between greater overestimation of past LS and greater overestimation of future LS.

Latent Trajectory Model for Present LS

An alternative approach to determining bias in the subjective LS trajectories is to examine the association between the actual trajectory in ratings of present LS from Wave 1 to Wave 4 with the Wave 2 subjective LS trajectory. I first estimated a standard latent

¹⁴ The validity of these adjustments rests on the assumption that the Wave 2 subjective trajectories are linear, that is, comprised of constant per year subject changes in LS. The Wave 2 latent trajectory model results, presented above, support this assumption.

¹⁵ The correlations between raw and adjusted bias scores were .73 and .88, respectively, for the retrospective and prospective biases.

growth curve model for ratings of present LS across the three waves. In this model, the latent intercept factor was indicated by fixed (unstandardized) loadings of 1 from ratings of Wave 1, Wave 2, and Wave 4 present LS; the latent trajectory factor was indicated by fixed loadings of -0.33 and 0 from ratings of Wave 1 and Wave 2 present LS, respectively, along with either a fixed factor loading of 2.33 for the rating of Wave 4 present LS (Model 1) or a freely estimated factor loading for the rating of Wave 4 present LS (Model 2). Together, these specifications created a latent linear trajectory for ratings of present LS with an intercept at Wave 2 (to coincide with the Wave 2 STP trajectory model) extending $1/3^{\text{rd}}$ of year in the past, and 2 and $1/3^{\text{rd}}$ years into the future (Model 1), or an unspecified latent trajectory shape with an intercept at Wave 2 and extending $1/3^{\text{rd}}$ years into the past (Model 2).

Model fit results are summarized in Table 20 below. Both models resulted in statistically ‘inadmissible’ solutions: Although Model 1 was a saturated model (i.e., $df=0$) and thus provided perfect fit, the estimated variance in the latent trajectory factor was negative and non-significant. In Model 2, the estimated residual variance in Wave 4 present LS rating was negative and non-significant.

Table 20. *Model Fit Results from Latent Trajectory Models for Ratings of Present Life Satisfaction.*

Model	Fit indices		
	χ^2 (df)	CFI	RMSEA
<i>Original models</i>			
Model 1 (future = free)	0 (0)	1.00	0.00
Model 2 (future = 2.33)	15.78 (1)*	0.93	0.18
<i>Modified models</i>			
Model 1B (future = free)	1.49 (1)	0.99	0.03
Model 2B (future = 2.33)	15.79 (2)*	0.93	0.12

Note. $N = 446$. The unstandardized factor loading for the rating of Wave 4 life satisfaction is shown in brackets in the 'Model' column. CFI = comparative fit index. RMSEA = root mean square error of approximation. * $p < .05$.

Modified versions of both models were estimated in which, respectively, the variance in the latent trajectory was fixed to zero (Model 1B), and the residual Wave 4 present LS rating variance was fixed to zero (Model 2B). Whereas Model 1B provided excellent fit, Model 2B did not.

In Model 1B, the estimated factor loading for the rating of Wave 4 present LS was -0.16 ($p = .02$), the estimated mean latent intercept was 6.94 ($p < .001$), and the estimated mean latent trajectory was -0.79 ($p < .001$). Further, the estimated variance on the latent intercept factor was 0.90 ($p < .001$), whereas the variance on the latent trajectory factor was fixed to zero. These results imply a non-linear trajectory in ratings of present LS between Wave 1 and Wave 4 comprising a mean LS rating of 6.94 at Wave 2, in combination with a small mean change of 0.26 in present LS from Wave 2 to Wave 1 (i.e., $-0.33 * -0.79 = 0.26$) and an even smaller mean change of 0.13 in present LS from Wave 2 to Wave 4 (i.e., $-0.16 * -0.79 = 0.13$). Further, whereas individuals differed with

respect to their level of present LS at Wave 2 (as indicated by the significant variance on the latent intercept factor), there were no significant individual differences in slope of the trajectory factor, as indicated by the non-significant variance in the latent trajectory factor.

Because this variance in the latent trajectory factor was non-significant, individual differences in this factor could not be examined in relation to other variables, including the Wave 2 subjective LS trajectory factor. Instead, in order to estimate the bias in the subjective LS trajectories, the adjusted retrospective and prospective bias scores were examined in relation to the Wave 2 latent intercept and trajectory factors by testing a model in which the adjusted bias scores were correlated with both latent factors and with each other. Although this model provided adequate fit ($\chi^2 = 17.27$, $df = 4$, $p = .002$, CFI = .95, RMSEA = .09), a significant residual covariance was observed between the residual variance in the rating of present LS and the prospective bias score. After modifying the model to incorporate this covariance ($r = .24$, $p < .001$), excellent fit was obtained; $\chi^2 = 4.75$, $df = 3$, $p = .19$, CFI = .99, RMSEA = .04.

In this modified model, the latent intercept factor was significantly correlated with the retrospective bias score ($r = .52$, $p < .001$) but not with the prospective bias score ($r = .04$, $p = .66$), whereas the latent subjective LS trajectory factor was significantly correlated both with the retrospective and prospective bias scores ($r_s = -.59$ and $.23$, respectively, $p < .001$ and $p = .008$). That is, participants with lower LS intercepts at Wave 2 were characterized by more negative retrospective bias (i.e., greater underestimation of past LS). Further, participants with steeper upward subjective LS trajectories were characterized by more negative retrospective bias (i.e., greater

underestimation of past LS) and more positive prospective bias (i.e. greater overestimation of future LS). Together, these findings suggest that steeper upward subjective trajectories were more biased, both respect to more negative bias toward the past and more positive bias toward future satisfaction.

Associations Between Bias Scores and Positive Functioning

According to Hypothesis 7a and Hypothesis 7b, individuals whose lives are characterized by greater distress and dysfunction at present should report, respectively, more negative retrospective bias and greater prospective bias. To evaluate these hypotheses, I examined the associations between bias in the subjective trajectories and positive functioning by correlating the two Wave 2 bias scores with the Wave 1, Wave 2, and Wave 4 measures of mental, physical, and interpersonal functioning.¹⁶ Results are shown in Table 21 below.

Wave 2 retrospective bias scores were negatively and significantly associated with Wave 1 mental functioning, indicating that more positive mental functioning at Wave 1 was associated with more negative retrospective bias (i.e., greater underestimation of past LS). In contrast, Wave 2 retrospective bias was positively associated with each Wave 2 functioning measure, indicating that more positive functioning at Wave 2 was correlated with less retrospective bias (i.e., less underestimation of past LS). Wave 2 prospective bias was not significantly correlated with any of the Wave 1 or Wave 2 functioning measures. However, prospective bias was significantly and negatively correlated with Wave 4 mental, physical, and interpersonal functioning. That is, as predicted, greater prospective bias at Wave 2 (i.e., greater

¹⁶ As these analyses were performed in SPSS using the measured variables only, model fit indices are not reported.

overestimation of future LS) was associated with less positive functioning in the future. These associations suggest greater biases toward underestimating past LS and overestimating future LS are systematically related to less positive levels of present and future functioning, respectively.

Table 21. *Associations Between Wave 2 Prospective and Retrospective Bias Scores and Positive Functioning Measures by Wave.*

Correlates	Wave 2 bias scores	
	Retrospective	Prospective
<i>Wave 1</i>		
Mental functioning	-.11*	-.09
Physical functioning	-.02	-.07
Interpersonal functioning	-.07	-.04
<i>Wave 2</i>		
Mental functioning	.19*	.04
Physical functioning	.13*	-.01
Interpersonal functioning	.11*	-.04
<i>Wave 4</i>		
Mental functioning	.04	-.28*
Physical functioning	.10	-.17*
Interpersonal functioning	.01	-.20*

Note. $N = 446$. * $p < .05$.

Non-Linear Effects of Prospective Bias

According to Hypothesis 8, associations between prospective bias and future functioning should be non-linear in nature, with extremely high levels of bias associated with the poorest outcomes. To assess the anticipated non-linear relations between prospective bias and measures of Wave 4 functioning, a curvilinear effect was computed

for the Wave 2 prospective bias score (i.e., prospective bias²) after standardizing the bias score. Each of the Wave 4 functioning indicators (converted to standardized scores) were then regressed onto the linear and non-linear prospective bias scores. As shown in Table 22 below, in all three models, the linear and non-linear effects were significant, and the nature of these relations were similar in each model. Specifically, the association between more positive prospective bias scores (i.e., the tendency to overestimate future LS) and more negative functioning at Wave 4 was particularly strong for individuals reporting highly positive prospective bias scores. For example, among individuals characterized by high levels of prospective bias (i.e., 1 SD above the mean), the association between more positive prospective bias and poorer mental functioning was significantly stronger than the relation observed among individuals characterized by low level of prospective bias (i.e., 1 SD below the mean); $bs = -.31$ and $-.15$, respectively (both $ps < .05$).

Table 22. *Non-Linear Associations Between Wave 2 Prospective Bias and Wave 4 Functioning*

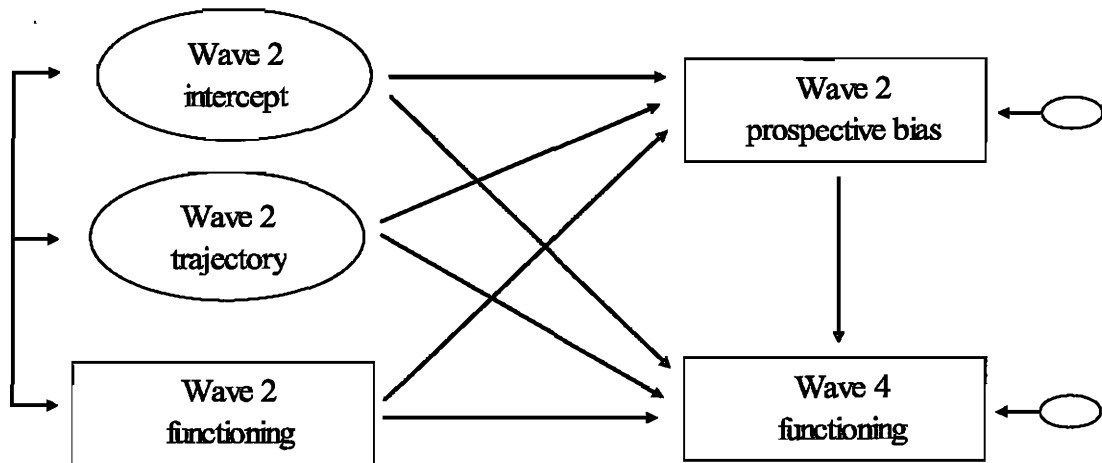
Wave 4 criteria	Wave 2 predictors	
	Bias score	Bias score ²
Mental functioning	-.23*	-.08*
Physical functioning	-.13*	-.05*
Interpersonal functioning	-.14*	-.09*

Note. $N = 446$. Unstandardized regression coefficients are shown for each predictor (column variables) by criterion (row variable). * $p < .05$.

Subsidiary Analyses: Indirect Effects of Subjective LS Trajectories

Taken together, results presented above suggest a possible indirect connection between subjective LS trajectories and less positive functioning, wherein steeper upward subjective trajectories predict greater overestimation of future LS which, in turn, predicts less positive future functioning. To investigate this possibility, I estimated three additional longitudinal predictive models in which each of the Wave 4 functioning measures were regressed individually onto the corresponding Wave 2 functioning measure, the Wave 2 latent intercept and latent trajectory factors, and the prospective bias score, which itself was regressed onto each of these Wave 2 variables (see Figure 20 below). Note that consistent with the modified models described above, correlations were also included between the residual variance in the prospective bias score and the residual variance in the Wave 2 rating of present LS ($r = .34, p < .05$) and, in the model predicting Wave 4 mental functioning, the residual variance in the Wave 2 mental functioning measure and the Wave 2 rating of present LS ($r = .24, p < .05$).

Figure 20. *Example of Longitudinal Model Predicting Wave 4 Functioning from Wave 2 Latent Intercept, Wave 2 Latent Trajectory, Wave 2 functioning, and Prospective Bias Scores.*



Note. Rectangles are measured variables, large ovals are latent variables, and small ovals are residual variance terms. For clarity of presentation, the measurement model for the latent intercept and latent trajectory factors is not shown.

As shown in Table 23 below, each model provided excellent fit the data. Across all three models, steeper upward trajectories at Wave 2 predicted greater prospective bias (i.e., greater overestimation of future LS), which in turn uniquely predicted lower levels of Wave 4 functioning. The Wave 2 latent intercept factor did not predict prospective bias, nor did any of the Wave 2 functioning measures. Higher Wave 2 latent LS intercepts did, however, uniquely predict higher levels of functioning in each model, as did the Wave 2 functioning measure corresponding to the Wave 4 criterion.

Table 23. Results from Longitudinal Models Predicting Wave 4 Functioning from Wave 2 Subjective Trajectories and Prospective Bias.

Wave 4 criterion / Wave 2 predictors	Model fit indices			Criteria			
	χ^2 (df), <i>p</i> -value	CFI	RMSEA	Prospective bias	R^2	Functioning	R^2
<i>Wave 4 mental functioning</i>	10.09 (3), .02	.99	.07		.07		(.30) .40
Mental functioning				.08		.50*	
Latent LS intercept				.05		.14*	
Latent STP LS trajectory				.27*		.03	
Prospective bias				---		-.31*	
<i>Wave 4 physical functioning</i>	12.68 (4), .01	.98	.07		.08		(.43) .47
Physical functioning				.01		.52*	
Latent LS intercept				.07		.19*	
Latent STP LS trajectory				.29*		-.05	
Prospective bias				---		-.15*	
<i>Wave 4 social functioning</i>	3.28 (4), .51	.99	.01		.07		(.46) .52
Social functioning				.01		.40*	
Latent LS intercept				.08		.35*	
Latent STP LS trajectory				.29*		-.03	
Prospective bias				---		-.18*	

Note. *N* = 446. Standardized regression coefficients (β s) are shown by criterion (column variable). For R^2 results, values in parentheses are variances explained by a model omitting the prospective bias score as predictor. * $p < .05$.

Summary

The third objective of Part 2 was to examine bias in the subjective LS trajectories. Hypothesis 6a and Hypothesis 6b stated, respectively, that steeper upward subjective LS trajectories would be associated with greater *overestimation* of future LS and greater *underestimation* of past LS. In contrast to the steep upward subjective LS trajectories observed at each wave, the actual mean levels of LS revealed a relatively flat trajectory over time. Consistent with this disparity in the mean-level trends between subjective and actual LS trajectories, and in support of Hypotheses 6a and 6b, participants at Wave 2 generally underestimated their level of past LS and overestimated their level of future LS. Further, whereas lower LS intercepts predicted more negative retrospective bias, steeper upward subjective LS trajectories were associated both with more negative retrospective bias and more positive prospective bias.

According to Hypothesis 7a and Hypothesis 7b, greater current distress and dysfunction should be related to more negative retrospective bias and more positive prospective bias, respectively. In support of Hypothesis 7a, lower levels of present functioning were associated with more negative retrospective bias, that is, greater underestimation of past LS. In contrast, Hypothesis 7b, in which current distress was expected to promote greater prospective bias was not supported.

Finally, according to Hypothesis 8a and Hypothesis 8b, respectively, greater prospective bias should be associated with less positive functioning in the future, and these associations should be non-linear in nature, with extremely high levels of bias associated with the poorest future outcomes. In support of Hypothesis 8a, more positive prospective bias was associated with less positive functioning in the future and these

relations were non-linear, such that the strongest negative associations were found at particularly high levels of prospective bias, consistent with Hypothesis 8b. Finally, subsidiary analyses revealed a potential indirect link between Wave 2 subjective LS trajectories and Wave 4 functioning wherein steeper upward subjective LS trajectories at Wave 2 predicted greater overestimation of future LS (i.e., more positive prospective bias), which in turn uniquely predicted less positive mental, physical, and interpersonal functioning at Wave 4.

Objective 4:

Comparing the Predictive Utility of Actual versus Subjective LS Trajectories

The fourth objective of the present study was to compare the relative predictive utility of the subjective LS trajectories with the separate ratings of past, present, and anticipated future LS. Hypothesis 9 stated that the subjective trajectory approach would provide greater utility than a predictive model based on the separate ratings of past, present, and anticipated future LS.

Cross-Sectional Models

Before comparing the predictive utility of the separate LS ratings to results based on the subjective LS trajectories, I first examined the bivariate associations between the three measures of positive functioning and the three separate LS ratings. Correlations between the three STP ratings and the three measures of functioning were computed. As shown in Table 24 below, at each wave, all three STP ratings were positively associated with higher levels of mental, physical, and interpersonal functioning.

Table 24. *Within-Wave Correlations Between Subjective Temporal Perspective Life Satisfaction Ratings and Measures of Functioning.*

Correlates	STP LS ratings		
	Past LS	Current LS	Future LS
<i>Wave 1</i>			
Mental functioning	.29	.46	.18
Physical functioning	.21	.31	.22
Interpersonal functioning	.32	.40	.20
<i>Wave 2</i>			
Mental functioning	.28	.58	.26
Physical functioning	.21	.41	.24
Interpersonal functioning	.34	.41	.28
<i>Wave 3</i>			
Mental functioning	.26	.49	.22
Physical functioning	.25	.37	.16
Interpersonal functioning	.31	.46	.30

Note. $N = 446$. STP = subjective temporal perspective. LS = life satisfaction. All $ps < .05$

Next, to determine the combined and unique predictive associations of the three STP ratings within each wave, the three measures of functioning were regressed onto the three separate LS ratings simultaneously. As shown in Table 25 below, higher levels of present LS were uniquely associated with higher levels of mental, physical, and interpersonal functioning at each wave. Similarly, with two exceptions (Wave 2 physical functioning, Wave 4 mental functioning), higher levels of past LS were uniquely associated with higher levels of functioning at each wave. In contrast, in only two models was the rating of future LS uniquely associated with functioning (Wave 1 physical functioning, Wave 2 interpersonal functioning).

Table 25. *Within-Wave Predictive Associations Between Subjective Temporal Perspective Life Satisfaction Ratings and Measures of Functioning.*

Criteria	Within-wave STP predictors			R^2
	Past LS	Present LS	Future LS	
<i>Wave 1</i>				
Mental functioning	.14*	.41*	.02	.23
Physical functioning	.10*	.23*	.13*	.12
Interpersonal functioning	.20*	.31*	.06	.20
<i>Wave 2</i>				
Mental functioning	.10*	.54*	.01	.35
Physical functioning	.07	.35*	.08	.18
Interpersonal functioning	.21*	.31*	.09*	.22
<i>Wave 4</i>				
Mental functioning	.07	.48*	-.04	.25
Physical functioning	.12*	.34*	-.04	.15
Interpersonal functioning	.14*	.35*	.09	.23

Note. $N = 446$. STP = subjective temporal perspective. Standardized regression coefficients (β s) are shown by criterion (row variable). * $p < .05$.

According to Hypothesis 9, the subjective trajectory approach should provide greater utility than a predictive model based on the separate ratings of past, present, and anticipated future LS. Of particular interest, therefore, was the comparison between results concerning the predictive utility of the three separate STP LS ratings, as indexed by the R^2 values shown in Table 25 above, and the corresponding within-wave predictive results based on the latent subjective trajectory models shown in Table 17 above. In six of the nine predictive models, the amount of criterion variance explained was substantially greater in the latent trajectory models, compared to the regression models based on the three separate LS ratings -- ranging from a total of 9% to 23% more explained variance (exceptions were Wave 1 physical functioning, Wave 2 mental functioning, and Wave 4

mental functioning). In contrast, in none of the models did the variance explained by the three separate LS ratings exceed that of the latent subjective trajectory models.

In addition to comparing the predictive utility of the three separate LS ratings to results from the latent variable models, the within-wave predictive models were computed based on factor scores for the LS intercept and subjective LS trajectory factors. These factor scores were estimated using the factor score coefficients derived from the latent variable models, and provided a comparison of predictive utility with the three separate LS ratings based on measured (rather than latent) scores for the LS intercept and subjective LS trajectory factors.

As shown in Table 26 below, higher levels of the LS intercept were uniquely associated with more positive mental, physical, and interpersonal functioning at each wave. Similarly, with one exception (Wave 1 physical functioning), steeper upward LS subjective trajectories were uniquely associated with less positive functioning at each wave.

Table 26. *Within-Wave Predictive Associations Between LS Intercept and Subjective LS Trajectory Factor Scores and Measures of Functioning.*

Criteria	Within-wave predictors		R^2
	LS intercept	LS trajectory	
<i>Wave 1</i>			
Mental functioning	.48*	-.19*	.22
Physical functioning	.35*	-.03	.12
Interpersonal functioning	.46*	-.16*	.20
<i>Wave 2</i>			
Mental functioning	.68*	-.39*	.31
Physical functioning	.49*	-.22*	.16
Interpersonal functioning	.57*	-.26*	.22
<i>Wave 4</i>			
Mental functioning	.48*	-.23*	.20
Physical functioning	.39*	-.21*	.14
Interpersonal functioning	.50*	-.16*	.22

Note. $N = 446$. Standardized regression coefficients (β s) are shown by criterion (row variable). * $p < .001$.

In seven out of the nine models, the amount of criterion variance explained by the three separate LS ratings was within 2% of the variance explained by the models based on the estimated LS intercept and subjective LS trajectory factor scores. Further, in the two models predicting Wave 2 and Wave 4 mental functioning, the three separate LS ratings explained 4% or 5% more criterion variance than did the estimated factor scores. In contrast, in no case was the amount of variance explained by the estimated factor scores greater than the variance explained by the separate LS ratings.

Longitudinal Models

Predicting Positive Functioning Over Time

Hypothesis 9 concerned the relative predictive utility of the subjective LS trajectories versus the three separate LS ratings both in cross-sectional and prospective models. Whereas the previous analyses addressed cross-sectional comparisons, to evaluate the predictive relations between the three separate LS ratings with measures of functioning over time, in a series of longitudinal predictive models individual measures of Wave 2 and Wave 4 functioning were regressed onto the corresponding Wave 1 functioning measure and the three Wave 1 LS ratings. In an additional three models, each of the three Wave 4 functioning measures were regressed individually onto the corresponding Wave 2 functioning measure and the three Wave 2 LS ratings.

As summarized in Table 27 below, in each model, strong stability in the criteria was observed. In contrast, the unique contribution of the three separate LS ratings was significant in only three models, with only one significant effect in each of these models. Higher ratings of future LS at Wave 1 uniquely predicted lower levels of Wave 2 physical functioning. Higher ratings of future LS at Wave 2 uniquely predicted higher levels of Wave 2 interpersonal functioning. Higher ratings of present LS at Wave 2 predicted higher levels of Wave 4 interpersonal functioning. Further, the amount of unique variance explained in the criteria by the inclusion of three separate LS ratings in each model was small, ranging from 0% to 2%.

Table 27. *Results from Longitudinal Models Predicting Future Functioning From Separate Life Satisfaction Ratings.*

Model / criteria	Predictors				R^2
	Baseline	Past LS	Present LS	Future LS	
W1 to W2 mental functioning	.54*	.05	.08	-.05	(.34) .35
W1 to W2 physical functioning	.75*	-.03	.03	-.07*	(.55) .55
W1 to W2 interpersonal functioning	.72*	.00	.01	.03	(.53) .53
W2 to W4 mental functioning	.51*	-.02	.05	.03	(.30) .30
W2 to W4 physical functioning	.61*	.06	.05	.01	(.41) .42
W2 to W4 interpersonal functioning	.57*	.06	.07	.09*	(.42) .44
W1 to W4 mental functioning	.43*	-.01	.06	.01	(.21) .22
W1 to W4 physical functioning	.61*	.01	.01	.01	(.38) .38
W1 to W4 interpersonal functioning	.47*	.08	.13*	.03	(.31) .33

Note. $N = 446$. Standardized regression coefficients (β s) are shown by criterion (row variable). For R^2 results, values in parentheses are variances explained by a model comprising only the corresponding baseline functioning measure. * $p < .05$.

Of particular interest with respect to Hypothesis 9 is the comparison between results concerning the cumulative variance explained in each criterion in these prospective models with findings from longitudinal predictive models based on the latent subjective LS trajectories shown in Table 18 above. In eight out of nine models, the amount of variance explained in each criterion in the latent trajectory models was within one or two percentage points of the results from the regression models using the three separate LS ratings. The one exception was in the prediction of Wave 4 interpersonal functioning from Wave 2 functioning, in which the Wave 2 latent trajectory model explained 4% additional variance compared to the model treating the separate LS ratings as separate predictors.

In addition to making these comparisons based on results from the latent variable models, estimated scores for the LS intercept and subjective LS trajectory factors were employed. More specifically, the measures of Wave 2 and Wave 4 functioning were regressed onto the corresponding Wave 1 functioning measure and the estimated Wave 1 LS intercept and subjective LS trajectory factor scores. In an additional three models, each of the three Wave 4 functioning measures were regressed individually onto the corresponding Wave 2 functioning measure and the Wave 1 LS intercept and subjective LS trajectory factor scores. Results are summarized in Table 28 below.

Table 28. *Results from Longitudinal Models Predicting Future Functioning From LS Intercept and Subjective LS Trajectory Factor Scores.*

Model / criteria	Predictors			R^2
	Baseline	LS intercept	LS trajectory	
W1 to W2 mental functioning	.54*	.06	-.08*	(.34) .35
W1 to W2 physical functioning	.76*	-.04	-.05	(.55) .55
W1 to W2 interpersonal functioning	.72*	.02	.02	(.53) .53
W2 to W4 mental functioning	.53*	.04	.01	(.30) .31
W2 to W4 physical functioning	.60*	.09*	-.04	(.41) .42
W2 to W4 interpersonal functioning	.57*	.17*	-.01	(.42) .44
W1 to W4 mental functioning	.44*	.05	.00	(.21) .21
W1 to W4 physical functioning	.61*	.02	.01	(.38) .38
W1 to W4 interpersonal functioning	.47*	.18*	-.04	(.31) .34

Note. $N = 446$. Standardized regression coefficients (β s) are shown by criterion (row variable). For R^2 results, values in parentheses are variances explained by a model comprising only the corresponding baseline functioning measure. * $p < .05$.

The amount of unique variance explained in the criteria by the inclusion of the LS intercept and subjective LS trajectory factor scores was small, ranging from 0% to 3% unique variance. The unique contribution of these factor scores was significant in four models, with only one significant effect in each of these four models. Higher LS intercept factor scores at Wave 2 uniquely predicted higher Wave 4 physical and interpersonal functioning. Similarly, higher LS intercept factor scores at Wave 1 uniquely predicted higher Wave 4 interpersonal functioning. Finally, steeper upward subjective LS trajectory factor scores at Wave 1 were uniquely predictive of lower mental functioning at Wave 2. Comparing between the two approaches, in all nine models, the amount of unique variance explained in each criterion by the LS intercept and subjective LS trajectory factor scores was within one percentage point of the results from the regression models using the three separate LS ratings.

Predicting Separate LS Ratings Over Time

Whereas the previous analyses addressed the prospective effects of the separate LS ratings and future functioning, the reciprocal relations also were of interest. No specific predictions were made, however, concerning the relative predictive utility of the positive functioning measures in predicting the separate LS ratings, compared to their utility in predicting the LS intercept and subjective LS trajectory factors. To examine this issue, the individual Wave 2 LS ratings were regressed simultaneously onto the individual Wave 1 LS ratings and each Wave 1 measure of functioning. Similar models were tested predicting the separate Wave 4 STP LS ratings from Wave 1 measures, and predicting the Wave 4 STP LS ratings from Wave 2 measures. Results are summarized in Table 29 below.

Table 29. Results from Longitudinal Models Predicting Subjective Temporal Perspective Life Satisfaction Ratings

Model / predictors	Criteria					
	Past LS	R^2	Present LS	R^2	Future LS	R^2
<i>Wave 1 to Wave 2</i>		(.29) .32		(.21) .26		(.18) .19
Past LS	.40*		-.03		-.02	
Present LS	.14*		.37*		.29*	
Future LS	-.04		-.07		.16*	
Mental functioning	.06		.10		.05	
Physical functioning	.02		.14*		.03	
Interpersonal functioning	.14*		.09		.05	
<i>Wave 1 to Wave 4</i>		(.07) .09		(.13) .18		(.08) .09
Past LS	.12*		.00		-.02	
Present LS	.14*		.19*		.19*	
Future LS	-.01		.08		.11*	
Mental functioning	.02		.16*		.03	
Physical functioning	.07		.10*		.00	
Interpersonal functioning	.08		.06		.09	
<i>Wave 2 to Wave 4</i>		(.17) .18		(.22) .25		(.23) .24
Past LS	.21*		.07		.07	
Present LS	.21*		.25*		.02	
Future LS	.03		.14*		.42*	
Mental functioning	.08		.02		-.04	
Physical functioning	.00		.08		.04	
Interpersonal functioning	.04		.13*		.12*	

Note. $N = 446$. Standardized regression coefficients (β s) are shown by criterion (column variable). Values in parentheses indicate R^2 values from predictive models estimated without the functioning measures as predictors. * $p < .05$.

In each model, modest to moderate levels of stability were observed for each of the STP LS ratings. In addition to the predictive associations involving the separate LS ratings, the functioning measures added between 1% and 5% unique explained variance in the separate LS ratings, and had unique predictive effects in each model. In predicting the Wave 2 LS ratings, higher interpersonal functioning at Wave 1 predicting higher ratings of past LS at Wave 2, and higher physical functioning at Wave 1 predicted higher ratings of present LS at Wave 2. In predicting the Wave 4 LS ratings from Wave 1 functioning, higher mental and physical functioning at Wave 1 predicting higher ratings of present LS at Wave 4. Finally, in predicting the Wave 4 LS ratings from Wave 2 functioning, higher interpersonal functioning at Wave 2 predicting higher ratings of present LS and future LS at Wave 4.

In contrast, none of the functioning measures were unique prospective predictors in the latent subjective trajectory models (see Table 19 above). Also of interest are the results from the longitudinal predictive models predicting the estimated LS intercept and subjective LS trajectory factor scores. To examine this issue, the estimated Wave 2 factor scores were regressed simultaneously onto the Wave 1 factor scores and each Wave 1 measure of functioning. Similar models were tested predicting the estimated Wave 4 factor scores from Wave 1 measures, and predicting the estimated Wave 4 factor scores from Wave 2 measures.

As summarized in Table 30 below, the functioning measures added between 2% and 5% unique explained variance in the estimated LS intercept factor scores. In predicting the estimated Wave 2 LS intercept factor score, higher mental and interpersonal functioning at Wave 1 each predicted higher LS intercepts at Wave 2.

Further, in predicting the estimated Wave 4 LS intercept factor score, higher interpersonal functioning at Wave 2 predicted higher LS intercepts at Wave 4. In contrast, in each model the functioning measures added 1% unique explained variance in estimated subjective LS trajectory factor scores, and none of the functioning measures were uniquely predictive in any of the models.

Table 30. *Results from Longitudinal Models Predicting Estimated LS Intercept and Subjective LS Trajectory Factor Scores.*

Model / predictors	Criteria			
	LS intercept	R^2	LS trajectory	R^2
<i>Wave 1 to Wave 2</i>		(.29) .34		(.05) .06
LS intercept	.40*		.08	
LS trajectory	-.09*		.22*	
Mental functioning	.11*		.00	
Physical functioning	.08		-.04	
Interpersonal functioning	.11*		-.05	
<i>Wave 1 to Wave 4</i>		(.13) .16		(.01) .02
LS intercept	.25*		.00	
LS trajectory	-.01		.09	
Mental functioning	.10		-.05	
Physical functioning	.07		-.09	
Interpersonal functioning	.10		.02	
<i>Wave 2 to Wave 4</i>		(.30) .32		(.11) .12
LS intercept	.47*		-.02	
LS trajectory	.01		.31*	
Mental functioning	.02		-.12	
Physical functioning	.04		.04	
Interpersonal functioning	.12*		.03	

Note. $N = 446$. Standardized regression coefficients (β s) are shown by criterion (column variable). Values in parentheses indicate R^2 values from predictive models estimated without the functioning measures as predictors. * $p < .05$.

Summary

The fourth objective of Part 2 was to compare the relative predictive utility of the subjective LS trajectories with the separate ratings of past, present, and anticipated future LS. According to Hypothesis 9, the subjective trajectory approach should provide greater utility than a predictive model based on the separate ratings of past, present, and anticipated future LS. Results based on the three separate LS ratings were compared both to findings based on the latent trajectory models, and models using estimated LS intercept and subjective LS trajectory factor scores.

In the cross-sectional models, all three STP LS ratings were significantly and positively associated with mental, physical, and interpersonal functioning at each wave. When all three STP LS ratings were examined as joint predictors of functioning at each wave, ratings of past and present LS were particularly useful with respect to predicting concurrent levels of mental, physical, and interpersonal functioning. In comparison to the latent subjective trajectory models, the cumulative variance explained in the functioning measures by the three separate STP LS ratings at each wave was substantially lower in six out of the nine models. These results provide partial support for Hypothesis 9 concerning the anticipated superior predictive utility of the subjective trajectory approach. Compared to results based on the estimated LS intercept and subjective LS trajectory factor scores, however, the cumulative variance explained in the functioning measures by the three separate STP LS ratings at each wave was comparable or higher in each model. These results do not support Hypothesis 9.

In the longitudinal models predictive mental, physical, and interpersonal functioning over time, the three STP LS ratings explained very small amounts of unique

variance in the functioning measures. Further, in only three models were any of the separate ratings uniquely predictive of future functioning. In comparison to the subjective trajectory approach based on the latent trajectory models, and on the estimated LS intercept and subjective LS trajectory factor scores, however, the cumulative explained variance in the models employing the separate LS ratings was not substantively lower. These results do not support Hypothesis 9. Finally, in the longitudinal models predicting the three separate LS ratings over time, the functioning measures added modest amounts of unique explained variance in the separate LS ratings, most notably with respect to predicting present LS.

Subjective LS Trajectories and Positive Functioning

A final issue of interest concerned the relative strength of the relations between the subjective LS trajectories with mental, physical, and interpersonal functioning. I expected that subjective LS trajectories would be associated with all three domains of functioning, but particularly mental and interpersonal functioning (Hypothesis 10).

In each within-wave model, the latent subjective LS trajectory factor was correlated with indicators of positive functioning in all three domains, and was uniquely associated with (controlling for the latent intercept) all three domains of functioning Wave 2 and at Wave 4, but not Wave 1. The magnitudes of these associations did not differ substantially across functioning domains. In the longitudinal predictive models, only one prospective effect of the latent subjective LS trajectory factor was found: steeper upward Wave 1 subjective LS trajectories predicted less positive mental functioning at Wave 2. However, a possible indirect link was found, via prospective bias, between steeper upward subjective LS trajectories and less positive future functioning in

all three domains. Finally, in the prospective models predicting future latent subjective LS trajectories, none of the functioning measures were individually significant as unique predictors of the subjective LS trajectories. Thus, Hypothesis 10 was partially supported in the cross-sectional models, but not in the longitudinal analyses. However, there was little supporting evidence concerning the anticipated differential strength of the associations across positive functioning domains.

Discussion of Part 2

A summary of the hypotheses from Part 2, along with an indication of whether each hypothesis was supported, partially supported, or not supported by the present findings is provided in Table 31 below. Implications of the present findings with respect to these hypotheses, and each of the main objectives of Part 2 more generally, are considered below.

Table 31. *Summary of Part 2 Hypotheses.*

Hypothesis	Result
1 Upward STP LS trajectories would be normative at all three waves.	Supported
2a Stability in the latent intercept would be substantial over time.	Supported
2b Stability in the latent trajectory factor would be significant but modest.	Partially supported
3a Higher levels of LS would predict more positive levels of functioning.	Partially supported
3b Steeper upward subjective LS trajectories would predict less positive functioning.	Partially supported
4 Correlations between latent intercept and trajectory factors would be negative at each wave.	Supported
5 Lower levels of present LS and less positive levels of functioning would predict steeper upward LS trajectories in the future.	Partially supported
6a Steeper upward subjective LS trajectories would be associated with more positive prospective bias.	Supported
6b Steeper upward subjective LS trajectories would be associated with more negative retrospective bias.	Supported
7a Individuals whose lives are characterized by greater distress and dysfunction at present should report more negative retrospective bias.	Supported
7b Individuals whose lives are characterized by greater distress and dysfunction at present should report more positive prospective bias.	Not supported
8a More positive prospective bias would be associated with less positive functioning in the future	Supported
8b Associations between prospective bias and future functioning would be non-linear.	Supported
9 Subjective trajectory approach would provide greater predictive utility than a model based on the separate LS ratings.	Partially supported
10 Subjective LS trajectories would be associated with all three domains of functioning, particularly mental and interpersonal functioning.	Partially supported

Longitudinal Replicability and Stability of Subjective LS Trajectories

The first objective was to examine the longitudinal replicability and stability the subjective LS trajectories. Hypothesis 1 stated that upward STP LS trajectories would be

normative at all three waves. In support of this hypothesis, upward subjective trajectories for LS were normative at all three waves, despite modest change in mean levels of present LS over time. These findings are consistent with the large volume of research documenting normative upward mean-level trends in STP LS trajectories in countries around the world, among all but the very old (e.g., Andrews & Withey, 1976; Bortner & Hultsch, 1972, 1974; Lachman et al., 2008; Okun et al., 2006; Ryff, 1991; Shmotkin, 1991; Staudinger et al., 2003; Woodruff & Birren, 1972). The reliability of this pattern across waves in the present study also is consonant with the longitudinal findings reported by Busseri et al. (2009b) in which upward trajectories at both waves were typical, again, despite modest mean changes in present LS over time. Results from this preliminary study and the present work support proposals from researchers studying lifespan personality development (e.g., Fleeson & Baltes, 1998; Heckhausen et al., 1989; Rocke & Lachman, 2008; Ryff, 1991; Staudinger et al., 2003) that upward subjective trajectories reflect a commonly-held belief about human development. That is, for many traits, abilities, and characteristics, individuals are generally expected to ‘grow’ or improve from youth to middle-aged, and decline in old age.

Although upward trends in the STP LS ratings may indeed reflect a general, culturally-shared belief about human development, and about youth in particular, direct evidence is needed to support this particular interpretation. In future studies employing a STP approach, participants could be asked to rate their own past, present, and anticipated future LS, as well as provide STP LS ratings for other people their own or various other ages. Such an approach would provide an opportunity to compare participants’ ratings of their own versus ‘other’ peoples’ subjective LS trajectories, thereby linking temporal

self-comparisons with research on social comparisons (Albert, 1977). According to Taylor and Brown (1988), for example, positively biased expectancies for the future and overly positive comparisons of the self versus others both are forms of positive illusions.

Consistent with the general finding that individuals' typically rate themselves as superior to the average 'other person' on a variety of traits and abilities, it would be valuable to determine whether individuals also evaluate their past and anticipated future lives as superior to comparison others, or whether such self-biased social comparisons are specific to ratings of present LS only (Adler & Fagley, 2005; Cheng, Fung, & Chan, 2008; Fox & Kahneman, 1992). Another approach to assessing participants' personal beliefs about human development would be to ask them directly about their beliefs concerning the tendency toward growth, stability, and decline for various characteristics and life outcomes, including life satisfaction (e.g., In general, do you believe that peoples' satisfaction with their lives gets better and better over time?). Finally, without discounting these social-cognitive interpretations, however, it is also possible that, as proposed by Shmotkin (2005), subjective trajectories are a motivated, self-regulatory reaction to adversity or threat in one's life. I discuss this possibility in greater detail in a subsequent section addressing the relations between subjective trajectories and positive functioning.

Also of interest, although upward subjective LS trajectories were normative at all three waves in the present study, the shape of the trajectories changed somewhat across waves. More specifically, in analysis of the mean trends, the interaction between STP and wave in mean LS revealed that the overall subjective change in LS from one year in the past to five years in the future was larger at Wave 4 compared to Wave 1 and Wave 2.

Further, in the latent trajectory models, the mean slope of the latent trajectory factor was higher at Wave 4 than at either Wave 1 or Wave 2 ($M_s = .54$ versus 0.23 and 0.26, respectively). The factor loading of the rating of anticipated future LS on the latent trajectory factor at Wave 4 also was smaller than at either Wave 1 and Wave 2 ($\lambda_s = 2.49$ versus 5 and 5, respectively), such that the anticipated change over the five years from the present to the future at Wave 4 was only 2.5 times the amount of perceived change from past to present LS – compared to 5 times the anticipated change from present to future versus past to present observed in the subjective trajectories at Wave 1 and Wave 2. Together, these results suggest that whereas first-year university students viewed their LS to be improving at a constant rate per year, from one year in the past to five years in the future, by the end of their third year of university, the perceived change in LS from one year in the past to the present increased, and the anticipated per year change in LS over the next five years decreased.

This non-linear latent trajectory at Wave 4 is consistent with results reported by Busseri et al. (2009b) based on a community sample of adults in which non-linear subjective LS trajectories were normative at both waves, with factor loadings for the rating of anticipated future LS estimated to be 2.42 and 3.06 at Wave 1 and Wave 2, respectively. Taken together, findings from both studies suggest a possible developmental trend toward non-linear subjective trajectories from late teens into early adulthood. It is possible, for example, that as teens progress toward young adulthood, the anticipated slowing in the per year change in LS reflects a more realistic appraisal of the future. Alternatively, the trend toward non-linear subjective trajectories with greater age could signal the positive anticipation of greater stability in one's LS and/or the looming

responsibilities of adulthood, following the high school and university years. These speculations concerning the psychological significance or meaning of the non-linear subjective LS trajectories await further investigation, including replication using LS ratings that are anchored to equally-spaced past and future intervals (e.g., 5 years in the past, 5 years in the future, as in Cantril, 1965) or unanchored ratings of the subjective past and anticipated future (e.g., Pavot et al., 1998), rather than the asymmetrical approach employed in the present work.

The second set of predictions concerned the stability of the subjective trajectories over time. According to Hypothesis 2a and Hypothesis 2b, respectively, stability in the latent intercept (reflected in overall levels of LS) should be significant and substantial over time, whereas the stability in the latent trajectory factor (reflected in the slope of LS ratings across subjective temporal perspective) would be significant but modest. In support of Hypothesis 2a, significant and substantial stability in the latent intercept factor was observed between adjacent and non-adjacent waves, but was greater over shorter versus longer intervals (i.e. Wave 1 to Wave 2 stability > Wave 1 to Wave 4 stability). These patterns are consistent with previous research examining the stability of ratings of present LS (e.g., Andrews, 1991; Anusic et al., in press). In combination with the modest mean-level changes in LS observed in the present work, the stability findings suggest that during the first three years of university, there was a moderate to high degree of stability in LS ratings, both in terms of rank order of individuals and overall levels of LS. These findings are important to consider when interpreting the largely non-significant results from the longitudinal models (discussed further below) in which mental, physical, and

interpersonal functioning were examined as predictors of the latent intercepts over time, controlling for stability in the latent factors.

In partial support of Hypothesis 2b, significant but moderate stability was found for the latent trajectory factor between adjacent waves, but not between Wave 1 and Wave 4. The moderate level of stability observed from the latent subjective LS trajectory factor between adjacent waves is consistent with findings reported by Busseri et al. (2009b) based on a five-year period. In general, the moderate to modest instability in latent trajectories did not reflect changes in the direction of the subjective trajectories, but rather inconsistency in the degree of the upward slope. That is, although most of the participants viewed their LS to be on an upward trajectory over time, the specific slopes of their trajectories varied considerably over time.

Whereas the present work followed the same group of students over a 3 ½ year period, it is possible that an extended longitudinal study following the same group of individuals over many years and through many life changes may reveal that inconsistency in the slopes of subjective LS trajectories is normative. Importantly, however, if personal narratives for well-being play an agentic role in promoting positive functioning, variability in the subjective LS trajectories should be systematic and predictable, rather than random (Shmotkin, 2005). For example, stability (versus change) in subjective trajectories should be related to functioning in other life domains over time – an issue to which I return in a subsequent section.

The contrast between the relative stability of the latent intercept and trajectory factors may also reflect an important dissociation between the relative reactivity of these factors to changes in life conditions or experiences. Subjective trajectories may be more

sensitive to daily life events and short-term changes in living conditions and experiences than is one's overall level of LS. In their description of positive illusions, for example, Taylor and Armor (1996) propose that self-biased cognitions and evaluations, including positive expectancies for the future, may become temporarily distorted in a self-enhancing direction as individuals cope with negative experiences or challenging situations. This normative reaction is short-lived, however, as the stress of the situation passes, and as individuals receive feedback from the environment concerning the inaccuracy of their overly-positive biases.

Consistent with this characterization of positive illusions, if individuals respond to current adversity and disappointments by hoping for a brighter future, and if such challenges are generally transient (even if acute for some), rather than chronic, upward subjective trajectories may be commonly observed in a given sample of individuals at any given point in time, even if the steepest (vs. flattest) slopes are observed among different individuals at each point in time. These notions would, in fact, explain (a) the consistent mean-level trends for upward subjective LS trajectories at each wave, despite (b) small actual changes in overall levels of LS over time, as well as (c) the relative instability over time in individual differences in the degree of incline in the subjective trajectories. To evaluate this proposal directly, a longitudinal design would be needed comprising daily diary or experience sampling methodologies to monitor acute or short-term changes in functioning and positive and negative experiences, in combination with longer term repeated assessments.

Other possible explanations for the relative instability of the latent subjective trajectories should also be considered. For example, the relative instability may reflect the

measurement error typical of single-item measures. Although ratings of present LS have been well-studied (e.g., Diener et al., 1985; Pavot & Diener, 1993; Pavot et al., 1998), the reliability of single-item ratings of past and anticipated future LS is less clear (but see McIntosh, 2001). To examine this issue directly, it is critical that in future longitudinal investigations, subjective ratings of past, present, and anticipated future LS are measured using a multi-item scale (e.g., Pavot et al., 1998).¹⁷ In addition, the assumption of a single underlying trajectory around which individuals vary may be incorrect. Shmotkin (2005) has suggested that there may be distinct types of trajectory patterns, including various complex trajectories which differ not only as a simple function of intercept and slope, but also with respect to shape, direction, and continuity (vs. discontinuity) – none of which would be adequately captured by the latent trajectory modeling approach I employed in the present work. One avenue for future research, therefore, is to employ pattern-based analyses, such as cluster analysis or latent class analysis, to explore such possibilities (e.g., Roche & Lachman, 2008).

Longitudinal Relations Between Subjective LS Trajectories and Positive Functioning

The second objective of the present study was to assess prospective relations between subjective LS trajectories and positive functioning over time. In Shmotkin's (2005) model, subjective trajectories are one mechanism through which the SWB system functions to maintain and promote positive functioning. Hypothesis 3a and Hypothesis 3b stated, respectively, that higher levels of LS would predict more positive levels of functioning, whereas steeper upward subjective LS trajectories would predict less positive levels of functioning. Although in the cross-sectional models higher levels of LS

¹⁷ I am currently engaged in several projects examining subjective trajectories in which multi-item scales are being used to assess past, present, and anticipated future life outcomes.

were related to more positive levels of functioning, and steeper upward subjective LS trajectories would be uniquely associated with less positive levels of functioning, there was little consistent evidence of prospective relations involving the latent intercept of latent trajectory factors as predictors. Thus, support for Hypothesis 3a and Hypothesis 3b was found only in the cross-sectional, but not longitudinal models.

According to Hypothesis 4, the latent intercept and latent LS trajectory factors would be negatively correlated at each wave. That is, individuals with higher overall levels of LS at a given point in time should also report less steep (i.e., flatter) subjective improvements from past to anticipated future LS. In support of this hypothesis, the latent intercept and trajectory factors were negatively correlated within each wave, but the latent trajectory factor did not consistently predict the latent intercept factor over time (with the exception of the Wave 1 to Wave 2 model). Similarly, support for Hypothesis 5, which stated that lower levels of present LS and less positive levels of functioning would predict steeper upward LS trajectories in the future, was limited to two prospective effects of the latent intercept factor but no significant effects for the functioning measures.

In part, the overall lack of prospective effects may reflect the relatively high level of stability in the composite measures of functioning, as well as the latent intercept factor. The cross-time correlations between corresponding functioning measures (particularly between adjacent waves) were not substantially lower than the internal consistency estimates of these measures. Similarly, the cross-time stability in the latent intercept factor also was very strong and, if previous reliability estimates of .50 to .70 (e.g., Andrews, 1991; Schimmack et al., 2008) apply to the present sample, stability in this

latent factor may have approached its' own reliability. With respect to the reliability of the latent trajectory factor, reliability can be estimated as the amount of variance explained by the model in the measure serving as the intercept, that is, the measure having a loading of zero on the latent trajectory factory (Willett & Keiley, 2000; Willett & Sayer, 1994). In the present case, the measure of present LS served as the intercept and the latent trajectory models explained between 37% and 45% of the variance in this measure at each wave – a figure which approaches the cross-time stability estimates for this factor between adjacent waves. Consequently, there may have been little reliable variance in the composite functioning measures and in the latent intercept and trajectory factors “to be explained” by other factors.

One possibility, therefore, is that the use of composite functioning measures reduced substantially the chances of finding longitudinal predictors of these measures. Disaggregated functioning measures (e.g., physical symptoms versus the physical functioning composite) may provide more informative criteria, if such measures are relatively free of random error and, assuming moderate levels of stability, still have substantial “explainable” variance that is not predicted by the stability over time. Indeed, differences between composite and disaggregated measures of functioning may explain why prospective predictive effects of the latent trajectory factor were observed in Busseri et al. (2009b); in that study, functioning measures were not aggregated.

A potential drawback to the disaggregation approach, however, is the resulting increase in the number of analyses and statistical comparisons computed based on separate, but correlated indicators or criteria. In the present sample, for example, analyses reported in Part 1 revealed three primary factors explaining much of the common

variance among the multiple indicators of mental, physical, and interpersonal functioning. Nonetheless, it is possible that a theory-driven selection of specific measures of functioning, instead of composite measures of functioning spanning broad domains such as 'interpersonal functioning', may provide a more nuanced and statistically powerful approach to assessing the prospective 'effects' of the subjective LS trajectories.

With respect to prospective relations involving the latent intercept and trajectory factors, one solution may be to obtain more reliable estimates of the past, present, and anticipated future LS in order to reduce random error and, therefore, increase the amount of explainable variance in both latent factors that is not accounted for by stability over time. Multi-item scales for rating each subjective temporal perspective have been developed (e.g., Pavot et al. 1998) and would provide a valuable extension of the approach employed in the present work based on Kilpatrick and Cantril's (1960) single-item ratings.

Apart from these methodological and statistical issues, the lack of prospective effects of the functioning measures on the latent intercept and trajectory factors is broadly consistent with previous research showing that many life events have relatively small and short-lived impact on global life evaluations (e.g., Suh et al., 1996). Indeed, although recent evidence from large-scale, multi-wave, and multi-national studies suggests that levels of LS do change over time in response to some life events (e.g., Lucas & Donnellan, 2007; Lucas et al., 2004), typically these events are quite dramatic (e.g., loss of a spouse, unemployment, birth of a child). Evidence concerning the predictability of LS during the university years is less clear. One possibility, therefore, is that LS evaluations are relatively stable during this developmental period and are not likely to be

reliably influenced by other global factors, such as one's overall evaluations of personal health status or interpersonal relationships. Indeed, results concerning the non-significant variability in the trajectory in actual levels of present LS over time observed in the present study support this possibility. Thus, specific factors and influences may have to be identified and directly measured (e.g., loss of a parent or friend, school expulsion, ending a romantic relationship) in order to uncover prospective effects on LS during the university years. Similarly, subjective trajectories for one's LS through time may be most closely aligned with (i.e., predicted by, correlated with, and predictive of) other temporally-oriented factors, such as nostalgia, regret, hope, and optimism.

The lack of prospective effects of the functioning measures on the latent trajectory factor also may indicate that the subjective LS trajectories are not particularly sensitive to global indicators of functioning assessed at different time points. Rather, subjective LS trajectories may be grounded in the 'here-and-now' of one's life, reflecting current adversity, struggles, and successes, regardless of one's personal history and irrespective of one's future achievements or challenges. From this perspective, subjective LS trajectories may serve primarily information/knowledge and self-expression functions (Eagly & Chaiken, 2007; Shavot, 1990; Shmotkin, 2005), by providing a unique indicator of, and outlet for, of one's beliefs concerning stability and change in personal well-being through time not reflected in the overall level of LS. Alternatively, and consistent with the description of other positive illusions described by Taylor and Armor (1996), an upward subjective LS trajectory may not be trait-like (and thus stable), but rather a situational-specific response to acute or short-term threat or adversity, which wanes over time as challenges pass.

In summary, present results do not provide clear or consistent evidence in support of Shmotkin's (2005) proposals concerning the adaptive role of subjective well-being trajectories either as promoters of positive future functioning, or indicators of previous distress or dysfunction. Nonetheless, the consistent cross-sectional associations involving the upward subjective LS trajectories, and the negative correlation between latent intercept and trajectory factors, suggest that there is novel information conveyed by the subjective LS trajectories, independent of the overall level of LS. These patterns of associations, in combination with the methodological issues discussed above, and the significant prospective findings reported by Busseri et al. (2009b), suggest that further work is needed before firm conclusions can be drawn concerning prospective effects involving the subjective LS trajectories.

Determining Bias in the Subjective LS Trajectories

The third objective of the present study was to determine the bias in the subjective LS trajectories. According to Hypothesis 6a and Hypothesis 6b, respectively, steeper upward subjective LS trajectories should be associated with more positive prospective bias and more negative retrospective. Consistent with both hypotheses, steeper upward subjective LS trajectories at Wave 2 were associated with a stronger tendency to overestimate future LS and a stronger tendency to underestimate past LS. Simply stated, steeper upward subjective LS trajectories at Wave 2 were more biased than flatter trajectories. These findings are consistent with Busseri et al. (2009b) who demonstrated that steeper upward trajectories were related to greater prospective bias. Further, such results support previous research on affective forecasting in which individuals generally tend to overestimate the impact of future hedonic events (Wilson & Gilbert, 2003), as

well as investigations showing how people tend to reconstruct the past in order to bolster one's present self image (Ross, 1989; Wilson & Ross, 2001). Recently, Lachman et al. (2008) provided evidence of retrospective and prospective biases in ratings of past, present, and future LS based on a two-wave longitudinal study, but each bias was evaluated at different waves. Thus, the present work is the first empirical demonstration that subjective LS trajectories from a single point in time are related to biases in evaluating the past and the future.

The actual trajectory in ratings of present LS was flat and did not vary significantly across individuals – suggesting that most individuals showed very little systematic change in LS over time. Given the modest overall change in levels of present LS over time, for many individuals the least biased subjective LS trajectory would have been to rate past and future LS as the same as present LS. Instead, steep upward subjective LS trajectories were typical at all three waves – resulting in inaccuracies both in how respondents viewed their past LS and their anticipated future LS.

On the one hand, bias in the upward subjective trajectories at Wave 2 may reflect the robustness of the culturally-shared belief about human development (e.g., Ryff, 1991). On the other hand, the upward trajectories may have been a motivated response, that is, an attempt to ameliorate current distress or threat (e.g., Taylor & Armor, 1996). Indeed, according to Hypothesis 7a and Hypothesis 7b, respectively, individuals whose lives are characterized by greater distress and dysfunction at present should report more negative retrospective and greater prospective biases. In support of Hypothesis 7a, the tendency to underestimate past LS was associated with greater current distress and dysfunction at Wave 2, as indicated by negative correlations with all three functioning

measures. Similarly, more negative retrospective bias was associated with lower levels of LS at Wave 2 and steeper upward subjective LS trajectories.

Also consistent with a motivational account, upward subjective trajectories may function to inspire action to bring about one's desired future (e.g., Shmotkin, 2005; Taylor & Brown, 1988), or may signal a greater tendency toward complacency and a generalized failure to act in one's own best interests (e.g., Oettingen et al., 2001) – as suggested by our preliminary study (Busseri et al., 2009b). Consistent with this latter possibility, and in support of Hypothesis 8a, in the present study not only were steeper upward trajectories at Wave 2 related to greater overestimation of future LS, but this prospective bias was associated with less positive future functioning. (In contrast, prospective bias was not significantly associated with current functioning, contrary to Hypothesis 7b). Thus, although the present findings do not rule out the possibility that upward subjective LS trajectories are influenced by culturally-shared beliefs about lifespan development, the inaccuracies of the subjective LS trajectories are also systematically related to distress and dysfunction, supporting motivational accounts (Busseri et al., 2009b; Shmotkin, 2005).

The consistent relations between greater overestimation of future LS and less positive future functioning also are noteworthy. As in our preliminary study (Busseri et al., 2009b), these patterns establish that upward subjective LS trajectories are not only biased, but that this biased is itself predictive of future dysfunction. Consistent with Hypothesis 8b, these associations were non-linear in both studies, with the strongest negative associations found among participants characterized by particularly high levels or prospective bias. These non-linear patterns support previous proposals that self-

deception and related self-oriented biases may be functional at moderate levels (e.g., Baumeister, 1989; Taylor & Armor, 1996), but a fools' paradise at high levels (Shmotkin, 2005).

One interpretation is that greater overestimation of future LS is accompanied by complacency, ineffective self-regulation, and a general failure to act in one's best interests, ultimately leading to a failure to achieve one's desired future and the accompanying disappointment and distress (e.g., Higgins, 1987; Michalos, 1980). Subsidiary analyses presented in the present work support this possibility. Yet, another interpretation is that greater prospective bias is not, itself, predictive of poorer functioning in the future, but rather a reflection of the degree of disappointment and dysfunction in the future. Regardless of whether greater prospective bias is associated with a causal process influencing future functioning, or is itself caused by future dysfunction, present results (see also Busseri et al., 2009b) are consistent with a general confluence of overestimation of future LS, distress, and future dysfunction. Indeed, perhaps one of the most striking findings is the absence of any evidence, either cross-sectional or longitudinal, linking overly rosy views of one's future with positive future outcomes.

Interestingly, the retrospective and prospective biases were only modestly associated, suggesting that inaccuracies in evaluating one's past did not necessarily imply mispredictions for the future. That is, whereas some individuals are particularly likely to distort the past, others instead are unrealistic specifically with respect to forecasts of the future. This potential dissociation raises the possibility that the subjective trajectories in fact reflect separate underlying motivations, beliefs, or tendencies: Whereas the first set

of factors is specific to misremembering or misevaluating the past, the second is specific to misforecasting the future. Such a dissociation would be consistent with temporal comparison research in which present-past comparisons typically are examined separately from present-future comparisons (e.g., Ross, 1989; Sanna & Cheng, 2006).

Alternatively, the modest association between bias scores may be an artifact of the differences in the subjective time scale employed in the present study (i.e., 1 year in the past versus 5 years in the future), as well as the disagreement between the subjective ratings and the actual spacing of the longitudinal assessments (e.g., 1 year in the subjective past versus 0.33 years in the actual past). Although the analytic models I employed corrected statistically for these asymmetries and spacing differences, it remains unclear whether results would have differed had respondents been asked to retrospect and prospect equal ‘distances’ into the past and future, and if the timing of the longitudinal assessments matched more closely the subjective spacing of the LS ratings. Thus, an important step in future research examining the bias in subjective LS trajectories is to determine the relation between retrospective and prospective bias scores based on evenly spaced longitudinal assessments corresponding to the subjective temporal intervals anchoring the ratings of past, present, and anticipated future LS.

Comparing the Predictive Utility of Actual versus Subjective LS Trajectories

The fourth objective was to compare the relative predictive utility of the subjective LS trajectories with the separate ratings of past, present, and anticipated future LS. According to Hypothesis 9, the subjective trajectory approach should provide greater predictive utility than a model based on the separate ratings of past, present, and anticipated future LS. In support of this hypothesis, results from the cross-sectional

models indicated that the latent subjective trajectory models explained as much, if not more, unique variance in the functioning indicators than the three separate LS ratings. And yet, contrary to Hypothesis 9, when the within-wave predictive utility comparisons were made based on the estimated scores for the LS intercept and subjective LS trajectory factors (rather than the latent factors themselves), the three separate LS ratings were comparable or superior to those based on the estimated factor scores. Further, consistent with the generally non-significant prospective relations involving the subjective trajectories (based either on latent factors or estimated factor scores) and the individual ratings of past, present, and anticipated future LS (either as predictors or criteria), results from the longitudinal models were inconclusive.

The superior predictive utility of the latent subjective trajectory approach in the cross-sectional models is consistent with Shmotkin's (2005) proposal that personal well-being narratives carry information that is not conveyed from the past ratings of one's past, present, and anticipated future well-being. In the present case, the latent trajectory models decomposed the variance in the separate ratings of past, present, and anticipated future LS into two sources: overall level of LS, reflected in the common variance among the three ratings, and a subjective trajectory reflected in the discrepancies among the ratings.

From a statistical perspective, this latter latent factor reflects information concerning discrepancies among the LS ratings that is not captured by examining the three ratings LS separately – even if examined simultaneously. Stated differently, because the latent subjective trajectory approach addresses both the covariation among ratings and the discrepancies in the levels of each variable, it conveys additional

information beyond that which is afforded simply by examining ratings of past, present, and anticipated future LS as predictors (or criteria) of positive functioning. This issue is particularly revealing given the paradox between (a) the consistent positive correlations of each of the individual LS ratings with the functioning indicators and (b) the consistent negative correlations between the latent trajectory factor and the functioning indicators. Without decomposing the variance in the separate LS ratings in the latent trajectory model, results concerning the negative relations between the upward subjective LS trajectories and positive functioning would have been obscured.

In this regard, findings from another recent study are relevant. Based on self-reports from a sample of 400 undergraduates, Busseri, Choma, and Sadava (2009c) examined differences between dispositional optimists and pessimists with respect to their views of past, present, and anticipated future LS. In this study, optimist and pessimist groups differed on ratings of each subjective temporal perspective, wherein optimists were consistently more positive in their life evaluations than pessimists, regardless of subjective temporal perspective. Two novel insights were uncovered, however, by comparing the subjective LS trajectories of the groups. First, both groups saw their lives to be an upward trajectory when only the past and anticipated future were considered. Second, a critical dissociation between groups was observed: Whereas optimists were characterized by perceived improvement in LS from the past to the present in combination with consistency in high levels of LS from the present to the anticipated future, pessimists were characterized by perceived consistency in low levels of LS from the past to the present, yet anticipated improved LS in the future.

In my view, therefore, despite the lack of unique prospective relations between the latent subjective trajectories and functioning indicators in the present longitudinal study, the subjective trajectory approach has the potential to provide unique insights not revealed by simply examining separate ratings of past, present, and anticipated future LS. In essence, this approach reveals a unique latent variable – a subjective trajectory – that is present in the subjective temporal perspective ratings but yet remains hidden when the LS ratings are examined separately.

Similarly, the use of estimated factor scores for the LS intercept and trajectory factors may not adequately represent the corresponding latent factors. Factor scores provide an estimated, observable value for each individual on each latent factor. In contrast, the latent trajectory models are based on statistical inferences concerning unobservable constructs derived from patterns of covariation across an entire sample, rather than provide specific estimates for a given individual. There are many situations in which knowing each individual's score on each factor is valuable, for example, in applied settings where decisions concerning diagnoses or interventions must be made.

In other cases, however, understanding the nature of the relations among a given set of constructs – rather than associations among imperfect indicators of such constructs – is of greater interest than knowing a given individual's score on each factor. For such purposes, latent factors provide a statistical method by which relations among the unobservable phenomena of interest can be estimated. Further, the influence of random measurement error is removed through analysis of only the common variance among a set of measured indicators. In contrast, estimated factor scores contain both meaningful and random error.

As the present dissertation was motivated by several basic conceptual issues concerning subjective trajectories derived from Shmotkin's (2005), the latent trajectory approach employed in the present work was consistent with this conceptual (rather than applied) emphasis. Nonetheless, in recent research, subjective trajectories have also been operationalized based on measured scores rather than unobserved latent factors (e.g., Busseri et al., 2009c; Rock & Lachman, 2008). It is likely, therefore, that unique insights may be afforded by both approaches. With respect to future research on subjective LS trajectories, I recommend that an attempt is made to operationalize subjective LS trajectories (e.g., through latent trajectory modeling as in the present study, or through examining trajectory patterns as in Rocke and Lachman, 2008) whenever ratings of past, present, and anticipated future LS are employed – rather than simply examining the three ratings separately.

Mention should also be given to the two components of SWB not addressed in the present study – positive and negative affect (PA and NA). In Shmotkin's (2005) framework, subjective trajectories are discussed only with respect to LS. Further, in research exploring subjective temporal perspective evaluations, people's views of their past, present, and anticipated future PA and NA have yet to be investigated. Clearly, however, a complete accounting of subjective trajectories based on Diener's (1984) three-component model of SWB requires operationalization of subjective trajectories for all three SWB components. In addition to providing a more thorough understanding of the potential functioning role of subjective well-being narratives, the assessment of subjective trajectories for PA and NA may reveal specific correlates, predictors and outcomes not found with the subjective LS trajectories. As argued by Schimmack and

colleagues (e.g., Schimmack et al., 2002), if individuals rely on affective information (at least in part) to form overall life evaluations, and if PA and NA function to mediate the impact of many variables on LS judgments (e.g., personality factors, life events), rather than vice-versa, then the nomonological networks of the affective factors may show greater specificity than LS. If so, subjective trajectories for PA and NA may show unique, and more differentiated, relations with factors not observed for the subjective LS trajectories. Thus, a valuable extension to Shmotkin's (2005) framework, and critical step for future research on subjective trajectories, is to examine subjective trajectories for all three SWB components.

Subjective LS Trajectories and Positive Functioning

The final issue was whether subjective LS trajectories were differentially associated with mental, physical, and interpersonal functioning. Hypothesis 10 stated that subjective LS trajectories should be associated with all three domains of functioning, particularly mental and interpersonal functioning. In support of this hypothesis, the cross-sectional relations between the latent trajectory factor with indicators of all three domains of functioning are consistent with other recent research on subjective trajectories (Busseri et al. 2009b; Rocke & Lachman, 2009). In contrast, results failed to support the related prediction that these relations should be relatively stronger for mental and interpersonal functioning, compared to physical functioning, as predicted based on previous studies examining subjective trajectories (Busseri et al. 2009b; Rocke & Lachman, 2009). Further, there was little consistent evidence of longitudinal associations between the subjective trajectories and indicators of functioning, regardless of which pairs of waves

were examined, and irrespective of whether the latent trajectories were examined as predictors or criteria.

Consistent with Shmotkin's (2005) framework, the concurrent associations between the subjective LS trajectories and each domain of functioning suggests that that upward subjective trajectories may be a response to any personally relevant life domain, for example, serving as a sensitive indicator of distress or disappointment across various areas of functioning. It is also possible, however, that all self-reports of personal functioning are influenced by a common underlying evaluative reaction to one's life (Cummins & Nistico, 2002), and that such an evaluative tendency underlies both the subjective trajectories and the functioning indicators.

The generality in the relations between the subjective trajectories and functioning indicators, and the strong positive correlations among composite functioning scores, are consistent with this possibility. In addition, the generality of the composite functioning scores and the subjective global evaluations of one's life used to assess LS may have inflated the associations between these variables simply due to the similar levels of abstraction. It is possible, therefore, that greater differentiation between the domain-specific correlates of subjective LS trajectories could be observed if more specific indicators of functioning had been examined (e.g., social support network rather than the interpersonal functioning composite). Similarly, consistent with the proposed self-regulatory processes linking steeper upward subjective LS trajectories with less positive functioning (Busseri et al, 2009b), greater specificity in the correlates of the subjective trajectories may be revealed if indicators of the proposed mediating mechanisms were examined (e.g., coping strategies, self-efficacy, planfulness).

Another consideration is that, consistent with Shmotkin's (2005) framework, subjective trajectories – as a reaction to perceived threat and adversity, and/or an attempt by the SWB system to maintain a positive psychological environment – may be particularly related to psychological functioning in the short term. For example, under conditions of threat or negative affect, positive mood may increase following perceived self-improvement, or predictions of positive future experiences (Buehler et al., 2007; McFarland & Alvaro, 2000; Sanna et al., 2005). If so, a fine-grained temporal analysis would be needed to evaluate proximal (e.g., momentary, daily), situational (e.g., experimentally induced) and longer-term naturally occurring links with subjective narratives for personal well-being. Thus, future research examining the nomonological network of subjective LS trajectories would benefit from including both subjective and objective indicators of functioning from multiple life domains, assessed both at general and specific levels, and measured at short-term (i.e., daily) and longer-term intervals.

Conclusions

Based on the fourth module of Shmotkin's (2005) dynamic modular framework, in the present study I examined the connection between subjective temporal perspective trajectories for LS and positive functioning in a longitudinal study of university students. Present results inform several key features of this module of Shmotkin's (2005) model. First, upward subjective LS trajectories were normative at all three waves spanning the first three years of university in the present sample. Further, despite high mean-level consistency in LS, and high stability in individual differences in overall LS, the upward subjective LS trajectories were only moderately stable (at best) over time. Rather than indicating a predisposition or stable tendency, therefore, upward subjective LS

trajectories may reflect a changeable narrative for personal well-being which, for the majority of individuals, may fluctuate over time with respect to the degree of steepness of the subjective incline, but might not often vary from an upward direction.

Second, the anticipated prospective links between subjective LS trajectories and positive functioning were not consistently found. Rather, the most robust findings were the cross-sectional associations observed at each wave between upward subjective LS trajectories and lower overall levels of LS, as well as less positive levels of mental, physical, and interpersonal functioning. The lack of prospective findings is contrary to the anticipated agentic function of subjective well-being trajectories proposed by Shmotkin (2005). Nonetheless, the robust cross-sectional links observed in the present work, in combination with the prospective results reported in other recent research (Busseri et al., 2009b; Roche & Lachman, 2008), suggests that subjective LS trajectories do convey unique information about an individual's present outlook and their view of their satisfaction through time, as anticipated by Shmotkin (2005), both of which are related to self-perceived functioning in multiple life domains.

Third, upward subjective LS trajectories were biased with respect both to individuals' underestimation of past LS and overestimation of future LS. The presence of retrospective and prospective biases demonstrates the illusionary nature of the upward subjective LS trajectories. Further, rather than reflecting a benign culturally-shared belief about human development or an adaptive positive illusion, more negative retrospective bias was associated with current distress and dysfunction and more positive prospective bias was associated with less positive functioning in the future.

In conclusion, upward subjective LS trajectories were normative and consistent over time, although the relative steepness of these trajectories was not highly stable within individuals. Upward subjective LS trajectories were associated with poorer levels of current functioning, and were biased both with respect to evaluations of the past and predictions for the future. Simply stated, there seemed to be no advantage, either at present or in the future, to viewing one's life as getting better and better over time. Together, these findings converge on the notion that steep upward subjective LS trajectories may be a fools' paradise, rather than an adaptive form of self-enhancement.

GENERAL DISCUSSION

The primary objective of the present dissertation was to test two key components from Shmotkin's (2005) dynamic modular framework for SWB. Most research on SWB has conceptualized SWB as an important life outcome. In contrast, a unique feature of Shmotkin's model is that it casts SWB as an agentic process, maintaining and promoting a positive psychological environment and adaptive functioning more generally. As discussed earlier, in Shmotkin's framework, the SWB system functions through four 'modules': experiences, declarations, configurations, and narratives. The present dissertation focused on the latter two modules, which are arguably the most novel aspects of Shmotkin's model and have major implications for how SWB should be conceptualized and studied.

The third module concerns the internal structure of SWB. Shmotkin proposed that there are coherent and distinct configurations of LS, PA, and NA components, and that differences between individuals characterized by different SWB configurations have implications for adaptive functioning. These propositions were examined in Part 1. The fourth module concerns individuals' personal narratives of their well-being through time. Shmotkin proposed that individuals differ with respect to their subjective trajectories for life satisfaction, and that these differences have important functional implications. These proposals were assessed in Part 2. In this General Discussion, general limitations of the present work are described. I then discuss major implications of the present findings for Shmotkin's framework and for research on SWB more generally, and directions for future research are proposed.

General Limitations

Limitations specific to Part 1 and Part 2 have been described in their respective *Discussion* sections. In this section, I consider three major types of limitations relevant to both parts of the present dissertation and Shmotkin's (2005) framework more generally.

General Limitation 1:

Sampling

The present work was based on a longitudinal sample of university undergraduates who were first assessed at the start of their first academic term in university and followed through the end of the third academic year. The transition to university is typically accompanied by major changes in personal, interpersonal, and academic domains (Bray & Kwan, 2006; Jackson, Pancer, Pratt, & Hunsberger, 2000; Ross, Neibling, & Heckert, 1999). Consequently, for many youth, this transition is linked with heightened distress and loneliness (Adlaf, Gliksman, Demers, & Newton-Taylor, 2001; Gall, Evans, & Bellorose, 2000; Paul & Brier, 2001). Research also suggests that recreational substance use and risky drinking patterns tend to peak during the early university years (Sher & Rutledge, 2007). Yet university life also presents new opportunities for positive growth and self-discovery, including forming new friendships and pursuing new interests (Gotlieb, Still, & Newby-Clark, 2007; Lefkowitz, 2005; Roe Clark, 2005). Further, the number, nature, and degree of major life events, both positive and negative, tend to be constrained during the university years as a result of the delay in assuming adult responsibilities and roles (Arnett, 2004).

Despite the changes and challenges often encountered during the transition to university, young university students are likely to be amongst the healthiest and highest

functioning segments of the population (Keyes, 2003; Keyes et al., 2002). Further, the longitudinal design of study extending into the third year of university likely resulted in some degree of systematic attrition (e.g., Wintre & Bowers, 2007); most obviously, students dropping out of university were unlikely to have been included in the follow-up assessments, resulting in a longitudinal sample that was (likely) over-representative of academically successful students. Consequently, the degree of stability in positive functioning may be particularly high during this period of life, particularly among students who do not drop out of university. This stability in functioning presents challenges for examining predictors of change in functioning. In particular, the chances of finding unique prospective effects of other hypothesized predictive factors, such as SWB configurations of subjective LS trajectories, are diminished as the stability of the criterion increases.

Further, the relatively young age of university students may have constrained the variety of SWB configurations or subjective LS trajectories that characterized the sample. For example, in previous research on SWB configurations using cross-tabulations of global ratings of satisfaction and happiness, McKennell (1978) found that older participants were over-represented in a cluster characterized by high levels of self-reported satisfaction, but low levels of self-rated happiness. With respect to subjective LS trajectories, whereas upward subjective trajectories characterized the vast majority of the present sample, other research examining subjective LS trajectory patterns has suggested that another dominant pattern – subjective decline in LS – may be characteristic of older adults, most typically among individuals 75 years or older (Bortner & Hultsch, 1974; Rocke & Lachman, 2008). The near-absence of this pattern in the present sample is

important because, compared to inclining or flat subjective LS trajectories, declining subjective trajectories may be linked with the relatively poorest levels of biopsychosocial functioning (Keyes & Ryff, 2000; Rocke & Lachman, 2008).

Based on all of these considerations, future research examining Shmotkin's (2005) framework should incorporate samples comprising both youth and adults of a wider range of ages. Indeed, a broader sampling of ages may reveal additional types of SWB configurations and more varied patterns of subjective LS trajectories, as well as stronger links and greater discriminability with respect to mental, physical, and interpersonal functioning. For similar reasons, it would likely prove valuable to examine SWB configurations and subjective LS trajectories among groups known to be suffering, for example, due to a chronic physical illness, addiction, or other mental illnesses, as well as individuals with more diverse past experiences or constrained futures (e.g., abuse victims, young people with terminal illnesses, prison inmates). Further, investigating these issues among individuals undergoing different types of major transitions, including both positive (e.g., starting a new career, winning a lottery) and negative life events (e.g., divorce, diagnoses of major illness) may also increase the variability of subjective LS trajectory patterns or SWB configurations observed, as well as attenuate the stability in functioning over time thereby increasing the amount of 'explainable' variance in the criteria of interest.

In addition to these sampling considerations, other sociodemographic factors may be linked with differences between individuals in SWB configurations and subjective LS trajectories. Reviews of SWB research suggest that factors such as age, sex, education, and income explain typically modest amounts of variance in SWB (e.g., Argyle, 1999;

DeNeve & Cooper, 1998; Diener et al. 2003; Lyubomirsky et al., 2005a; Myers, 2000). Nonetheless, some studies have shown that education level and socioeconomic status are linked (albeit somewhat inconsistently) with different patterns of subjective LS trajectories, and different combinations of cognitive and affective components of SWB (e.g., Lachman et al., 2008; Rocke & Lachman, 2008; Shmotkin, 1998; Shmotkin et al., 2006).

Further, although early research established that upward subjective LS trajectories are normative in several countries around the world (Cantril, 1965), the role of culture as a potential moderator of the shape the typical subjective trajectory, and the implications of such trajectories has yet to be programmatically investigated. It is possible, for example, that in cultures with a greater collectivist (versus individualist) emphasis (e.g., Javidan & House, 2001; Klassen, 2004), or in which the future is not as idealized or salient (versus the present or past) as in Western societies (Nurmi, 1991; Poole & Cooney, 1987; Seginer & Halabi-Kheir, 1998), the normative trajectory may not reflect perceived continuous self-improvement. Thus, whereas the homogeneity of the present sample precluded examining links between sociodemographic factors and SWB configurations or subjective LS trajectories, investigating these issues in more diverse samples and cultures would represent an important extension.

General Limitation 2:

Self-Report

Assessing SWB

An individual's subjective evaluations of and affective reactions to their life lie at the core SWB. One of the impetuses for early research on SWB was to expand economic

and social indicator approaches to assessing personal and societal well-being based purely on individual-level indicators as education level, income, and disability status; or national-level indicators including gross domestic product, infant mortality rate, or average life expectancy (Andrews & Withey, 1976; Bradburn, 1969; Cantril 1965). According to Diener (1984), an individual's idiosyncratic, summary judgment of their life overall is a hallmark of SWB research. Further, unlike approaches to assessing quality of life based on predetermined lists of important life domains (e.g., Frisch, Cornell, Villanueva, & Retzlaff, 1992; Harper & Power, 1998), or operationalizing well-being with respect to idealized types of functioning within particular domains (e.g., Keyes, 1998; Ryff, 1989; Seligman et al., 2005), an SWB perspective allows each individual to decide for him or herself which aspects of their life are most important when forming global judgments of their life (Diener, 1984; Diener et al., 1998). For these reasons, SWB is typically assessed through self-reported satisfaction with one's life overall, as well as the frequency or degree of positive and negative affective experiences "in general" (Diener, 2008).

Several other methods or modes of assessing SWB also have been tested, however. For example, research has examined the convergence between self-report and informant-reports, most typically made with respect to satisfaction judgments of the target persons' life overall or particular life domains, such as marriage or family functioning (Schimmack & Crites, 2005; Schimmack, 2008; Seidlitz et al., 1997). Other studies have employed memory-based measures, such as the number of positive versus negative life events or emotional experiences recalled within a fixed time interval (e.g., Seidlitz & Diener, 1993; Seidlitz et al., 1997). Whereas recall- and informant-based

measures are both based on self (or other) reports, additional work has examined computer-facilitated, reaction-time based ‘implicit’ measures of SWB, including LS (Kim, 2004) and happiness (Walker & Schimmack, 2008) designed to reveal automatic mental associations between one’s life and good (vs. bad) judgments. With the exception of the implicit measures, self-reports of LS, PA, and NA typically correlate at least moderately with measures from each of the other assessment modalities. Collectively, this work provides valuable evidence for the validity of self-reports of SWB. However, given the theoretical conceptualization of SWB exclusively in terms of subjective experiences and personal life evaluations (e.g., Diener, 1984, 2008; Shmotkin, 2005), self-report will likely continue to be the dominant assessment approach for SWB.

Assessing Positive Functioning

The approach employed in the present work to assess positive functioning was based on the World Health Organization’s (1946) definition of “health”, which includes not only the absence of illness, but the presence of positive mental, physical, and interpersonal functioning. Multiple self-report indicators of each domain of functioning were employed, from which three composite functioning scores were derived. The use of self-report assessments of health have a long history in medical, clinical, epidemiological, and psychological research. Studies have consistently shown that self-reported assessments of health have unique statistical effects on several life outcomes, including morbidity and mortality, even after controlling for physiological indicators of health status or physician reports (Benyamini & Idler, 1999; Idler & Benyamini, 1997).

However, unlike the definition and conceptualization of SWB, healthy functioning is not an exclusively subjective phenomenon. One reason is that some

components of health, and positive functioning more broadly, may not be observable by the respondent (e.g., internal biological functioning), or require the judgment of other individuals (e.g., job aptitude, romantic attractiveness; mental illness diagnoses). Other aspects of positive functioning are not subjective in nature (e.g., disability status or physical impairment, major life events like the loss of a spouse), or are defined with respect to societal norms, regardless of personal perceptions of relevance (e.g., educational success defined in terms of attainment of post-secondary education; career success defined with respect to job tenure or income). Further, although researchers often find substantial convergence between subjective versus objective indicators of healthy functioning, self-serving biases or cognitive and memory-related distortions are not uncommon, particularly when individuals are asked to evaluate or report on life events or circumstances occurring more than a few days prior (Robinson & Clore, 2003; Robinson et al., 2004). Thus, although theorists and researchers alike have emphasized the importance of including a subjective perspective when assessing healthy functioning, objective indicators (including physiological indices or other-reports) are considered the “gold-standard” for assessment (Bowling, 1997; Larsen, 1991; Poole, Matheson, & Cox, 2008).

With respect to the present dissertation, the absence of objective indicators of health or positive functioning raises several important questions. For example, to what extent might the positive correlations among the composite functioning measures, and between these measures and the components of SWB, reflect a self-presentation bias? Research exploring the role of a socially desirable responding style in producing SWB judgments has revealed that self-presentation biases do not generally distort the relations

between SWB and other outcomes of interest (e.g., Diener et al, 1991; Kozma & Stones, 1987, 1988). Nonetheless, given that social desirability was not assessed in the present work, conclusions concerning this possibility cannot be drawn with respect to the present studies.

Further, rather than reflecting a self-presentation bias, the network of associations among the variables examined in the present work may reflect a self-evaluation or self-perception bias. Indeed, as early as Thorndike (1920), researchers have noted the tendency for individuals' ratings of their own personality to be saturated by an overarching positivity bias. Similarly, in recent research, Anusic et al. (in press) have investigated this "halo effect", and found it to account for a sizeable proportion of the common variance among the Big Five (John & Srivastava, 1999) personality factors.¹⁸ At the other extreme, Watson and colleagues have noted that substantial correlations among self-reports of negative affect and physical systems or pain may reflect a more global tendency toward complaining about one's distress (e.g., Watson et al., 1988, 1989), and may be understood more generally as a reflection of a neurotic personality.

Thus, an implication for the present work is that the associations observed among and between measures of positive functioning and SWB may all have been saturated, at least to some degree, by one or both types of global self-perception biases. Left unanswered, therefore, is what the nature of the associations among the SWB and functioning measures are, independent of these potential halo or complaining biases. Even in the absence of objective indicators or informant reports, as recommended by Anusic et al. (in press) future research employing self-reports could investigate this issue

¹⁸ Interestingly, related recent research suggests that this halo-like bias may be specific to ratings of the Big Five personality factors, and may not distort ratings based on the six-factor HEXACO model (Ashton, Lee, Goldberg, & de Vries, in press).

by (a) including measures of the Big Five personality factors to estimate, and then remove statistically, the common variance associated with a halo-like bias or global neurotic-like tendency to complain, or (b) assessing the halo-like bias using a simple four-item scale developed by Schimmack et al. (2009) as a proxy for the tendency toward positively-biased self-reports of personality and statistically controlling for this variable.

Taken together, there are several important considerations concerning the exclusive reliance on self-reports of SWB and positive functioning. Clearly, self-report places constraints on the interpretation of present findings, particularly with respect to assessments of healthy or positive functioning. Although self-report will likely continue to be the dominant choice for SWB assessment, additional approaches can and should be employed in future work to validate self-report measures of functioning; assess positive functioning using more objective indicators; and address potential positive and negative self-report biases whenever this assessment modality is employed.

General Limitation 3:

An Abundance of Statistical Tests

Choices concerning analytic approaches and statistical comparisons employed in the two parts comprising the present dissertation were guided by the hypotheses developed for each study. Given the number of hypotheses delineated in each study, and the multivariate nature of the models employed, a large number of statistical comparisons were performed. Consistent with statistical conventions in psychological research, an alpha level of .05 (non-directional, two-tailed tests) was employed for each comparison. The alpha level defines the Type I error rate, which is the probability of incorrectly rejecting the null hypothesis when, in fact, it should have been retained. As an example,

the Type I error rate in Part 1 refers to the probability of rejecting the null hypothesis of “no significant difference” in interpersonal functioning between SWB clusters when, in fact, the clusters do not actually differ. The odds of making a Type I error increase as a function of a number of factors, including the number of statistical comparisons computed.

Given that researchers typically strive to avoid making conclusions based on ‘false positive’ results, it is desirable to limit the number of statistical tests computed in a given study in order to reduce Type I errors. Another approach to reducing the overall Type I error in a given study is to lower alpha in order to compensate for the number of statistical tests computed. Various decision rules have been employed in this respect, including simply lowering alpha to a more conservative level (e.g., .01 or .001) or a Bonferroni correction in which alpha is lowered as direct function of the number of statistical tests computed, that is, the reduced alpha rate = $.05 / \text{number of statistical tests}$. However, whereas the former approach requires a somewhat arbitrary decision concerning a more appropriate alpha level, the latter approach may be overly restrictive as the number of statistical tests increases.

Although these approaches may indeed serve to attenuate the probability of making a Type I error, a second type of error – a Type II error – is also relevant. A Type II error occurs if the null hypothesis is not rejected when, in fact, it should have been (i.e., the null hypothesis is false). As an example, the Type II error rate in Part 1 refers to the probability of not rejecting the null hypothesis of “no significant difference” in interpersonal functioning between SWB clusters when, in fact, the clusters do actually differ. The probability of making a Type II error, referred to as beta, is related to

statistical power (i.e., $\text{power} = 1 - \beta$), which is itself a function of a number of factors, including the magnitude of the difference between groups or association between variables assessed (i.e., the effect size), the sample size, and alpha. As the effect size, sample size, or alpha level decreases, statistical power decreases, and beta (i.e., Type II error rate) increases. Consequently, attempting to attenuate the Type I error rate by reducing alpha (in order to adjust for the number of statistical tests) will inflate the Type II error rate (Pedhauzer & Schmelkin, 1991).

In every study, therefore, researchers face a trade-off between limiting the odds of falsely rejecting the null hypothesis when it should not have been rejected (i.e., a false positive, or Type I error) and failing to reject the null hypothesis when it should have been rejected (i.e., a false negative, or Type II error). In the present work, I have not employed an omnibus alpha correction, but rather have reported exact p -values (e.g., $p = .002$), or upper limits for p -values (e.g., $p < .05$, $p < .001$) for individual statistical tests, where possible. Further, effect sizes (e.g., η^2 for ANOVAs, r s for bivariate associations, R^2 values for predictive models involving more than one predictor) were reported where appropriate to inform the magnitude of the statistical comparison, rather than simply focusing on the statistical significance level (Schmidt, 1996; Wilkinson, 1999).

In my view, this approach provides a reasonable compromise between using an arbitrarily adjusted alpha level (e.g., .01 instead of .05) or an overly restrictive adjusted alpha based on a Bonferroni-type correction to determine the “significance” of the findings. Further, it represents a practical solution to the inherent trade-off between Type I and Type II errors. That is, by reporting the observed p -values (where possible), rather than simply indicating whether a given p -value exceeds alpha or not, and through

including information concerning the associated effect size, full information is provided to the reader where feasible. Nonetheless, it is also important to acknowledge that the large number of statistical comparisons computed across Part 1 and Part 2 raises the probability that some of the results identified as “statistically significant” may be Type I errors.

General Implications

Implications of the present findings for the third and fourth modules of Shmotkin’s (2005) framework have been described in the *Discussion* sections for Part 1 and Part 2, respectively. In this section, with full recognition of the limitations noted above, I outline major implications of the present work for Shmotkin’s (2005) model and for future research on SWB more generally.

General Implication 1:

The Structure of SWB

At the heart of the third module in Shmotkin’s (2005) framework is the assumption that SWB is best understood with respect to similarities and differences between individuals in the within-individual organization of the SWB system. In support of Shmotkin’s claim concerning differences in the internal organization of SWB as an integrated system of components, Part 1 provided evidence of the longitudinal replicability of the five SWB configurations first identified in our preliminary study (Busseri et al., 2009a).

Congruous and Incongruous Configurations

Two of the five clusters at each wave were characterized by ‘congruent’ combinations of SWB components, reflecting high SWB (high LS, high PA, low NA) and low SWB (low LS, low PA, high NA) respectively. These two configurations were anticipated based on other research and discussions in which high SWB is regarded as the optimal combination of SWB components (e.g., Diener, 1984; Lucas et al., 1996; Diener & Seligman, 2002) and, although less frequently discussed, low SWB has been described as least optimal (e.g., Diener & Seligman, 2002). Although SWB researchers have consistently described “high SWB” as a specific combination of components occurring within individuals, there is a disconnect between how high SWB is typically described, and how it is more frequently operationalized and studied using dimensional scores of LS, PA, and NA. Yet this conceptual-empirical divide is avoidable. If SWB researchers are interested in particular configurations of LS, PA, and NA, or distinct sub-groups of individuals characterized by specific SWB configurations, a person-centered approach would ensure a direct correspondence between conceptual and empirical approaches.

Apart from the high SWB and low SWB clusters, the other three SWB configurations were each dominated by elevated or depressed levels of one or two SWB components. For example, at Wave 1 and Wave 4 the three incongruous configurations were dominated, respectively, by low affect (moderate LS, low PA and NA), high NA (moderate LS and PA, high NA), and low LS (low LS, moderate PA and NA); at Wave 2 the corresponding three configurations were dominated by low PA, high affect, and low LS/low PA, respectively. Prior to our preliminary study (Busseri et al., 2009a), these specific configurations were not predicted a priori. The identification of these sort of

configurations, however, are consonant with Shmotkin's (2005) discussion of 'incongruent' patterns in which the SWB components do not align in the prototypical patterns (i.e., high SWB or low SWB), but rather reflect more complex (or contradictory) combinations of life evaluations and affective experiences.

Noticeably absent among these incongruous configurations is a "moderate SWB" pattern, characterized by moderate levels of all three SWB components. Instead, at Wave 1 and Wave 4, for example, two of these three configurations reflected incongruities between the cognitive and affective components of SWB: Whereas the low affect cluster was characterized by moderate LS and low PA (and low NA), the low LS cluster was characterized by low LS and moderate PA (and moderate NA). These combinations suggest that the cognitive and affective components of SWB may not be "two sides of the same coin" (Biswas-Diener et al., 2005, p. 221; see also Kim-Prieto et al., 2005) as some researchers have proposed, but rather imply that the cognitive and affective components may be functionally independent for some individuals.

Furthermore, with respect to the affective components of SWB, two of the three incongruous clusters at Wave 1 and Wave 4 were characterized by similar, rather than opposing, levels of PA and NA: low PA and NA in the low affect cluster; and moderate PA and NA in the low LS cluster. These configurations suggests that the experience of PA and NA is not necessarily represented along a single positive-negative continuum for all individuals. Rather, for many people, PA and NA both may be infrequently experienced, or experienced to moderate degrees. These findings are consonant with research demonstrating a bivalent structure of affect and evaluation (e.g., Cacioppo et al., 1999; Watson et al., 1998). Thus, one broad implication of the present dissertation is that

a person-centered, configuration-based approach to SWB can provide important insights into the structure of SWB that might not be apparent from the typical dimensional-based approaches.

Informing Competing Structural Models of SWB

A person-centered approach to SWB also may help reconcile competing proposals concerning the structure of SWB as either three separate components, a global hierarchical construct with three lower-order components, or a causal system in which PA and NA influence LS. Each of these competing structural models are premised on the notion that SWB can be operationalized in terms of individual differences in the separate SWB components. Further, each model assumes a particular set of relations among the three components: In the hierarchical model, substantive covariation among all three components is assumed in which LS and PA are positively correlated, and both are negatively correlated with NA; in the causal systems model, substantive and unique associations between PA and NA with LS are assumed, whereas the correlation between PA and NA is not specified and, in fact, of little consequence to the overall structure of SWB; in the three separate components model, the associations among components are assumed to be modest, at best, and largely uninformative with respect to SWB.

Consistent with these conflicting assumptions, Diener (2008) has recently suggested that the ‘true’ nature of the relations among SWB components may never be determined. Yet, a configural approach to SWB makes no assumptions concerning the true nature of the relations among SWB components. There is no contradiction, therefore, in expecting that in some configurations, a congruous alignment of cognitive and affective components may be observed (e.g., high LS, high PA, and low NA), whereas, in

other cases, incongruity may be typical (e.g., moderate LS in combination with low PA and low NA). Therefore, a configural approach to SWB may provide new opportunities to move beyond conflicting assumptions concerning the dimensional structure of SWB and the quest for the “true” nature of the relations among its components. Instead, a person-centered approach focuses on understanding how SWB is experienced by individuals in terms of integrated patterns of life evaluations and affective experiences.

In summary, the appeal of a person-centered approach to SWB is at least two-fold: as a potential bridge between the conceptual-empirical divide in SWB research with respect to how SWB is typically discussed versus studied; and as a context for new insights concerning the structure of SWB. Yet an inescapable question that has yet to be addressed is whether SWB is fundamentally categorical or dimensional in nature. That is, is SWB manifested as a series of distinct types (e.g., high SWB, low affect), or it is dimensional, reflected in quantities or ‘amounts’ ranging from low to high values? Although Shmotkin’s (2005) framework emphasizes SWB configurations in module three, other parts of the framework are variable-centered, for example, emphasizing individual differences in levels of life satisfaction in module four. Thus, rather than adopting one approach over the other, it appears that Shmotkin’s conceptualization of SWB encompasses both person-centered and variable-centered perspectives.

Although the cluster analytic approach illustrated in Part 1 can be used to evaluate which of various possible cluster solutions best characterize a given sample, the issue of whether a categorical approach to SWB is more appropriate than a dimensional approach cannot be determined through the use of cluster analysis alone. Instead, alternative statistical techniques may be required. For example, although less widely employed than

cluster analysis, methodologists have developed a series of procedures known as ‘taxometric’ analyses, designed to test competing assumptions concerning the underlying continuous versus discontinuous nature of a particular variable or construct (e.g., Meehl, 1995; Ruscio & Ruscio, 2008). Recent developments also include latent class methods that have been described as ‘model-based’ procedures because they determine empirically whether a statistical model based on a pre-specified number of clusters (or latent classes) can provide adequate fit to the observed data (Muthen, 2001; Muthen & Muthen, 2000). Interestingly, some researchers have proposed that such approaches hold the promise of revealing “hidden” latent classes, or a mixture of ordered categories, even among distributions that appear continuous (Pickles & Angold, 2003). Other researchers have suggested that latent class analysis be used to compare models that assume an underlying categorical (i.e., latent ‘class’) versus dimensional (i.e. latent ‘trait’) structure (e.g., Krueger et al., 2005; Markon & Krueger, 2005).

To date, little methodological research has compared the relative merits and limitations of each of these approaches directly (Ruscio & Ruscio, 2008). Nonetheless, whereas the cluster analytic approach used in the present work provided a well-established and reasonable first-step toward establishing the viability of a person-centered approach SWB, one direction for future research on SWB configurations is to compare cluster analytic and latent class approaches, for example, as well as to test competing latent class and latent trait models of SWB.

On the Underlying Nature of SWB

Even if it is premature to draw conclusions concerning the fundamental nature of SWB as either dimensional or categorical, it is worthwhile considering the broader

implications of the issue. As reviewed above, there are three primary structural models of SWB: SWB as three separate components; SWB as a hierarchical latent construct; and SWB as a causal system (i.e., PA, NA \rightarrow LS). As discussed by Busseri and Sadava (in preparation), whereas some integration between models is possible (e.g., a hybrid higher-order model in which SWB is conceptualized with respect to the common variance between components, separate from the meaningful, unique variance in each separate component), in other cases there are strong contradictions among models, for example, between treating all three components as conceptually equivalent indicators in the hierarchical structural model versus specifying LS as the critical outcome of interest and PA and NA as predictors only in the causal systems model. Despite the discrepancies, the three competing models share the variable-centered assumption that SWB is best conceptualized and studied with respect to differences between individuals in levels of 'amounts' of SWB. From this perspective, operationalizing SWB as distinct configurations of components would inappropriately force individuals into artificial clusters, resulting in the loss of meaningful variation between individuals in LS, PA, and NA.

On the other hand, however, if SWB is best understood as an integrated system of components structured in different ways within individuals, then each of the three variable-centered structural models would be inappropriate. More specifically, treating SWB as three separate components varying between individuals would completely obscure the distinct SWB configurations found within individuals. A latent variable model treating SWB as a higher-order latent factor with three first-order indicators would also be inappropriate because this model infers the presence of SWB from a prescribed

pattern of correlations among LS, PA, and NA components, rather than allowing for various within-individual combinations of SWB components, encompassing both congruent and incongruent patterns, regardless of the direction and magnitude of the correlations among LS, PA, and NA these patterns imply. A causal systems model would also require a particular pattern of correlations among SWB components (i.e., PA and NA as positive and negative predictors of LS, respectively), and makes the additional assumption that LS is a product of PA and NA, rather than one of three indicators of SWB that can combine and integrate in various ways within individuals.

Thus, rather than simply representing a fourth type of structural model of SWB, a person-centered configural approach constitutes a qualitatively different type of structural model that allows researchers to address different types of empirical questions concerning the nature of SWB.¹⁹ For example, the person-centered approach enables researchers to identify groups of people who do not fit a high SWB or low SWB pattern, but who may report high or low levels of functioning nonetheless. A person-centered approach also may reveal distinct patterns of SWB configurations that are linked with particular types of experiences or life events, or most characteristic of individuals with different types of personalities (e.g., Asendorpf, 2006). In contrast, the variable-centered approach enables the researcher to determine how each SWB component, a latent SWB factor, or a total SWB score relates to positive functioning. Variable-centered research also can establish mediators or moderators of such linkages.

Given these differences, as well as the contradictions among the three competing dimensional structural models of SWB, it is critical that researchers give greater attention to the implications of their choices concerning operationalization of SWB (e.g., as three

¹⁹ This section draws on information presented in Busseri et al. (2009a).

separate scores, a latent variable, a causal system, or distinct configurations) with respect to the assumptions attending a given approach concerning the assumed structure of SWB. Indeed, even if the structure of SWB is not the primary focus of a given study, it would be valuable if consideration were given to how the meaning and implications of the study's finding might change depending on the type of assumptions made concerning the structure of SWB.

General Implication 2:

The Function of SWB Configurations

In addition to raising novel and important questions concerning the structure of SWB, Shmotkin's (2005) proposals concerning SWB configurations have implications for the function of SWB. In Shmotkin's framework, SWB configurations are flexible modes (i.e., changeable within-individual combinations of LS, PA, and NA), rather than the fixed dispositions, that adjust to adversity and threat in order to maintain and/or promote positive functioning (see also Keyes et al., 2002; Shmotkin et al., 2006). Consistent with these notions, Part 1 tested a basic issue concerning the function of SWB configurations: whether SWB configurations predict future mental, physical, and interpersonal functioning. There was little evidence of prospective relations between SWB configurations at Wave 1 or Wave 2, or positive functioning at a subsequent wave, or prospective relations between positive functioning at Wave 1 or Wave 2 on SWB configurations at a subsequent wave. Instead, stability and change in SWB configurations were associated with change in positive functioning over time, with the particular pattern of association depending on the SWB configuration. Although these dynamic associations do not rule out the anticipated functional role of SWB configurations in

promoting positive functioning and adaptation to adversity, results from Part 1 do not support a directional influence of SWB configurations on future functioning.

Further, when all five SWB configurations were examined, I did not find any consistent advantage for individuals characterized by incongruous configurations that, at least in Shmotkin's framework, may have provided some degree of compensation over incongruous configurations most likely to be characterized by the strain of strongly diverging SWB components. More concretely, participants characterized at Wave 1 by a low affect configuration had no apparent advantage over individuals reporting a low LS configuration, despite the advantage of favorably low levels of NA in the former and the burden of extremely low levels of LS in the latter cluster. Similarly, results from examination of just the 'middle three' clusters were inconsistent in this regard. There was evidence that among Wave 1 participants changing cluster configurations over time in a 'downward' direction (i.e., toward low SWB or intervening configurations), participants in the low LS cluster fared particularly more poorly than expected with respect to mental functioning at Wave 2 and at Wave 4. Although these trends are consistent with the hypothesized strain of an incongruous SWB configuration characterized by extremely low levels of one component (in this case, low LS), these trends were not observed for the other domains of functioning.

In general, therefore, in comparisons among all five congruous and incongruous SWB configurations, and among just the three incongruous configurations, evidence of the hypothesized adaptive advantage of compensation among SWB components, or the anticipated additional disadvantage of strain among incongruous components was not consistently observed. Instead, the most positive levels of functioning across mental,

physical, and interpersonal domains were found among individuals characterized by high SWB, that is, a combination of high LS, high PA, and low NA; at the other extreme, the least positive levels of functioning were found among individuals characterized by a low SWB configuration. These results are more clearly consistent with Shmotkin's (2005) proposal that congruity among SWB components is a double-edged sword.

Although results from Part 1 failed to provide support for the anticipated predictive functional role for SWB configurations, other forms of functionality also are relevant to Shmotkin's (2005) framework. First, the SWB system may induce positivity, resulting in "an environment that is more pleasant at the output than at the input stage" (Shmotkin, 2005, p. 296). Further, SWB may help individuals counter the effects of hostile psychological and physical environments, thereby helping to maintain or promote adaptive functioning by regulating real or perceived threat. It is possible, therefore, that SWB configurations may function as buffers of adversity, by counteracting current suffering or stress.

Second, SWB configurations may play a valuable information or knowledge function (Eagly & Chaiken, 1993; 2007; Shavitt, 1990), indicating at any point in time how one's life is going, both in terms of overall satisfaction and affective experiences. Further, if monitored over time, stability versus change in SWB configurations may serve as a useful barometer, reflecting pressures and changes in other areas of functioning. For example, individuals reflecting on their lives at a given point in time may realize that despite a number of negative experiences that have resulted in feelings of anger and frustration, they are still fairly satisfied with their life overall. Several months later, however, they may realize that they still regularly feel angry and are no longer as

satisfied as they used to be, prompting deeper personal reflection, for example, concerning what has changed (or not changed) over the past months in various life domains.

In the absence of evidence concerning a predictive functional role for SWB configurations, it is reasonable to ask whether a dimensional approach would be more useful in this respect. Results from Part 1 provide unambiguous evidence on this point. The cumulative prospective effects of the SWB components, measured at a given point in time, on changes in future functioning were not consistently or substantially stronger than those of the SWB configurations. When dynamic effects of the SWB components were considered, however, changes in LS, PA, and NA added unique and substantial explanatory power to the predictive models, over and above the dynamic statistical effects of the SWB configurations. More specifically, respondents reporting increases in LS and PA, and decreases in NA over time also tended to report better than expected mental, physical, and interpersonal functioning in the future. With respect to predictive utility, therefore, a dynamic dimensional approach to SWB was superior to a parallel person-centered approach.

Yet, predictive utility is not the only criteria by which the merits of a person-centered approach, or any other approach, to which SWB should be evaluated. According to Bergman and Trost (2006), for example, an equally if not more important issue is the extent to which a particular approach improves understanding of the phenomena of interest. Additional considerations include the simplicity and clarity of the completing models (Asendorpf & Denissen, 2006; Bergman & Trost, 2006), ease of communication of findings (Pickles & Angold, 2003), as well as the extent to which the analytic model

appropriately matches the theoretical or conceptual framework underpinning a given investigation (Kazdin, 1998).

In the present case, for example, a statistical approach based on SWB configurations was chosen to match the person-centered conceptual model, specifying distinct within-individual combinations of SWB components (Shmotkin, 2005). With respect to simplicity of the predictive models, the key comparison was between a person-centered model of SWB specifying (in the ‘main effects’ portions of the models) one categorical variable with five levels (or four dummy codes) versus three dimensional scores and the associated non-linear effects (totaling 10 associated statistical effects). Further, greater predictive utility of the changes scores for the SWB dimensions does not necessarily imply greater understanding of the nature, causes, or consequences of these changes without making additional assumptions concerning the underlying nature of SWB.

For example, results demonstrating the superior predictive utility of the SWB dimensions are consistent with a structural model of SWB in which SWB refers to three separate components: LS, PA, NA. And yet the moderate correlations observed among these SWB components at each wave also raises the possibility of a higher-order SWB factor that may provide a more parsimonious, and predictively powerful, explanatory model. Similarly, the third primary structural model based on SWB dimensions – the causal systems model in which PA and NA influence LS – also may present a viable alternative model, particularly given the longitudinal nature of the data. Thus, a complete test of the relative predictive utilities of person-centered and variable-centered approaches to SWB would require a more thorough examination of, and more explicitly

theoretical statements concerning the various possible dimensional structures of SWB. To this end, Shmotkin's (2005) framework provides a clear statement concerning the anticipated within-individual structure of SWB as distinct configurations of components, against which dimensional models of the structure and function of SWB can be evaluated.

Even if predictive utility is only one of several important considerations, however, support for the functional role for SWB configurations in promoting and maintaining positive functioning over time would be most compelling if a person-centered approach provides both conceptual and empirical utility above and beyond the more typical dimensional approaches to SWB. Part 1, in combination with our preliminary work on SWB configurations (Busseri et al., 2009a), provides a compelling case for the conceptual advantages of a person-centered approach, particularly with respect to bridging the conceptual/empirical divide previously discussed, and informing the structure of SWB from a within-individual perspective. However, the superior predictive utility of this approach has yet to be demonstrated. Therefore, an important step for future research investigating the potential function of SWB configurations is to delineate in greater detail the agentic role(s) that SWB configurations may play, and provide supporting evidence of these functions.

And yet it may also be possible eventually to move beyond an "either/or" debate concerning the more appropriate treatment of SWB as categorical or dimensional. For example, paraphrasing Pickles and Angold (2003, p. 529), the central question is not 'Is SWB scalar or categorical?' But '*Under what circumstances* does it make sense to regard SWB as being scalar and *under what circumstances* does it make sense to regard SWB as

being categorical?’ The relations between SWB and various other phenomena may be both continuous and discontinuous. Whereas some associations involving SWB may be linear – for example, improved relationship functioning appears to be linked with higher and higher levels of SWB up to the scale maximum (Oishi, Diener, & Lucas, 2007) – other associations (e.g., income, education) may be discontinuous or categorical, such that there might exist a ‘threshold’ value of SWB beyond which quantitative changes have little impact. Consequently, the properties exhibited by SWB may be not consistent with a single manifestation (i.e., categorical or dimensional). From this perspective, the key issue is determining the nature of the relations between SWB and other associated processes and factors, as opposed to discerning its’ abstract fundamental state. Informing these issues will require greater specificity and more nuanced evidence concerning associations between SWB with other processes and theoretically-specified correlates, causes, and outcomes. Further, an open approach will be required in which both person-centered and variable-centered conceptualizations of SWB, and related empirical approaches, are investigated simultaneously.

General Implication 3:

Upward versus Onward Subjective Trajectories

The defining feature of the fourth module in Shmotkin’s (2005) framework is its subjective temporal perspective, comprising individuals’ personal narratives of their past, present, and anticipated future well-being. Part 2 provided clear evidence of the longitudinal replicability of the upward subjective LS trajectories, consistent with our preliminary investigation (Busseri et al., 2009b). Indeed, despite modest mean-level changes in LS over time, the subjective sense that one’s life satisfaction gets “better and

better” was normative at all three waves. In contrast, relatively few individuals in the present sample of students reported flat or declining subjective LS trajectories.

The consistency of the upward subjective trajectory pattern across waves may reflect self-improvement and growth-oriented motivation characteristic of young adults (Keyes, 2000; Rocke & Lachman, 2008). Indeed, such patterns are consistent with other research showing that whereas subjective trajectories for LS and other personally-valued characteristics are ascending, on average, among young and middle-aged adults, normative subjective trajectories tend to become flatter in later adulthood and decline in old age (e.g., Heckenhausen et al., 1989; Lachman et al., 2008; Ryff, 1991; Staudinger et al., 2003).

The persistence of the upward subjective LS trajectories is intriguing, not only because they do not appear to reflect the “actual” LS trajectories (a point which I discuss further below), but also because steeper upward subjective LS trajectories were related to less positive functioning at each wave. Stated differently, individuals reporting flatter subjective LS trajectories were characterized both by less biased subjective trajectories and more positive functioning, compared to those reporting steeper upward LS trajectories. Thus, findings from Part 2, in combination with other recent examinations of subjective LS trajectories (Busseri et al., 2009b, 2009c; Lachman et al., 2008; Rocke & Lachman, 2008), provide a compelling case that optimal functioning in several life areas may be most closely aligned with the subjective sense that one’s satisfaction with life is relatively constant over time, rather than improving.

This conclusion is somewhat counterintuitive, given the widespread belief in the “power of positive thinking” and the presumed functional value of seeing the silver lining

in every cloud (e.g., Scheier & Carver, 1993; Snyder, 2002; Woodstock, 2005). However, the present conclusion concerning upward (vs. onward) subjective LS trajectories is also supported by our own recent work demonstrating that dispositional optimists (as determined through a well-validated self-report measure) view their LS to be on a relatively flat subjective trajectory, particularly from the present to the anticipated future, whereas dispositional pessimists (not optimists) anticipate that the future will be much brighter than the present (Busseri et al., 2009c; see also Rocke & Lachman, 2008). These latter findings are particularly intriguing given the common assumption among pollsters and media outlets that upward subjective LS trajectories are sign of a desirable indicator of positive thinking – even when such “optimism” is observed during bleak economic times (e.g., when all indications point to greater troubles ahead, rather than recovery) or among the most disadvantaged segments of society (e.g., Cantril, 1965; Taylor, Funk, & Craighill, 2006; Pew, 2002).

To explain these findings, I, and my colleagues (Busseri et al., 2009b, 2009c), have proposed that upward subjective LS trajectories are linked with complacency (rather than agency) and ineffective self-regulation (rather than proactive coping, self-efficacy, and adaptive emotional functioning) which reduce the likelihood of acting in one’s own best interest and, ultimately, decrease the chances of achieving the desired future. This model is consistent with discussions concerning the functional difference between naïve optimism, in which it is assumed a positive future will simply unfold over time, versus constructive (Taylor & Armor, 1996) or pragmatic optimism (Bortner & Hultsch, 1974), in which the positive anticipated future is expected to be achieved through personal effort and investment.

Several other researchers examining subjective change have found consonant results. For example, Rocke and Lachman (2008) reported that adults characterized by inclining subjective LS trajectories were characterized by less positive functioning in several domains than those reporting a consistent/high subjective trajectory; the relatively worst levels of functioning were found among individuals reporting consistently low levels of LS, or patterns of subjective decline. Similarly, Keyes and Ryff (2000; see also Keyes, 2000) found that, in several life domains, subjective change – particularly perceived declines over time – was associated with less positive mental health compared to subjective stability. Interestingly, in this study, participants reporting subjective improvements were characterized by a mixed pattern of results, including levels of LS comparable to the subjective stability group.

According to Keyes (2000; Keyes & Ryff, 2000), self-consistency is a basic human need, whereas subjective change is distressing and unsettling. Consequently, individuals who perceive that their lives are stable through time are more likely to be characterized by positive mental health, compared to those perceiving change over time. In addition to placing high value on self-consistency, according to Keyes, individuals also evaluate the direction of their perceived changes. Although subjective improvement forces the individual to acknowledge their own inconsistency, it satisfies a self-enhancement standard, thereby providing flattering feedback. In contrast, subjective decline violate both self-consistency and self-enhancement standards. Overall, therefore, whereas optimal mental health should be more closely aligned with a subjective sense of stability, perceived self-improvement may confer some advantages relative to subjective declines.

Keyes' subjective change framework offers a novel explanation for the present findings in terms of self-concept, self-standards, and basic human needs such as homeostasis. Together, Keyes' self-theory of subjective change, along with the self-regulatory model proposed in the present work, provide a rich social-cognitive framework for research on subjective trajectories. Although preliminary evidence consistent with the proposed self-regulatory framework, which assumes a directional (albeit indirect) influence of subjective LS trajectories on future functioning, was demonstrated by Busseri et al. (2009b), prospective effects of the subjective LS trajectories were not observed in the present Part 2. Further, in our studies to date we have yet to provide evidence linking (a) subjective LS trajectories and (b) the hypothesized mechanisms connecting these trajectories with mental, physical, and interpersonal functioning, including coping style, self-efficacy, planfulness, and personal agency. Therefore, investigating the mediating and moderating mechanisms of a joint self-concept/self-regulation model, founded both in Shmotkin's (2005) and Keyes' (2000) frameworks, should be given high priority in future research.²⁰

Another important gap is that although the present work and Shmotkin's framework both draw on Diener's (1984) three-component model of SWB, little is known concerning subjective trajectories for PA and NA. In part, this may reflect the long-standing tradition of measuring subjective trajectories with respect to global life evaluations only, following Cantril's pioneering and influential early work (e.g., Cantril, 1965; Kilpatrick & Cantril, 1960). Cantril's single-item measurement approach to evaluating past, present, and anticipated future life satisfaction remains the most

²⁰ I am presently involved in a longitudinal study examining these issues.

commonly-used instrument for evaluating subjective trajectories, despite more recent measurement developments (e.g., Pavot et al., 1998).

Information concerning subjective SWB trajectories based on all three SWB components will better inform the link between subjective change in well-being and positive functioning anticipated by Shmotkin's (2005) framework, as well as a more nuanced reflection of individuals' personal narratives for their well-being through time. Such an approach will also offer unique opportunities to examine further the three-component structure of SWB, based both on relations among individual differences in levels of LS, PA, and NA, as well as the relations among subjective trajectories in each component. Further, comparisons between subjective trajectories in each SWB component to actual trajectories in LS, PA, and NA measured over time would further inform the biased nature of these retrospective and prospective evaluations for LS, PA, and NA. Such an approach could reveal similarities and dissociations in how accurately people view the three components of their SWB through time, thereby addressing the structure of SWB with respect to relations among (i) SWB components, (ii) subjective trajectories, and (iii) biases in subjective trajectories. Clearly, therefore, to understand more fully people's views of their SWB through time, an empirical approach is needed in which ratings of past, present, and anticipated future well-being for all three SWB components (LS, PA, and NA) are assessed.²¹

In summary, despite the lack of prospective evidence in Part 2 of the predictive effects of subjective LS trajectories on future functioning, findings from the present dissertation do confirm Shmotkin's (2005) claim the subjective LS trajectories convey important and novel information about individuals' well-being. Most clearly, young

²¹ I am currently involved in a study assessing subjective SWB trajectories for all three components.

adults differ with respect to the steepness of the incline of their subjective LS trajectories, and steeper upward subjective LS trajectories are linked not only with lower levels of LS, overall, but also with less positive mental, physical, and interpersonal functioning. These patterns are consistent with a small, but growing body of research examining the psychological significance of subjective change in well-being (e.g., Keyes, 2000; Keyes & Ryff, 2000; Lachman et al., 2008; Rocke & Lachman, 2008). Simply stated, subjective LS trajectories appear to one context in which “looking up” may not necessarily be a positive sign.

General Implication 4:

Bias in Subjective Trajectories for Life Satisfaction

Consistent with the disparity between the relatively flat mean-level trends in LS over time and the persistent upward subjective LS trajectories reported in Part 2, biases were observed both for recollections of past LS and forecasts for future LS. On average, past LS was rated as less positive at Wave 2 than it actually was in the past (a negative retrospective bias), whereas anticipated future LS at Wave 2 was more positive than it actually turned out to be (a positive prospective bias). In support of Shmotkin’s (2005) proposal that subjective trajectories provide an opportunity for self-enhancement, more negative retrospective bias was associated with less positive current functioning as well as steeper upward subjective LS trajectories. These patterns may reflect the motivated, defensive, and reactive nature of subjective LS trajectories (Shmotkin, 2005), such that individuals respond to current disappointment and adversity by construing past LS to be worse than it actually was – perhaps as a way to bolster one’s current self image, as has also been proposed by other researchers (Keyes, 2000; Ross, 1989; Ryff, 1991).

Shmotkin also proposed a similar adaptive role for optimistic forecasts. Yet, findings from Part 2 and Busseri et al. (2009b) demonstrate that individuals overestimating future LS tend to report less positive functioning in the future, compared to individuals making less biased forecasts. These patterns are consistent with other recent research examining biases in subjective versus actual change in LS over time showing that less bias in perceived changes in LS, both retrospective and prospective, is associated with more positive psychological, physical, and interpersonal functioning (Lachman et al., 2008). Whether or not these relations involving prospective bias reflect an indirect causal influence of overly-optimistic subjective LS trajectories on future functioning could not be determined in Part 2. It is clear, however, from Part 2 and other recent research (Busseri et al., 2009b; Lachman et al., 2008; Rocke & Lachman, 2008), that less bias in subjective LS trajectories goes ‘hand-in-hand’ with more positive functioning, both at present and in the future.

Although Part 2 focused on biases in the Wave 2 subjective temporal perspective LS ratings, the fact that upward subjective LS trajectories were normative at all three waves (despite the small change in levels of present LS over time) suggests that biases were also likely to have been present at each wave. Interestingly, Taylor and Armor (1996) have suggested that positive illusions (which include optimistic predictions for the future) are constrained within a functional range by feedback from the environment which serves to temper overly self-biased illusions. Consequently, excessively positive illusions tend not to be stable over time, but rather are short-lived and situation specific. In their view, instances in which excessive self-biased illusions persist over time are unlikely to be functional responses to stressful situations or negative effects, but rather

indicate “a more general psychological dysfunction that may involve the failure to process social and personal feedback” (Taylor & Armor, 1996, p. 891; see also Shedler et al., 1993). From this perspective, the moderate levels of stability in the latent subjective trajectory factors observed between adjacent waves in Part 2 raises the possibility that some individuals consistently reporting steep (i.e., excessive) upward subjective LS trajectories suffer from an inability to effectively process negative feedback.

A somewhat more benign alternative is that individuals may rarely contemplate or communicate personal narratives for their well-being. If so, many individuals may only infrequently receive feedback concerning the accuracy of their subjective sense that their LS keeps getting better and better. Other individuals may interpret negative feedback through a positive self-bias (Cummins & Nistico, 2003; Taylor & Brown, 1988). That is, some people may be aware of the ‘evidence to the contrary’, but chose nonetheless to maintain the illusion that life gets better and better over time. Thus, one interesting avenue for future research is to evaluate the role of self, social, and environmental monitoring in moderating the stability of the subjective LS trajectories and the retrospective and prospective biases implied by these trajectories.

Also of interest with respect to the biased nature of the subjective LS trajectories, the relations observed in Part 2 between prospective bias and future functioning were non-linear, such that the negative links between prospective bias and future functioning were particularly strong at very positive levels of bias. That is, whereas people who overestimated their future LS were more likely to report less positive functioning in the future compared to individuals who were less biased in their predictions, individuals who grossly overestimated their future LS were particularly likely to report poorer mental,

physical, and interpersonal functioning in the future. These patterns are consistent with Shmotkin's (2005) proposal concerning the risk of overly-high levels of self-deception. More generally, these findings are consonant with research on other forms of positive illusions (e.g., self-other comparisons) in which adaptive functioning is thought to be linked with a moderate amount of bias, consistent with the notion of an "optimal margin of illusion" (Baumeister, 1989; see also Shedler et al., 1993; Taylor & Armor, 1996). Of interest for future research on subjective trajectories, therefore, is to determine whether there is indeed an optimal type or degree of bias with respect to retrospective and prospective subjective temporal evaluations of well-being, or whether flat subjective LS trajectories are not only most realistic, but also most closely linked with positive functioning over time, as supported by present results and other emerging research (e.g., Busseri et al., 2009b, 2009c; Lachman et al., 2008; Rocke & Lachman, 2008).

General Implication 5:

The Many Faces of SWB

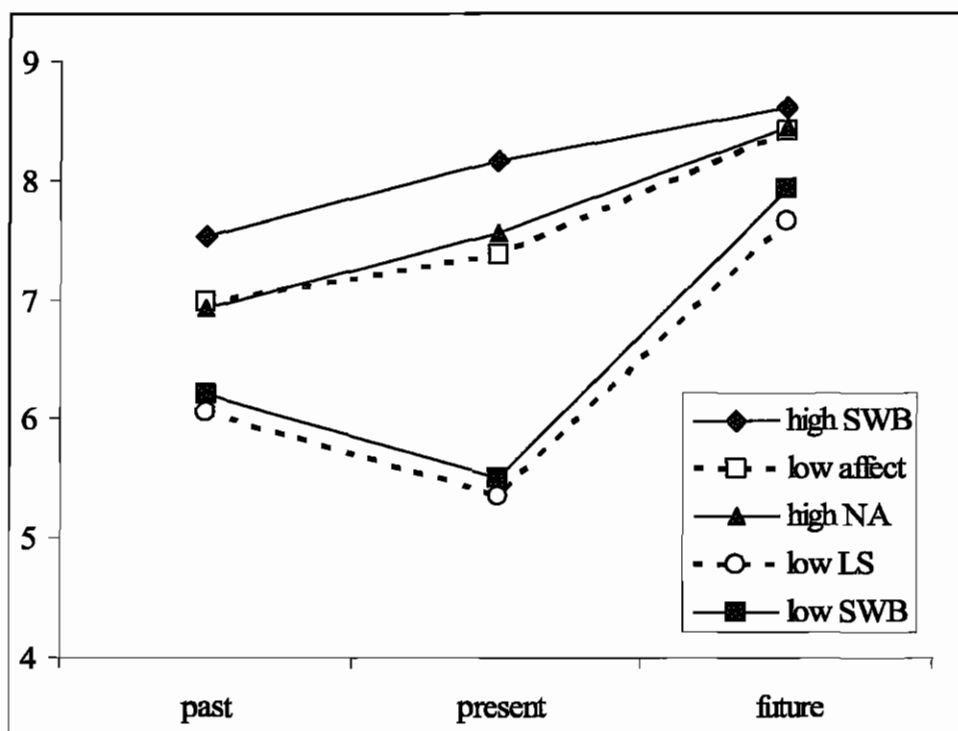
Consistent with the delineation of separate modules in Shmotkin's (2005) framework, SWB configurations and subjective LS trajectories were reported and discussed in separate studies in the present dissertation. This work illustrates how the third and fourth modules of Shmotkin's framework can be operationalized and examined empirically. However, an important issue that needs to be considered is how findings concerning both modules can be integrated with each other, and with the other two modules in Shmotkin's model: experiential and declarative SWB.

To this end, Shmotkin proposes the concept of a "SWB profile" comprising an individual's private experiences and public reports of their SWB, their internal

organization of SWB components, and their personal narrative of their well-being through time. Accordingly, there are a wide variety of ways in which these four modules could be combined into SWB profiles – ultimately creating “a variety of “well-beings” that have agentic powers” (Shmotkin, 2005, p. 314). This diversity provides the SWB system great flexibility in responding and adapting to adversity and threat through “permeating larger psychological processes” (Shmotkin, 2005, p. 343), including self-consciousness, social interaction, congruent and incongruent self-concepts, and personal life narratives.

Given the various possible “well-beings”, it is likely that focusing exclusively on any one manifestation may present an incomplete picture of the SWB system. With respect to the two modules examined in the present dissertation, for example, two individuals may report similar upward subjective LS trajectories, but be characterized by different SWB configurations. To examine this issue more concretely, in a post hoc analysis I compared the Wave 1 subjective LS trajectories across the five Wave 1 SWB configurations. As shown in the Figure 21 below, there are two main differences in the subjective LS trajectories characterizing the five SWB configurations.

Figure 21. *Wave 1 Subjective LS Trajectories by SWB Configuration.*



Note. Wave 1 mean subjective temporal perspective LS ratings (y-axis) are shown for past, present, and anticipated future LS (x-axis) by Wave 1 SWB configuration.²²

The first difference between SWB configurations is with respect to the level of present LS, with the highest to lowest levels found (in descending order) for the high SWB, low affect, and high NA, followed by low LS and low SWB configurations. The second difference among SWB configurations is with respect to the shape of the subjective LS trajectories. Whereas the first three clusters (high SWB, low affect, high NA) are characterized by inclining linear trajectories, the other two clusters (low LS, low SWB) are characterized by non-linear trajectories comprising subjective decreases in LS from past to present, and large anticipated increases from present to future.

²² Plots based on Wave 2 and Wave 4 clusters and trajectories are consistent with this figure.

Taken together, this basic integration of SWB configurations and subjective LS trajectories reveals several novel insights. For example, although upward LS subjective trajectories are normative overall, such trajectories were most typical of individuals characterized by one of three SWB configurations: high SWB, low affect, and high NA. In contrast, people who were characterized either by a low LS and low SWB configuration not only reported low levels of LS overall, but also expected (on average) large increases in LS in the future. Also noteworthy is that individuals in the low LS and low SWB clusters had nearly identical subjective LS trajectories despite distinct SWB configurations and (as reported in Part 1) different levels of mental, physical, and interpersonal functioning.

As this illustration suggests, therefore, the joint examination of SWB configurations and subjective LS trajectories, may provide a more nuanced understanding of the relation between each of these two modules and positive functioning, compared to focusing exclusively on SWB configurations or subjective LS trajectories. These differentiations may become even more subtle when subjective trajectories based on all three SWB components are examined. A similar conclusion was reached by Shmotkin et al. (2006) who examined SWB configurations in terms of older participants' affective reactions (operationalized as four "types" based on a cross-tabulation of PA and NA) in relation to past life events and compared these affective types with respect to a variety of factors including present life satisfaction, thereby incorporating a subjective temporal comparison between recollected past affect and present LS.

An important step for future studies investigating the integration of Shmotkin's (2005) third and fourth approaches would be to evaluate both SWB configurations and

subjective trajectories based on all three SWB components. More broadly still, when all four modules of Shmotkin's framework are considered, it is likely that results based on any of the modules in isolation may obscure valuable information concerning the SWB system. Consider, for example, the possibility that self-reports of LS, PA, and NA from two individuals reflect similar SWB configurations despite strikingly different declarative functions for their self-reports (e.g., self-expression vs. self-deception). Or suppose that steep upward subjective LS trajectories provide an accurate depiction of the private experiences of LS for some individuals who truly perceive that their life gets better and better over time, but not for others. In both situations, the functional implication of one particular SWB module depends on another – a revelation that is lost if the modules are not studied jointly. Clearly, from the perspective of Shmotkin's model, a comprehensive assessment of SWB would encompass all four modules. As the present work shows, operationalization of SWB configurations and subjective LS trajectories is feasible. To my knowledge, however, methods for assessing the hypothesized core themes of experiential SWB described by Shmotkin (2005) in module 1 or the declarative functions of SWB discussed in module 2 have yet to be reported.

Therefore, an important step for future research based on Shmotkin's framework is to develop methods by which all four representations of SWB can be examined simultaneously and analyzed jointly. This approach will not only provide a complete and integrated assessment of Shmotkin's framework, but will also supply valuable information concerning which of the several "faces" of SWB are linked most closely with positive functioning, in what situations or domains of functioning, and for what type of

individuals. Ultimately, such steps may extend the framework outlined by Shmotkin (2005) into a more general theory of the structure and function of SWB.

General Implication 6:

Looking Beyond Shmotkin (2005)

In the present dissertation, I tested two key modules from Shmotkin's (2005) dynamic modular framework. Hypotheses were derived from this particular conceptualization of SWB, and results were reported and discussed with respect to Shmotkin's framework. Despite my use of this specific model of SWB as the guiding conceptual framework, however, as I have also described throughout the present work, present findings provide valuable insights that advance our understanding of SWB beyond Shmotkin's framework, and may link research on SWB in new ways to various other domains of inquiry.

For example, results from Part 1 demonstrate that 'high SWB' – whether operationalized as combinations of components occurring within individuals or as three separate dimensions – is associated with the most positive levels of mental, physical, and interpersonal functioning. Although previous research has provided consonant evidence based on cross-sectional analyses (e.g., Diener & Seligman, 2002), the present work is the first to demonstrate the dynamic nature of this association, based on changes in LS, PA, and NA in relation to changes in other indicators of positive functioning over time. Whereas stability in high SWB was linked with the most positive levels of functioning over time, stability in low SWB was linked with the relatively least positive levels of functioning. In between these two extremes, increases in LS and PA, and decreases in NA, each were linked with greater than expected improvements in functioning over time.

These findings highlight the potential value in examining SWB as a dynamic system of components, rather than simply as an important life outcome, or a fixed disposition. For example, a dynamic approach to SWB provides opportunities to examine new questions concerning the structure of SWB (e.g., Are changes in LS linked with changes in PA and NA over time?), as well as the role that SWB may play in promoting versus (simply) reflecting positive and negative adaptation to changing life events and circumstances.

Findings from Part 2 of the present work illustrate the value of a subjective temporal perspective. As I have reviewed in previous sections, the subjective temporal component of well-being has been the focus of surprisingly little systematic empirical study. Results from the present work demonstrate that the subjective sense that one's life is getting more and more satisfying over time is not a positive sign – but rather is most typical of individuals experiencing heightened distress and disappointment with their lives. Further, positively biased prospective forecasts for future LS are linked with less positive functioning in the future. As I have reviewed in previous sections, these findings provide a bridge to numerous other research areas, including (for example) temporal self-comparisons, self-theories of change, self-regulation, affective forecasting, and lifespan personality development. Thus, examining individual's subjective trajectories for their past, present, and anticipated future LS may prove to be a simple, but rich conceptual and empirical paradigm.

Conclusion

Following Diener's (1984) seminal review, most research on SWB has examined individual differences in LS, PA, and NA as indicators of optimal functioning and positive quality of life. The present dissertation extends previous research and theorizing

by testing Shmotkin's (2005) innovative framework in which SWB is conceptualized as an agentic process, rather than simply an important life outcome. Although high SWB is typically described as a quality of individuals, few studies to date have examined SWB from a person-centered perspective. Further, although the temporal nature of SWB has been recognized, research examining the implications of subjective self-change, including individuals' perceptions of their past, present, and future LS, is only now starting to receive empirical attention. Thus, the issues examined in the present dissertation concerning the dynamic functioning of SWB as an integrated system, the nature of its structure within individuals, and the utility of a subjective temporal perspective represent novel and timely opportunities for delineating and testing the 'next generation' of questions concerning the qualities, characteristics, and potential benefits of SWB.

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APPENDICES

Appendix A. *Life Satisfaction Ratings.*

Below are three ladders. The first ladder represents how you feel about your life right now; the second represents how you felt about your life at this time last year; and the third ladder represents how you hope to feel about your life 5 years from now. For each ladder, the box on the bottom rung is the worst possible situation you could imagine in your life; the box on the top rung is the best you might expect to have. The boxes on the other rungs are in between. For each of the three ladders, please select the box that best describes your feelings at the three different times.

Right now	Last year at this time	5 years from now
BEST LIFE I COULD HAVE	BEST LIFE I COULD HAVE	BEST LIFE I COULD HAVE
9	9	9
8	8	8
7	7	7
6	6	6
5	5	5
4	4	4
3	3	3
2	2	2
1	1	1
WORST LIFE I COULD HAVE	WORST LIFE I COULD HAVE	WORST LIFE I COULD HAVE

Note. Ratings from the first column ("Right now") were used in Part 1 of the dissertation. Ratings from all three columns were used in Part 2.

Appendix B. *Positive and Negative Affect Schedule.*

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you generally feel this way, that is, how you feel on the average.

Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely

	interested
	distressed
	excited
	upset
	strong
	guilty
	scared
	hostile
	enthusiastic
	proud

	irritable
	alert
	ashamed
	inspired
	nervous
	determined
	attentive
	jittery
	active
	afraid

Appendix C. *SF-36*.

The following questions ask for your views about your health. Please answer each question by selecting the appropriate box. If you are unsure about how to answer a question, please give the best answer you can.

1. In general, would you say your health is:

1 – Poor	2 – Fair	3 – Good	4 – Very Good	5 – Excellent
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2. Compared to one year ago, how would you rate your health in general *now*?

1 Much worse now than 1 year ago.	2 Somewhat worse now than 1 year ago.	3 About the same now as 1 year ago.	4 Somewhat better now than 1 year ago.	5 Much better now than 1 year ago.
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3. The following items are activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

1. Vigorous activities such as running, lifting heavy objects, participating in strenuous sports.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Walking or carrying groceries.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Lifting or carrying groceries.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Climbing several flights of stairs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Climbing one flight of stairs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Bending, stooping or kneeling.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Walking more than a mile.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Walking one block.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Walking one block.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Bending or stooping.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a *result of your physical health*?

	Yes	No
1. Cut down on the amount of time you spent on work or other activities.	<input type="checkbox"/>	<input type="checkbox"/>
2. Accomplished less than you would like	<input type="checkbox"/>	<input type="checkbox"/>
3. Were limited in the kind of work or other activities you could do.	<input type="checkbox"/>	<input type="checkbox"/>
4. Had difficulty performing work or other activities (for example, looking at things)	<input type="checkbox"/>	<input type="checkbox"/>

6. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a *result of any emotional problems* (such as feeling depressed or anxious)?

	Yes	No
1. Cut down on the amount of time you spent on work or other activities.	<input type="checkbox"/>	<input type="checkbox"/>
2. Accomplished less than you would like	<input type="checkbox"/>	<input type="checkbox"/>
3. Didn't do work or other activities as carefully as usual	<input type="checkbox"/>	<input type="checkbox"/>

7. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
1	2	3	4	5

8. How much *bodily* pain have you had during the *past 4 weeks*?

Not at all	Very Mild	Mild	Moderate	Severe	Very severe
1	2	3	4	5	6

9. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all
1

Slightly
2

Moderately
3

Quite a bit
4

Extremely
5

10. These questions are about how you feel and how things have been with you during *the past 4 weeks*. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks...

1. Did you feel full of pep?
3. Have you felt so down in the dumps that nothing could cheer you up?
5. Have you felt down hearted and blue?
7. Have you been a happy person?
9. Did you have a lot of energy?

11. During the past 4 weeks, how much of the time have your *physical health or emotional problems* interfered with your social activities (like visiting with friends, relatives, etc.)?

All of the time
5

Most of the time
4

Some of the time
3

A little of the time
2

None of the time
1

12. How TRUE or FALSE is each of the following statements for you?

1. I seem to get sick a little easier
than other people.

2. I am as healthy as anyone I
know.

3. I expect my health to get worse.

4. My health is excellent.

Appendix D. *Stress Ratings.*

On average, how many times do you become stressed and tense in a one week period?

Never Once or twice 3 to 4 times 5 to 6 times Every day

Would you describe your life in general as:

Very stressful Fairly stressful Not at all stressful

Appendix E. *Physical Complaints.*

Many of us have times when things just do not seem right or we do not feel so well for one reason or another. HOW OFTEN have each of the following happened to you in the past year?

	Never	Rarely	Sometimes	Fairly Often	Always
1. Had trouble getting to sleep or staying asleep?					
3. Felt nervous, fidgety or tense?					
5. Bothered by pains and ailments in different parts of your body?					
7. Had spells of dizziness?					
9. Troubled by headaches?					
11. Bothered by an upset stomach?					
13. Had ulcers?					
15. Had the flu?					
17. Had fractures (broken bone)?					
19. Had fatigue, tiredness?					
21. Had trouble moving?					

Appendix F. *Self-Perceived Health and Fitness Ratings.*

In general, *compared to other people your age*, would you say your health is:

Excellent

Good

Fair

Poor

How would you rate your level of physical fitness?

Excellent

Good

Fair

Poor

Appendix G. Health-Care Utilization.

About how many visits to a doctor have you made in the last year (excluding routine checkups)?

0 1 to 3 4 to 6 7 to 9 10 to 12 13 to 15 more than 15

About how many days were you sick in bed in the past year?

0 1 to 3 4 to 6 7 to 9 10 to 12 13 to 15 more than 15

Appendix H. *Social Support Questionnaire.*

The following questions ask about the people in your life who provide you with help or support. Each question has two parts. First, think of all the people you know, excluding yourself, that you can count on to help or support you in the manner described. This would include parents, brothers and/or sisters, a romantic partner, friends, clergy or other people.

1. a) How many people can you count on to distract you from your worries when your stressed?

0	1	2	3	4	5	6	7	8	9 or more
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b) How satisfied are you with the overall level of support?

Very Dissatisfied 1	Fairly Dissatisfied 2	A little Dissatisfied 3	A little Satisfied 4	Fairly Satisfied 5	Very Satisfied 6
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2. a) Please select the number of people you can count on to help you feel more relaxed when you are under pressure or tense?

0	1	2	3	4	5	6	7	8	9 or more
---	---	---	---	---	---	---	---	---	-----------

b) How satisfied are you with the overall level of support?

Very Dissatisfied 1	Fairly Dissatisfied 2	A little Dissatisfied 3	A little Satisfied 4	Fairly Satisfied 5	Very Satisfied 6
------------------------	--------------------------	----------------------------	-------------------------	-----------------------	---------------------

3. a) Please select the number of people that accept you totally, including both your worst and your best points?

0	1	2	3	4	5	6	7	8	9 or more
---	---	---	---	---	---	---	---	---	-----------

b) How satisfied are you with the overall level of support?

Very Dissatisfied 1	Fairly Dissatisfied 2	A little Dissatisfied 3	A little Satisfied 4	Fairly Satisfied 5	Very Satisfied 6
------------------------	--------------------------	----------------------------	-------------------------	-----------------------	---------------------

4. a) Please select the number of people you can count on to care about you, regardless of what is happening to you?

0	1	2	3	4	5	6	7	8	9 or more
---	---	---	---	---	---	---	---	---	-----------

b) How satisfied are you with the overall level of support?

Very Dissatisfied 1	Fairly Dissatisfied 2	A little Dissatisfied 3	A little Satisfied 4	Fairly Satisfied 5	Very Satisfied 6
------------------------	--------------------------	----------------------------	-------------------------	-----------------------	---------------------

5. a) Please select the number of people you can really count on to help you feel better when you are generally down in the dumps?

0	1	2	3	4	5	6	7	8	9 or more
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b) How satisfied are you with the overall level of support?

Very Dissatisfied 1	Fairly Dissatisfied 2	A little Dissatisfied 3	A little Satisfied 4	Fairly Satisfied 5	Very Satisfied 6
------------------------	--------------------------	----------------------------	-------------------------	-----------------------	---------------------

6. a) Whom can you count on to console you when you are very upset?

0	1	2	3	4	5	6	7	8	9 or more
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b) How satisfied are you with the overall level of support?

Very Dissatisfied 1	Fairly Dissatisfied 2	A little Dissatisfied 3	A little Satisfied 4	Fairly Satisfied 5	Very Satisfied 6
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Appendix I. *Relationship Styles Questionnaire.*

Please read each of the following statements and rate the extent to which each describes your feelings about CLOSE RELATIONSHIPS. Think about all of your close relationships, past and present, and respond in terms of how you generally feel in these relationships.

- | | Not at all
like me | A little
like me | Somewhat
like me | Quite a bit
like me | Very much
like me |
|---|-----------------------|---------------------|---------------------|------------------------|----------------------|
| 1. I find it difficult to depend on other people. | | | | | |
| 2. It is very important to me to feel independent. | | | | | |
| 3. I find it easy to get emotionally close to others. | | | | | |
| 4. I want to merge completely with another person. | | | | | |
| 5. I worry that I will be hurt if I allow myself to become too close to others. | | | | | |
| 6. I am comfortable without close emotional relationships. | | | | | |
| 7. I am not sure I can always depend on others to be there when I need them. | | | | | |
| 8. I want to be completely emotionally intimate with others. | | | | | |
| 9. I worry about being alone. | | | | | |
| 10. I am comfortable depending on other people. | | | | | |
| 11. I often worry that romantic partners don't really love me. | | | | | |
| 12. I find it difficult to trust others completely. | | | | | |
| 13. I worry about others getting too close to me. | | | | | |
| 14. I want emotionally close relationships. | | | | | |
| 15. I am comfortable having other people depend on me. | | | | | |
| 16. I worry that others don't value me as much as I value them. | | | | | |
| 17. People are never there when you need them. | | | | | |
| 18. My desire to merge completely sometimes scares people away. | | | | | |
| 19. It is very important to me to feel self-sufficient. | | | | | |
| 20. I am nervous when anyone gets too close to me. | | | | | |
| 21. I often worry romantic partners won't want to stay with me. | | | | | |
| 22. I prefer not to have other people depend on me. | | | | | |
| 23. I worry about being abandoned. | | | | | |

- 24. I am somewhat uncomfortable being too close to others.
- 25. I find that others are reluctant to get as close as I would like.
- 26. I prefer not to depend on others.
- 27. I know that others will be there when I need them.
- 28. I worry about having others not accept me.
- 29. Romantic partners often want me to be closer than I feel comfortable.
- 30. I find it relatively easy to get close to others.