2007

Dispositional optimism and pessimism: stability, change, and adaptive recovery following life event experiences

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Dispositional optimism and pessimism:
stability, change, and adaptive recovery following life event experiences

by

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A dissertation submitted to the graduate faculty

in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Psychology

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Ames, Iowa

2007

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ACKNOWLEDGMENTS

I would first like to thank my co-major professors and mentors, Dr. Daniel Russell and Dr. Carolyn Cutrona who throughout my doctoral training have provided invaluable guidance and instruction in multiple areas, including academics, research, teaching, and professional development. I would also like to express my sincerest appreciation to both of my mentors for the numerous opportunities to develop my research interests and skills as well as the intellectual freedom to pursue diverse options. I look forward to our continuing relationship that includes both professional collaboration and personal friendship.

I would also like to thank the members of my doctoral committee, Dr. Susan Cross, Dr. Frederick Lorenz, Dr. K. A. S. Wickrama, and Dr. Meifen Wei, whose insightful suggestions during the early stages of this research helped shape both the current study and my future research direction. In addition, I greatly appreciate the opportunity to analyze data from the Family and Community Health Study (FACHS). Without the foresight of the co-principal investigators, Dr. Rand Conger, Dr. Carolyn Cutrona, Dr. Rick Gibbons, and Dr. Ron Simons, the current investigation of longitudinal changes in optimism and pessimism would not have been possible. Finally, I would like to thank the data manager of the FACHS project, Dr. Linda Vandelune, for her invaluable assistance, clarification, and encouragement.

Lastly, I would like to express my unending gratitude to my colleagues, Dr. Kevin Randall, Dr. Misty Skaff, and Dr. Robert Cramer for their enduring support and encouragement throughout my doctoral and graduate training. Words cannot express my sincerest appreciation for the effort, support, and dedication of my wife, Beckie, my family, Rodger, and my parents, Louis and Linda – I will always owe you both ‘big time’.

ABSTRACT

As a trait-like disposition, optimism has received a wealth of research attention in connection with areas of physical and psychological well-being. However, less research attention has focused explicitly on the stability of optimism during adulthood. As such, we currently know very little about the long-term stability of optimism during middle adulthood, the developmental changes in optimism that occur across adulthood, or whether optimism changes in relation to specific life event experiences. The present research addressed these gaps in the optimism literature by examining stability and changes in optimism and pessimism over approximately nine years using longitudinal data from a sample of African American adults participating in the Family and Community Health Study (FACHS). In addition, this research attempted to extend adaptation theory as a potential explanation for short-term and/or long-term changes in optimism and pessimism following life event experiences. In terms of general stability, optimism and pessimism demonstrated moderate rank-order stability over time. However, average levels of optimism and pessimism increased and decreased, respectively, across the nine-year study period. Although not entirely consistent, life event experiences did relate to reactive changes in both optimism and pessimism in specific instances. Finally, effect size estimates for adaptive changes following life event experiences were generally consistent with complete adaptive recovery processes, except for a potential exception involving changes following marriage. Discussion integrates the study findings with the literature on personality development in adulthood, the stability of optimism and pessimism, and adaptation theory, with focus on potential implications of these findings for future research efforts aimed at integrating dominant theoretical perspectives in personality psychology.

STUDY OVERVIEW

Research in personality psychology has generated a wealth of evidence demonstrating that individual differences remain largely stable or consistent throughout adulthood (e.g., Costa, Herbst, McCrae, & Siegler, 2000; Roberts & DelVecchio, 2000; Terracciano, Costa, & McCrae, 2006). Much of the existing literature is consistent with trait perspective assertions that personality crystallizes once people reach early adulthood. From a trait perspective, individual differences should remain consistent across adulthood with minimal fluctuations occurring as a function of life circumstances or events (e.g., Costa & McRae, 1994; McCrae et al., 2000). In contrast, recent research on personality stability from a developmental perspective has produced findings that are inconsistent with trait approaches. For example, studies have shown that various personality characteristics continue to exhibit moderate maturational or normative changes across adulthood (e.g., Roberts, Helson, & Klohnen, 2002; Srivastava, John, Gosling, & Potter, 2003; Watson & Walker, 1996). Compelling evidence also suggests that life circumstances and specific events do influence many personality constructs throughout adulthood in a manner consistent with contextual perspectives on personality development (e.g., Roberts, 1997; Roberts & Chapman, 2000).

The current study focuses specifically on the stability of optimism and pessimism during adulthood. As a personality construct or trait-like disposition, optimism (Scheier & Carver, 1985; see also Carver & Scheier, 2001, 2003) has received a wealth of research attention in connection with areas of physical (e.g., Peterson & Bossio, 2001; Scheier & Carver, 1987, 1992) and psychological (Scheier & Carver, 1992; Scheier, Carver, & Bridges, 2001) well-being. Previous research consistently shows that high levels of optimism are related to lower levels of physical symptom reporting (e.g., Aspinwall & Taylor, 1992;

Lyons, Stewart, Archbold, Carter, & Perrin, 2004; Scheier & Carver, 1985; Scheier, Carver, & Bridges, 1994). In addition, optimists also tend to report less physical pain when suffering from various health conditions (e.g., Affleck, Tennen, & Apter, 2001; Fitzgerald, Tennen, Affleck, & Pransky, 1993; Tennen, Affleck, Urrows, Higgins, & Mendola, 1992) and recover faster following surgery (e.g., Scheier et al., 1989). Higher levels of optimism are also consistently related to better immune system functioning (e.g., Cohen et al., 1999; Kamen-Siegel, Rodin, Seligman, & Dwyer, 1991; Milam, Richardson, Marks, Kemper, & McCutchan, 2004; Sieber, Rodin, Larson, Ortega, & Cummings, 1992). Finally, high levels of optimism are often associated with intentions to engage in various health-promoting/protective behaviors including general health maintenance behaviors (Robbins, Spence, & Clark, 1991), sunscreen use and skin cancer screenings (Friedman, Webb, Bruce, Weinberg, & Cooper, 1995), and condom use/avoidance of unsafe sex (Carvajal, Garner, & Evans, 1998). In terms of psychological well-being, high levels of optimism are consistently correlated with lower levels of depression and psychological distress (e.g., Carver & Gaines, 1987; Carver et al., 1993; Chang, 2001; Cutrona, Russell, Hessling, Brown, & Murry, 2000; Tompkins, Schulz, & Rau, 1988). Optimism also seems to provide a buffer against the negative effects of stress (e.g., Brissette, Scheier, & Carver, 2002; Lai et al., 2005). Finally, existing research consistently demonstrates that optimism relates to increased levels of subjective well-being (e.g., Carver et al., 1994; Chang & Sanna, 2001; Diener & Lucas, 1999; Lucas, Diener, & Suh, 1996; Scheier & Carver, 1993).

Although the construct of optimism has generated much research interest during the past two decades, very little research attention has focused explicitly on the stability of optimism during adulthood. Numerous studies do provide compelling evidence for the

consistency of optimism across assessments but time intervals typically span relatively short periods of time (e.g., Atienza, Stephens, & Townsend, 2004; Bromberger & Matthews, 1996; Scheier et al., 1994). Currently, we know very little about the long-term stability of dispositional optimism during middle adulthood. In addition to potential developmental changes in optimism during adulthood, very little research has examined whether optimism changes as a function of specific life event experiences. The few studies investigating the potential influence of life events yield mixed findings, with optimism changing in some cases (Antoni et al., 2001; Kivimäki et al., 2005) but remaining stable in others (e.g., Helgeson, 1999; Schou, Ekeberg, Sandvik, & Ruland, 2005). Unfortunately, most of the existing evidence regarding changes in optimism within the context of life event experiences faces limitations related to the timing of initial optimism assessments and the interval over which change might occur.

The present research focused on these gaps in the optimism literature. To examine the general stability of optimism and pessimism, this research explicitly investigated maturational or normative changes that occurred over approximately nine years using longitudinal data from a sample of African American adults participating in the Family and Community Health Study (FACHS). In addition, this research examined whether the experience of positive and negative life events produces short-term and/or long-term changes in optimism and pessimism. In doing so, this work attempted to extend adaptation theory beyond existing research regarding life satisfaction and subjective well-being through the application to the study of changes in optimism and pessimism following specific life event experiences.

LITERATURE REVIEW

Work in the field of personality psychology continues to focus predominantly on a long-standing debate regarding both the development of personality and the stability of individual differences. Dominant theoretical perspectives in contemporary personality research occupy an underlying continuum anchored at one end by behavioral genetic approaches and at the other end by contextual approaches. From a genetic perspective, personality stems largely from the transmission of genotypic information responsible for the phenotypic expression of individual differences (see Plomin & Caspi, 1999). Much of the research from the genetics perspective focuses on the personality similarities among biologically-related individuals, with the influence of environmental factors or context receiving comparatively little explicit attention. Although genetic approaches acknowledge that genes and environments interact to influence personality development and expression, direct examination of these proposed interactions are rare (for an exception see Caspi et al., 2002). At the opposite end of the continuum, contextual perspectives on personality emphasize the importance of environmental factors in both the development and expression of personality (see Lewis, 1999, 2001). From a strict contextual perspective, personality develops in response to interactions with the environment and manifests itself as responses to contextual or situational input. As with genetic approaches, contextual perspectives acknowledge that genes play a role; however, contextualists view genotypic influences as secondary or distal factors upon which environmental influences build.

Moving inward from the genetic end of the continuum, trait perspectives maintain the primary importance of genetics while allowing for larger environmental influences. Typically, trait theorists view personality development as stemming largely from the

interplay between genes and context in which both serve as potential causal factors (see McCrae & Costa, 1999). From a trait perspective, personality develops as a function of both genetic influences and individual experiences with environmental input. Although trait perspectives place more emphasis on environmental factors than do genetic approaches, genotypic influences remain largely involved in both the development and expression of personality (see John & Srivastava, 1999). Moving inward from the contextualist end of the continuum, developmental perspectives also posit that personality development and expression stem from the interplay of genes and environment. Although genetic influences remain important as a basis or foundation, environmental or contextual factors serve as influences that are more proximal to personality development and expression (see Caspi & Roberts, 1999).

The four perspectives outlined above relate specifically to the issue of personality stability or lability. From a genetic perspective, substantial changes in personality over time should not occur during adulthood, as the causal agents of personality development already exist in infancy. Proponents of the genetic perspective suggest that genes operate across adulthood to produce small changes in personality (see McCrae et al., 2000) and some evidence exists to support this position (e.g., Viken, Rose, Kaprio, & Koskenvuo, 1994). However, equally compelling evidence supports the view that genes contribute to maintaining stability rather than functioning to produce changes in personality during adulthood (Johnson, McGue, & Krueger, 2005; also see Roberts & Caspi, 2003). From a trait perspective, changes in personality should occur but only during the period in which personality develops. Although genetic influences on personality exist at infancy, the development of personality occurs in conjunction with environmental experiences during

childhood and young adulthood (see Costa & McCrae, 1994). Once developed in early adulthood, however, further dramatic changes in personality should not occur (see McCrae et al., 2000). Developmental perspectives view personality change in a fashion similar to that of trait perspectives with the exception that no endpoint for the full development of personality exists. Rather, developmentalists posit that meaningful changes in personality continue to occur across the lifespan throughout adulthood (see Caspi & Roberts, 1999, 2001). Finally, contextual approaches view changes in personality as the inevitable result of the interaction with a constantly changing environment. Changes in contextual inputs that provide new challenges or opportunities necessarily present the potential for dramatic and recurring changes in personality construction or expression (see Lewis, 1999, 2001).

Because genetic approaches largely view change in adult personality as nonexistent or as simple noise stemming from differential phenotypic expression of genotypic information, the application of genetic perspectives to the study of personality change is rare (for an exception see Viken et al., 1994). Trait, developmental, and contextual perspectives agree that substantial changes in personality should occur during specific developmental periods such as late adolescence and early adulthood. Therefore, comparisons between the three approaches when studying personality change during childhood, adolescence, and young adulthood are of limited utility. However, these three perspectives differ explicitly when applied to the study of personality change among adults. Trait perspectives predict little or no change across adulthood (i.e., personality stability; see Costa & McCrae, 1994), developmental perspectives predict moderate and ongoing change across adulthood (i.e., maturational change; see Roberts, 1997), and contextual perspectives predict potentially dramatic changes corresponding to shifting environmental inputs throughout the course of

adulthood (i.e., change as a function of specific events; see Lewis, 1999, 2001; Srivastava et al., 2003). Findings from existing research on the stability of adult personality provide differing degrees of support for each of these predictions. An overview of methods used to assess change is necessary before discussing empirical evidence related to personality stability and change, as findings regarding personality stability vary depending on the method used.

Assessing Personality Stability and Change

A principle distinction among methods to examine stability and change in personality centers on whether the level of analysis is the population or the individual. At the population level, assessment of personality consistency involves an examination of differential, absolute, structural, and factorial stability. Differential consistency refers to the degree to which the rank ordering of individuals on a given personality dimension remains unchanged over time. Evidence for differential consistency exists to the extent that the correlation between scores at two time points is high. Over short intervals (e.g., days or weeks), the correlation between scores reflects the test-retest reliability of the instrument, whereas correlations between scores obtained over longer periods of time (e.g., months or years) reflect construct stability (see Caspi & Roberts, 2001; Roberts & DelVecchio, 2000; Roberts & Pomerantz, 2004). Alternatively, absolute consistency reflects the degree to which average levels of a construct within a population change over time. Absolute stability exists if the population shows no mean-level change over time on a particular construct of interest (see Caspi & Roberts, 2001; Roberts, Caspi, & Moffitt, 2001; Roberts & DelVecchio, 2000; Roberts & Pomerantz, 2004). Although less often investigated, structural stability involves assessing whether patterns of relationships between various personality dimensions remain consistent over time (Robins,

Fraley, Roberts, & Trzesniewski, 2001). For example, structural stability exists to the degree that correlations *between traits* such as extraversion and neuroticism remain stable over time. Finally, factorial stability involves assessing whether the underlying personality construct remains the same over time. For example, such stability exists to the degree that relationships between measured indicators of extraversion and the underlying (unobserved) extraversion construct remain stable over time. Factorial and structural stability relate conceptually in that factorial stability represents a special case of structural stability in which the relationships between an underlying personality dimension and the observed measures used to assess that dimension remain stable over time. In addition, evidence for structural stability requires (or assumes) factorial stability in that the observed relations between personality measures over time must reflect stability in the relationship between the assessment instrument(s) and the underlying personality dimension (see Caspi & Roberts, 2001; Small, Hertzog, Hultsch, & Dixon, 2003).

When the level of analysis focuses on the individual, assessment of personality stability involves two general approaches. The first approach examines ipsative stability among numerous personality constructs rank ordered by individuals. Ipsative stability exists to the degree that an individual's rank ordering on multiple constructs remains consistent over time (Roberts et al., 2001; Robins et al., 2001). The second and much more common approach involves examination of intraindividual stability and change or the degree to which each individual remains consistent over time. Typically, intraindividual analyses focus on single dimensions of personality at a time but such a narrow focus is not required (see Roberts et al., 2001). Traditional methods for conducting intraindividual analyses include the use of raw difference scores and residual change scores. However, currently available

methods involving growth curve and structural equation modeling overcome a number of difficulties and limitations associated with the use of traditional change score analyses.

Differential Stability in Adult Personality

Much of the existing evidence for stability in personality comes from studies employing the Big-5 model of personality in which a myriad of personality and individual difference constructs are subsumed under global dimensions reflecting extraversion, agreeableness, conscientiousness, neuroticism (emotional stability), and openness (intellect). Traditional assessments of stability on the five dimensions involve an examination of both differential and absolute stability. Regarding differential stability, findings generally indicate high levels of personality consistency in adulthood. For example, Costa and McCrae (1994) reported stability coefficients from a number of studies that administered measures of the Big-5 personality dimensions to different adult samples. Stability coefficients for neuroticism ranged from .46 to .83 with an average of .63 across six studies with retest intervals ranging from 6 to 30 months. Across the same set of six studies, stability coefficients for extraversion ranged from .56 to .82 with an average of .66. Similarly, stability coefficients across four studies measuring openness ranged from .54 to .83 with an average of .66. Consistent stability coefficients emerged for both agreeableness (.46 to .65; four studies) and conscientiousness (.46 to .79; five studies) with average coefficients of .60 and .61, respectively. Similar stability coefficients have emerged from a study of the Big-5 in an adult sample ranging in age from 39 to 45 years (Costa et al., 2000). For example, stability coefficients for the global dimensions of the Big-5 ranged from .76 to .84 (M = .81), with only slightly smaller coefficients ranging from .64 to .80 (M = .72) for specific facets of the global dimensions.

In a recent meta-analysis of differential consistency, Roberts and DelVecchio (2000) examined a large number of studies using various measures conceptually related to the Big-5 personality dimensions. Average stability coefficients for each of the five global constructs ranged between .50 and .54 across an average of approximately 56 studies. Although many studies provide some evidence supporting the trait perspective that personality changes in adulthood do not occur, the raw stability coefficients do not approach unity, suggesting that some degree of inconsistency remains possible (e.g., Small et al., 2003). Proponents of the trait perspective suggest that reductions in observed stability coefficients stem from random measurement error in the assessment instrument and that disattenuation of the correlations for unreliability often elevates the stability coefficients above .90, leaving very little room for personality lability (e.g., Costa & McCrae, 1994). However, studies of other personality constructs conceptually related to the Big-5 do not demonstrate such high stability coefficients even after disattenuation. For example, examination of longitudinal stability in positive and negative affectivity revealed raw stability coefficients that were only moderate, ranging from .33 to .56 across intervals of over seven years, with disattenuated coefficients ranging from .50 to .61 over a five-year interval (Watson & Walker, 1996). The wealth of research examining differential stability in adult personality points to a consensus that individual rank order on many personality dimensions remains moderately to highly consistent over reasonably long periods of time but that the rank order is not perfectly maintained, indicating that change remains possible.

Perhaps more interesting are findings from recent research examining differential stabilities across adulthood. Through their meta-analysis of stability, Roberts and DelVecchio (2000) demonstrated that the differential stability in personality increases linearly across

adulthood. For example, confidence limits for the average rank order consistency across multiple personality dimensions among those between the ages of 18 and 22 ranged from .50 to .52. Between ages 30 and 39, the average consistency shifted upward, falling between .56 and .68. This result suggests a significant increase in average stability as people reach adulthood. Furthermore, the confidence limits shifted further upward between the ages of 50 and 59 such that the population average falls somewhere between .69 and .81, indicating another significant increase in personality stability during later adulthood. Additional studies provide similar evidence that stability in personality increases with age (e.g., Terracciano et al., 2006; Watson & Walker, 1996). Although cohort effects offer one potential explanation for these findings, Roberts and DelVecchio's (2000) meta-analysis included multiple studies conducted at different time periods. For example, data for those between the ages of 50 and 59 were obtained from studies conducted between 1979 and 1994. Therefore, individuals within a particular age group in the meta-analysis did not necessarily reflect individuals of the same chronological age. Together, these findings lead to two major conclusions regarding the stability of adult personality. First, stability does not peak in early adulthood (i.e., by age 30) as trait theorists predict (see Costa & McCrae, 1994) but rather continues to increase across adulthood, peaking much later in life (i.e., during one's 50s), consistent with developmental perspectives. Second, and also consistent with developmental perspectives, stability peaks at a level far below unity (i.e., between .70 and .80) leaving ample room for potentially significant changes in personality throughout adulthood.

Absolute Stability in Adult Personality

Studies that examine absolute stability do so through two distinct methods. Use of cross-sectional data allows for an examination of personality variability in a population as a

function of age, provided the samples are randomly selected. For example, Costa and McCrae (1994) reported that age correlated significantly with global dimensions of personality but that the association was small, accounting for only 3% of the variability in adult personality. Additional research demonstrated similar findings using cross-cultural samples in which decreases in neuroticism, extraversion, and openness and increases in agreeableness and conscientiousness emerged between the ages of 18 and 30 (McCrae et al., 1999). However, these same data suggested that although such developmental trends continue into later adulthood, the rate of change decreased dramatically after age 30 (McCrae et al., 2000). Srivastava et al. (2003) reported similar relationships between age and the Big-5 dimensions of extraversion, neuroticism, and openness. However, age accounted for 12% and 16% of the variability in global dimensions of agreeableness and conscientiousness, respectively, indicating that change on some of these global dimensions throughout adulthood may be greater than earlier reports suggested.

Findings from cross-sectional studies do not provide a definitive answer to the question of whether personality continues to change across the adult lifespan. A second and more appropriate approach involves examining absolute stability using longitudinal data. Regarding the Big-5 personality dimensions, examination of absolute stability in longitudinal data indicated small but significant declines in extraversion, openness, neuroticism, and conscientiousness over 6 to 9 years with no significant change in agreeableness (Costa et al., 2000). Other studies investigating less global personality constructs including effective functioning (Roberts & Chapman, 2000) and negative affectivity (Watson & Walker, 1996) as well as multiple dimensions from the California Psychological Inventory (CPI) including

flexibility, self-control, and socialization (Roberts et al., 2002) suggest similar small longitudinal changes in adult personality.

Recent examinations of intraindividual change in personality also demonstrate mean-level changes on various personality constructs. For example, a 12-year longitudinal study assessing extraversion and neuroticism among adults revealed no significant average change in extraversion but a significant overall decline in neuroticism did emerge (Mroczek & Spiro, 2003). Similarly, Helson, Jones, and Kwan (2002) reported findings from administrations of the CPI at age 33, 49, 62, and 75 in one sample and age 35, 42, 55, and 68 in a second sample. Results from growth curve analyses indicated that 14 of the 20 scales assessed by the CPI demonstrated significant absolute change over time. Perhaps most striking, both of these studies also reported nonlinear mean-level changes in adult personality. The change in neuroticism reported by Mroczek and Spiro (2003) also demonstrated curvature in which the linear decrease slowed over time and flattened out in late adulthood. Similarly, analyses reported by Helson et al. (2002) revealed that 11 of the 20 CPI scales demonstrated significant nonlinear overall change, with both linear and nonlinear trajectories emerging for seven scales. Together, research examining absolute stability in adult personality indicates that change continues, albeit slowly and modestly, throughout adulthood. In addition, although normative changes occur on many personality dimensions, specific constructs demonstrate patterns of change that are more complex than simple linear increases or decreases.

Intraindividual Variability in the Stability of Personality

In addition to information regarding absolute change, examination of intraindividual personality stability in longitudinal data provides information about individual variability or

the degree to which the pattern of personality change for each individual deviates from the average overall pattern of change. For example, daily fluctuations in locus of control and perceived competence over seven weeks revealed relatively small amounts of average overall change (0.50 and 0.04 raw units, respectively). However, such fluctuations did reveal moderate levels of individual variability (Eizenman, Nesselroade, Featherman, & Rowe, 1997). Examination of the global Big-5 dimensions within a sample of older adults (aged 55 to 85 years) demonstrated similar findings of significant individual variability in change on each of the five dimensions across a six-year period (Small et al., 2003). Mroczek and Spiro's (2003) analysis revealed no overall change in extraversion but significant intraindividual variability, indicating that, while the majority of people did not change, some did. In addition to individual variability on extraversion, the linear decrease in neuroticism observed in the same study varied significantly indicating that some individuals declined faster or slower than others. The most dramatic evidence for individual variability in personality change comes from Helson et al.'s (2002) CPI data in which linear changes on 19 of the 20 scales varied significantly across individuals. Furthermore, although no significant linear change occurred on six of the CPI scales (e.g., socialization, tolerance, and well-being), individuals did vary considerably, indicating that some people changed over time. Establishing that rates of change on personality constructs vary across individuals leads to an interesting question of whether differential change trajectories covary with specific life event experiences.

Life Events and Personality Change

Research examining whether the experience of life events relates to changes in personality during adulthood provides suggestive evidence for an association. For example,

data from a longitudinal study of adult women revealed that personality changes between the ages of 27 and 43 corresponded to characteristics of women's adult work histories (Roberts, 1997). Specifically, women with higher levels of work force participation and attainment during this period also experienced increases in agency. In addition, increases in attainment corresponded with increases in norm adherence. A second study using the same sample with an additional assessment at age 52 revealed that increases in marital tension between ages 27 and 52 correlated moderately with increases in anxiety, decreases in effective functioning, and decreases in well-being net of influences due to concurrent marital tension (Roberts & Chapman, 2000). Increases in marital satisfaction also related uniquely to increases in both effective functioning and well-being. Interestingly, increases in work satisfaction did not relate uniquely to personality at age 52. Similar findings showed that the experience of divorce between the ages of 27 and 43 correlated with decreases in dominance, whereas changes in motherhood status during this period correlated positively with increases (i.e., higher femininity) on the femininity/masculinity scale of the CPI (Roberts et al., 2002).

Examination of the relationship between life events and personality changes in adulthood using assessments of the Big-5 dimensions reveals a pattern of results that is more complex (Costa et al., 2000). For example, losing one's job corresponded to what Cohen (1988) called small effects that reflected an increase in neuroticism (3 *T*-score points) and a decrease in conscientiousness (2 *T*-score points) when compared to changes on these dimensions among those promoted at work. Further examination of changes on the specific facets of the Big-5 dimensions revealed that job loss related to significant increases on subscales assessing anxiety, depression, and vulnerability (all facets of neuroticism) as well as to decreases on facets assessing activity, order, dutifulness, and achievement striving (all

facets of conscientiousness). In addition, women who divorced experienced significant changes on extraversion and openness but no change on the remaining global dimensions. Although divorced women experienced overall increases in extraversion, only the gregariousness, activity, and positive emotion facets revealed significant change. Similarly, the overall increase in openness appears largely due to significant increases on only two facet scales (fantasy and actions). Comparisons between men who married and men who divorced suggested a slightly different pattern of personality change. Men who married experienced a decline in neuroticism (4 *T*-score points; a small to moderate effect in Cohen's [1988] terminology), whereas men who divorced experienced a decrease in conscientiousness of similar magnitude. Again, comparisons at the facet scale level provided much more specificity regarding where change actually occurred. Specifically, the decrease in conscientiousness among men who divorced appears largely driven by changes on competence, achievement striving, self-discipline, and deliberation (all conscientiousness facets). These men also experienced significant increases on the depression subscale (a neuroticism facet) even though no overall change on neuroticism occurred. Together, the findings presented by Costa et al. (2000) indicate that specific life event experiences do correlate with significant changes on both global and facet-level personality measures and that such changes are generally small to moderate (i.e., 2-5 *T*-score points) in magnitude. An alternative interpretation of such findings involves the possibility that particular life event experiences produce elevated levels of depression and anxiety that manifest as state-like fluctuations on trait measures of personality constructs. Findings from a study of clinically depressed individuals undergoing antidepressant treatment (Costa, Bagby, Herbst, & McCrae, 2005) are partially consistent with such an interpretation. Pre-treatment and post-

treatment responses on a measure of the Big-5 (the NEO-PI-R) revealed mean-level changes on both the global dimensions and facet-level scales that were similar to changes observed among the men and women who had lost their jobs or divorced in Costa et al.'s (2000) study. However, moderate to large retest correlations between pre-treatment and post-treatment assessments for both those who responded to antidepressant treatment and those who did not indicate that rank-order stability remained quite high throughout the depressive episode. In addition, personality measures accounted for significant proportions of variance in self-reported measures of depressive symptoms (i.e., the BDI and the General Severity Index of the SCL-90) after controlling for pre-treatment scores on the Hamilton Rating Scale for Depression. These findings suggest that the general structure of personality (e.g., one's standing on extraversion relative to that of others) remains largely unchanged even during a major depressive episode and that associations between personality dimensions and other factors do not simply reflect increases in anxiety or depression. However, the data presented by Costa et al. (2005) clearly indicated that the experience of major depression did correspond to mean-level fluctuations in personality scores. Therefore, the disentangling of meaningful personality change and state-like fluctuation remains a difficult task.

The Stability of Adult Personality – an Interim Summary

Existing research into the stability of adult personality seems to paint an inconsistent picture in that differential stability is often quite high, mean levels change only modestly throughout adulthood, and global dimensions often show little change. Conversely, facet-level constructs often show moderate change, longitudinal trajectories for both global dimensions and facet-level constructs often contain substantial individual variability, and changes in adult personality covary in meaningful ways with specific life events, indicating

that individual variability is not simply random noise. From any single theoretical perspective, research findings regarding stability and lability in adult personality seem inconsistent in that apparent support for each perspective exists. However, it is certainly possible that all four perspectives are correct. For example, genetic and trait perspectives seem well-suited to explain high levels of differential and absolute consistency, developmental perspectives adequately explain the normative changes that do occur in adulthood, and contextual perspectives present an intuitive account of how specific life events contribute to ongoing personality development.

Review of the existing literature regarding adult personality change leads to a few conclusions. First, a clear understanding of whether personality remains stable during adulthood requires assessing multiple dimensions of change because one type of stability does not preclude change in a different form. For example, perfect differential stability (i.e., retest correlations equal to one) across multiple assessments says nothing about whether mean shifts occur; such a result could occur either if everyone increased or decreased the same amount or if the degree of change was associated with initial scores, provided that perfect rank-order was maintained. Similarly, perfect absolute stability (i.e., mean difference equals zero) says nothing about rank order; such a result could merely indicate that a given number of individuals increased and an equal number decreased by the same amount. Therefore, the examination of intraindividual change is vital in that such change often occurs even when both differential and absolute stability are high. A second conclusion drawn from existing research involves the need to examine facet-level or specific personality constructs in lieu of (or in addition to) global dimensions. Because global dimensions subsume a number of more specific lower level constructs, stability on some facets may obscure

changes on others (see Costa et al., 2000; Johnson et al., 2005). Finally, existing research clearly demonstrates that life events matter. What remains less clear, however, is whether life events are equally important for all who experience them, whether life events influence personality in simplistic (i.e., linear) or complex (e.g., quadratic, cubic, etc.) ways, and whether interaction with a stable and unchanging environment marked by the absence of experience with certain life events maintains personality stability (see Johnson et al., 2005; Lewis, 1999, 2001). The current work focused on addressing these issues by examining the potential influence of life events on the longitudinal stability and lability of dispositional optimism during adulthood.

Dispositional Optimism

Although slightly different conceptual and theoretical definitions of optimism exist, the dominant view of optimism stems from that proposed by Scheier and Carver (1985). They define optimism as a generalized expectancy that the future holds positive outcomes, whereas pessimism reflects a generalized expectancy that future events will more often be negative. These generalized expectancies stem from a general model of self-regulation of goal-directed activity (Scheier & Carver, 1985; also see Carver & Scheier, 2001, 2003). Essentially, salient goals motivate action as well as an internal self-focus or evaluation of whether one feels capable or confident that achieving a goal is possible. The result of this evaluation leads to the formation of an outcome expectancy that is positively or negatively valenced (i.e., I can achieve the goal or I cannot). Over the course of repeated evaluations, the outcome expectancy generalizes such that it remains consistent across situations and relatively stable over time, reflecting a dispositional characteristic or trait-like personality construct (see Carver et al., 1994). Maintaining a general outcome expectancy that is positive

or being optimistic sustains effort toward achieving goals. Alternatively, a negative generalized expectancy or being pessimistic leads to behavioral or psychological disengagement from the further pursuit of the goal (Scheier & Carver, 1985; also see Carver & Scheier, 2001, 2003).

Quantifying Optimism

The earliest attempts to measure optimism explicitly come from clinical settings as evidenced by a single item on the Beck Depression Inventory (BDI; see Beck, 1967) that assesses pessimistic outlook. Further realization that an absence of hope was associated with psychopathology led Beck and colleagues to develop the Hopelessness Scale (Beck, Weissman, Lester, & Trexler, 1974) that contains items assessing a positive (e.g., "I can look forward to more good times than bad") and negative (e.g., "My future seems dark to me") outlook toward the future. Administration of the Hopelessness Scale to hospitalized suicide ideators who had not attempted suicide revealed that hopelessness predicted eventual suicide completion whereas depression did not, demonstrating the importance of maintaining hope for a positive future (Beck, Steer, Kovacs, & Garrison, 1985).

The Attributional Style Questionnaire (ASQ; Peterson et al., 1982) reflects an attempt to measure optimism and pessimism based on conceptual definitions linked to the application of concepts from attribution theory in social psychology. The original ASQ asked respondents to indicate a cause for each of six positive and six negative events, and to rate each cause on internal, stable, and global dimensions. Internal, stable, and global attributions for negative events reflect pessimism, whereas internal, stable, and global attributions for positive events reflect optimism. Typically, subtraction of attributions for negative events from attributions for positive events yields a single composite score. Reviews of research

using the ASQ generally support its validity as a measure of optimism/pessimism (e.g., Gillham, Shatté, Reivich, & Seligman, 2001; Reilley, Geers, Lindsay, Deronde, & Dember, 2005) but most applications focus only on attributions for negative events (e.g., Peterson & Vaidya, 2001).

The Optimism and Pessimism Scale (OP; Dember, Martin, Hummer, Howe, & Melton, 1989) reflects an attempt to create an instrument that assesses optimism and pessimism in a broad conceptual sense within a normative range of experience avoiding the extreme affective tone of items contained in the Hopelessness Scale. The OP instrument asks respondents to rate their level of agreement with 18 optimism items, 18 pessimism items, and 20 filler items using a 4-point scale. Initially, Dember et al. (1989) intended the OP to yield a single score reflecting an individual's position on an underlying bipolar optimism-pessimism dimension (see Dember, 2001). However, psychometric analyses during scale development revealed that separate composite scores formed from the optimistic and pessimistic items correlated only moderately (r = -.52). In addition, the optimism and pessimism composites related differentially with other measures. For example, optimism correlated significantly with commitment to religion whereas pessimism did not. Conversely, pessimism correlated significantly with perceived likelihood of nuclear war whereas optimism did not. As suggested by Dember and colleagues (1989), current research applications of the OP employ separate scores for optimism and pessimism (see Dember, 2001).

Finally, the Life Orientation Test (LOT; Scheier & Carver, 1985) provides a measure of dispositional optimism developed within the context of the conceptual definition discussed earlier with an explicit emphasis on avoiding content related to personal agency that appears in the ASQ and, to a lesser extent, the Hopelessness Scale. The original LOT contained eight

items (four positive and four negative) assessing optimism and four filler items. Participants indicate agreement with each item using a 5-point scale. Consistent with Scheier and Carver's view that optimism and pessimism constitute opposite ends of the same continuum, the LOT yields a single composite score reflecting optimism after reverse coding the negatively-worded pessimism items. Correlations between scores on the LOT, ASQ, and OP instruments indicate that each reflects a valid measure of optimism (see Reilley et al., 2005) but that all three scales capture unique information. For example, LOT scores typically correlate only moderately (.20 to .40) with ASQ scores (Dember, 2001; Hjelle, Belongia, & Nesser, 1996; Reilley et al., 2005; Scheier & Carver, 1992). Scores on the LOT and OP instrument correlate more strongly (.50 to .60) but still reflect partial independence (Dember, 2001; Reilley et al., 2005). In addition to the original LOT, Scheier et al. (1994) introduced a revised version of the scale (the LOT-R) that eliminated two of the original positively-worded items due to overlap with coping strategies, added a new positively-worded item, and dropped a negatively-worded item to maintain symmetric scoring. Comparison of scores on the LOT and LOT-R indicate that the two measures overlap considerably, sharing more than 80% of their variance (Scheier et al., 1994). Although multiple measures of optimism exist, empirical research examining dispositional optimism overwhelmingly relies on either the LOT or LOT-R.

Generalized vs. Specific Expectancies

A key distinction necessary for the conceptual definition of dispositional optimism involves the role of domain-specific expectancies or appraisals. Clearly, individuals may hold optimistic expectancies in some facets of life (e.g., academic or employment settings) while maintaining pessimistic expectancies in others (e.g., interpersonal relationships). Of

primary importance is whether a generalized expectancy across multiple domains provides utility over domain-specific expectations. For example, Scheier et al. (1989) examined the influences of dispositional optimism and domain-specific expectancies on recovery following coronary artery bypass surgery (CABS). Before surgery, patients reported their expectancies regarding how quickly they would return to work, resume exercising, and return to normal life. Measures of dispositional optimism before surgery uniquely predicted the speed of recovery in all three domains after controlling for the influence of patients' specific expectancies. Chang (1998) reported that dispositional optimism remained uniquely predictive of life satisfaction, depressive symptoms, and physical symptoms after controlling for influences due to primary and secondary stressor appraisals. However, additional studies examining recovery among CABS patients (Fitzgerald et al., 1993) and immunocompetence among law school students (Segerstrom, Taylor, Kemeny, & Fahey, 1998) suggest that dispositional optimism does not remain uniquely informative when information regarding domain-specific expectancies is available.

Although existing research findings regarding the differential utility of generalized and domain-specific expectancies seem mixed, empirical evidence generally supports the theoretical distinction. For example, generalized expectancies do not correlate substantially (e.g., Chang, 1998; Fitzgerald et al., 1993; Segerstrom et al., 1998) or consistently (e.g., Scheier et al., 1989) with domain-specific expectancies, suggesting that each type of expectancy captures independent information. Findings that domain-specific expectancies predict domain-relevant outcomes better than do generalized expectancies also fits with the theoretical conceptualization of dispositional optimism. For example, expectations regarding academic success should relate more strongly than generalized expectancies to actual

achievement of academic goals because academic expectancy stems, in part, from previous successes and failures in academic domains. However, when interest involves general outcomes or when domain-specific expectancies do not exist such as when a goal presents a new challenge, the utility of generalized expectancies becomes clear (Scheier et al., 1989; also see Carver & Scheier, 2001, 2003).

Distinguishing Optimism/Pessimism from other Constructs

A second issue involves whether conceptual and empirical support exists for treating dispositional optimism as a distinct construct. Given the conceptual definition proposed by Scheier and Carver (1985), numerous constructs including self-efficacy, mastery, and self-esteem seem relevant because each explicitly entails positive outcome expectancies. In the case of mastery and self-efficacy, positive outcomes link to perceived abilities or competence to achieve goals. Similarly, self-esteem reflects a global judgment regarding self-worth often influenced by the occurrence of positive or negative outcomes. The primary conceptual distinction between these constructs and dispositional optimism involves the attribution for a given outcome. Mastery and self-efficacy invoke the self as the causal agent for a given outcome, with self-esteem tied to the global judgment of outcomes produced. Optimism, on the other hand, explicitly ignores the causal agent of outcomes and the invocation of the self, allowing for a generalized positive or negative outcome expectancy that is partially independent of one's own agency (Scheier & Carver, 1985; Scheier et al., 1994; also see Carver & Scheier, 2003). Thus, an optimist expects a future full of positive outcomes but does not necessarily see him/herself as the causal agent in producing those outcomes, thereby allowing for external causal influences (e.g., assistance from others, luck, influence of a higher power, etc.).

Empirical evidence for a distinction between optimism and conceptually-related constructs appears in numerous sources. For example, scores on measures of optimism and self-esteem often correlate moderately, suggesting that the shared variance between the two constructs approaches 25% (see Scheier & Carver, 1985; Scheier et al., 1994). In addition, optimism and self-esteem relate in different ways to different outcomes. For example, Aspinwall and Taylor (1992) reported that optimism related directly and indirectly to college adjustment and indirectly to self-reported health symptoms whereas self-esteem related indirectly only to college adjustment. Conversely, self-esteem indirectly predicted academic achievement whereas optimism showed no direct or indirect relationship. Optimism also correlates only moderately with measures of mastery (e.g., Scheier et al., 1994), locus of control (e.g., Scheier & Carver, 1985), and self-efficacy (e.g., Magaletta & Oliver, 1999) suggesting 20-30% overlap increasing to as much as 50% overlap when adjusted for measurement error (see Marshall & Lang, 1990).

Although research evidence generally supports the claim that optimism reflects a unique dispositional characteristic, distinguishing optimism from low negative affectivity presents a more difficult challenge. For example, Smith, Pope, Rhodewalt, and Poulton (1989) demonstrated that measures of generalized expectancies did not discriminate from measures of negative affect. In addition, accounting for the shared influence of negative affect eliminated the association between optimism and various outcome measures such as physical symptom reporting and coping behaviors. A second study replicated these findings and refuted a proposal by Scheier and Carver (1987) that optimism was responsible for the link between anger, irritability, and coronary heart disease (Robbins et al., 1991). Finally, a study examining the links between optimism, hassles, illness severity, and psychological

symptoms among adult men revealed that controlling for shared variance with neuroticism either eliminated or greatly reduced associations between optimism and the outcome measures (Mroczek, Spiro, Aldwin, Ozer, & Bossé, 1993). Together, these findings call into question whether optimism and negative affect reflect unique personality dimensions. However, Scheier et al.'s (1989) findings that optimism maintained a significant association with the speed of recovery among CABS patients after controlling for pre-surgery anxiety, hostility, and depression suggests that the distinction between optimism and negative affect is valid.

Additional research findings further support the distinction between optimism and negative affect. Although controlling for negative affect often eliminates associations between optimism and reports of physical symptoms (Scheier et al., 1994; also see Chang, 1998), optimism maintains unique associations with reports of psychological symptoms (see Chang, 2001). Contrary to Smith et al.'s (1989) findings, Scheier et al. (1994) demonstrated that optimism related uniquely to reports of engagement in various coping behaviors after controlling for negative affect. Finally, additional evidence clearly demonstrates that optimism maintains unique associations with multiple psychological constructs including depression (e.g., Scheier et al., 1994; also see Chang, 2001; Chang & Sanna, 2001; Plomin et al., 1992), anxiety (e.g., Chang, 2001), and life satisfaction (e.g., Chang, 1996, 1998; Chang & Sanna, 2001; Plomin et al., 1992) net of influences shared with negative affect.

Distinguishing Optimism from Pessimism

A final issue involves whether optimism and pessimism reflect opposite ends of the same bipolar dimension, consistent with Scheier and Carver's (1985) view, or represent related but partially independent constructs as suggested by Dember et al. (1989). Support for

distinguishing between optimism and pessimism stems largely from modest intercorrelations between composite scores and factor analytic examinations of the underlying structure of the measure. Multiple studies demonstrate weak to moderate correlations between optimism and pessimism composite scores in diverse samples including elderly osteoarthritis patients (r = -.49; Benyamini, 2005), HIV positive adults (r = -.34; Milam et al., 2004), adult men in the U.S. (r = -.28; Mroczek et al., 1993), as well as adults in China (r = -.25; Lai, 1994), the Netherlands (r = -.39; Mook, Kleijn, & Ploeg, 1992), and Sweden (r = -.02; Plomin et al., 1992). Similar findings typically emerge from factor analytic studies examining the structure of the LOT and LOT-R. For example, psychometric analyses of the original LOT (Scheier & Carver, 1985) and LOT-R (Scheier et al., 1994) suggested that a two-factor solution fit the data better than did a single factor model with a forced simple structure (i.e., no residual correlations). Consistent replication of a two-factor structure appears in numerous studies (e.g., Carifio & Rhodes, 2002; Chang, D'Zurilla, & Maydeu-Olivares, 1994; Creed, Patton, & Bartrum, 2002; Lai & Yue, 2000; Marshall & Lang, 1990; Marshall, Wortman, Kusulas, Hervig, & Vickers, 1992) in which the disattenuated or latent intercorrelation between optimism and pessimism becomes only moderate in size (i.e., r = -.47 to -.64; Chang et al., 1994; Marshall et al., 1992; Scheier & Carver, 1985). Based solely on statistical evidence, a distinction between optimism and pessimism seems warranted. However, others have proposed that the statistical distinction may stem from complex methodological artifacts (e.g., Chang & McBride-Chang, 1996; Røysamb & Strype, 2002; Vautier, Raufaste, & Cariou, 2003).

Because of the overwhelming statistical evidence for partial independence, a number of investigations have examined whether optimism and pessimism relate differentially to

various outcomes. For example, Marshall et al. (1992) demonstrated that unique relationships with other personality constructs emerged when controlling for either optimism or pessimism. Specifically, after removing shared variance due to pessimism, optimism no longer related to neuroticism or negative affect, but significant relationships with extraversion and positive affect remained. Conversely, after controlling for optimism, pessimism remained significantly associated with neuroticism and negative affect, but no longer related to extraversion or positive affect. Similar differential associations emerged in relation to self-reported physical symptoms, in that pessimism did not relate concurrently or prospectively to symptom reports after controlling for optimism, whereas optimism remained predictive both concurrently and prospectively after controlling for pessimism (Lai, 1994). Among adults with rheumatoid arthritis, optimism uniquely related to positive mood net of shared influences with pessimism, whereas pessimism uniquely predicted negative mood, negative events, poor sleep, and limited activity due to pain after controlling for optimism (Affleck et al., 2001). Similar findings among caregivers of persons suffering from Alzheimer's disease indicated that optimism related uniquely to concurrent depression whereas pessimism did not. Conversely, pessimism remained predictive of both concurrent self-reported health and changes in health over a 10-year period after controlling for optimism (Lyons et al., 2004). Research also demonstrates differential associations between optimism, pessimism, and various physiological measures. For example, Lai et al. (2005) demonstrated that optimism remained uniquely associated with levels of salivary cortisol after controlling for pessimism. Finally, in a study of HIV positive adults, pessimism uniquely predicted baseline and 18-month follow-up viral load after controlling for depression, optimism, and immunocompetence (CD4 cell count), whereas optimism uniquely

predicted immunocompetence after controlling for depression, pessimism, and initial viral load (Milam et al., 2004).

Although no *a priori* conceptual reason existed for viewing optimism and pessimism as separate dimensions, recent reviews provide speculative interpretations for the distinction. For example, Carver and Scheier (2001) suggested that high levels of optimism might reflect confidence in obtaining positive outcomes, whereas low levels of pessimism may reflect confidence about avoiding negative outcomes. Alternatively, Carver and Scheier (2003) suggested that optimism and pessimism might reflect different dimensions in much the same way as do positive and negative affect (e.g., Watson & Tellegen, 1999). Currently, neither interpretation has received empirical attention but consistent rejection of a single underlying factor, low intercorrelations between optimism and pessimism, and differential relationships with various psychological and physiological outcomes argues strongly for consideration of optimism and pessimism as related but partially independent constructs.

It is important to note that some researchers have questioned the distinction between positive and negative affect and similar issues could relate to distinctions between optimism and pessimism. For example, Green, Goldman, and Salovey (1993) reported that failing to account for systematic or nonrandom measurement error artificially decreases the correlation between positive and negative affect. When multiple methods of assessment or correlated residual error structures are incorporated to account for this systematic error, the underlying structure of positive and negative mood was consistent with a bipolar interpretation. A related criticism of the distinction between positive and negative affect involves the possibility of a statistical artifact related to the use of positively and negatively worded items (e.g., Russell & Carroll, 1999; also see Feldman-Barrett & Russell, 1998). Specifically, use

of oppositely framed items can cause specific distributional problems that result in a spurious decrease in the correlation between the positively and negatively worded scale items. Unfortunately, no existing research has examined either of these possibilities in connection with the LOT.

Stability and Change in Dispositional Optimism

Much of the existing research regarding optimism takes a trait-like approach consistent with conceptual definitions that optimism reflects a stable personality construct. As such, multiple assessments over time rarely appear. Rather, optimism is typically measured only once under the assumption that individual differences in trait optimism are adequately captured by such assessments. Single assessments of optimism then serve as predictors of various physical or psychological well-being outcomes (see Peterson & Bossio, 2001; Scheier et al., 2001) or as moderators of relationships between other variables of interest (e.g., Cohen et al., 1999; Kivimäki et al., 2005; Sieber et al., 1992). Alternatively, optimism often serves as a distal predictor of outcomes with research emphasis on more proximal mediating constructs such as social support (e.g., Aspinwall & Taylor, 1992; Brissette et al., 2002; Srivastava, McGonigal, Richards, Butler, & Gross, 2006), coping strategies (e.g., Aspinwall & Taylor, 1992; Brissette et al., 2002; Carver et al., 1993; King, Rowe, Kimble, & Zerwic, 1998; Scheier, Weintraub, & Carver, 1986; Segerstrom et al., 1998; Updegraff & Taylor, 2000), and affectivity (e.g., Chang & Sanna, 2001).

Given the trait-like conceptualization of optimism/pessimism, much of the existing evidence regarding stability involves examinations of change similar to those commonly conducted with other personality constructs. In terms of differential stability, evidence from a number of studies converges on the conclusion that optimism demonstrates convincing rank-

order consistency. For example, measures of optimism obtained over 3-4 months correlate near .70 (e.g., Scheier et al., 1994; Schou et al., 2005). Associations of similar magnitude ranging from .60 to .75 appear over spans from six months to one year (e.g., Atienza et al., 2004; Park, Cohen, & Murch, 1996; Scheier et al., 1994; Schou et al., 2005). These findings are consistent with evidence that 64% - 73% of the total variability in optimism over one year reflects consistency (Eid & Diener, 2004). Although fewer in number, additional studies have demonstrated similar findings over longer intervals of two (r = .56; Scheier et al., 1994) and three (r = .60 to .69; Bromberger & Matthews, 1996; Kivimäki et al., 2005) years. Finally, latent stability coefficients indicated 69%-79% overlap between optimism measured over an interval of three years (Robinson-Whelen, Kim, MacCallum, & Kiecolt-Glaser, 1997).

Of course, evidence for differential stability speaks little to whether average levels of optimism change over time. Although no definitive longitudinal studies of normative change in optimism appear in the literature, limited cross-sectional evidence does exist. For example, Isaacowitz (2005) compared levels of optimism and pessimism across groups of people aged 18-25, 36-59, and 60 or older. Results indicated that those over 60 years of age reported significantly higher levels of optimism and lower levels of pessimism than did those between the ages of 36 and 59. Similarly, those between the ages of 36 and 59 reported significantly higher average levels of optimism and lower levels of pessimism than did those in the youngest age group. However, mean-level differences in optimism and pessimism did not remain significant after controlling for education, health, depression, negative affect, and race. Although these findings are suggestive, the cross-sectional nature of the data cannot adequately rule out the possibility of cohort effects as an explanation for the study findings. In addition, these findings raise an important issue regarding mortality and its possible

influence on apparent normative changes in optimism and pessimism. For example, the finding that those in the oldest age group reported the highest levels of optimism and lowest levels of pessimism may reflect a potential bias stemming from differential mortality as a function of age. Mortality effects provide a less likely explanation for the observed differences between the young adult (aged 18-25) and middle adult (aged 36-59) groups because differential mortality rates across these two groups should be less severe. However, the fact that differences in optimism and pessimism between these two younger groups did not remain significant after controlling for health suggests that those between the ages of 36 and 59 who were in poor health may not have been more optimistic and less pessimistic than the typical young adult.

Consistent with the paucity of research regarding normative/maturational changes in optimism, few studies provide direct examinations of absolute stability and those that do yield mixed findings. For example, comparisons of mean levels of optimism assessed one year apart in a sample of adult women revealed a 0.20 standard deviation unit change (Atienza et al., 2004). Similar results emerged over shorter intervals of three (0.26 standard deviation unit change) and six (0.36 standard deviation unit change) months among a sample of emergency rescue and recovery workers (Dougall, Hyman, Hayward, McFeeley, & Baum, 2001). Contrary to these findings, Robinson-Whelen et al. (1997) reported no latent mean differences in optimism or pessimism over a three-year interval in a sample of adults who either were or were not providing care for a cognitively impaired relative. Alternatively, assessments of optimism at one week and 1, 6, and 12 months following coronary artery surgery in a small ($N = 55$) sample of women suggested mean level changes over time but the linear effect of time did not achieve statistical significance ($p = .06$; King et al., 1998).

Specifically, the average increase in optimism from one week to one month following surgery reported by the women participating in King et al.'s study corresponded to a small effect (d = 0.23) in terms of Cohen's (1988) effect size d for the difference between two means expressed in standard deviation units. These women also reported a slightly larger (d = -0.30) average decline in optimism between the one-month and six-month post-surgery assessments, with optimism levels remaining relatively stable six months after surgery (d = 0.14 for the difference in optimism scores assessed 6 and 12 months following surgery). Similarly, a study of optimism among stroke victims and their caregivers revealed a statistically significant small (d = -0.16) overall decline in optimism over six months, but only among caregivers (Schulz, Tompkins, & Rau, 1988; also see Scheier & Carver, 1987, p. 177 for data not appearing in Schulz et al., 1988).

Regarding intraindividual change, findings are extremely limited. For example, Beck (1974) described a series of studies with depressed inpatients showing that manipulation of task success/difficulty resulted in decreased levels of pessimism, and that changes in pessimism between admission and discharge correlated moderately (.49) with concurrent changes in depression. Among college undergraduates, changes in stress-related growth that occurred over a six-month period positively predicted increased levels of optimism after controlling for baseline optimism scores (Park et al., 1996). These findings suggest that the differences between baseline and follow-up levels of optimism are substantial enough to covary with other factors. Finally, examination of raw change scores in a sample of adult women assessed one year apart revealed that 62% of the women changed less than half of a standard deviation. However, optimism decreased for 18% of the women whereas 20%

experienced an increase, with the change exceeding half a standard deviation in both cases (Atienza et al., 2004).

A final issue related to the stability of dispositional optimism involves whether people's expectancies change as a function of specific life events. Once again, the extant literature is sparse and findings are mixed. Suggestive evidence comes from a study of adult Finns in which cross-sectional findings demonstrated an association between employment history and scores on the LOT. Men and women with histories of employment throughout their adult lives reported higher average levels of optimism than did those who had experienced any unemployment or those who had been unemployed more often than employed. In addition, those who experienced unemployment as part of work histories dominated by employment reported higher average levels of optimism than did those whose work histories demonstrated chronic unemployment (Ek, Remes, & Sovio, 2004). Unfortunately, Ek et al. did not directly examine changes in optimism. However, some longitudinal studies have been conducted. For example, Helgeson (1999) examined whether the occurrence of new cardiac events during the six months following angioplasty influenced levels of dispositional optimism. Although those who experienced a new event (21%) reported lower levels of optimism at the initial assessment than did those who experienced no new events, results revealed no mean level change in optimism across time or an interaction between time and the experience of a new event, indicating that average levels of optimism did not change for either group. Similar findings emerged from a study of women recovering from surgery to treat breast cancer (Schou et al., 2005). During the year following surgery, approximately 38% of the women received additional bad news regarding the course of their illness. Analysis of optimism scores obtained before surgery and at 3-month and 12-month

follow-up assessments revealed no significant overall changes in optimism among women who received additional bad news. These two studies suggest strong support for the stability of optimism in spite of severe physical health threats.

Alternatively, a few studies present findings that suggest life events can produce changes in dispositional optimism. Among adult women, increases in family role stress over one year corresponded to significant decreases in dispositional optimism with a similar (although not statistically significant) pattern emerging in relation to increases in work stress (Atienza et al., 2004). Consistent results appeared in Robinson-Whelen et al.'s (1997) study in that caregivers reported lower levels of optimism at both baseline and a three-year follow-up than did non-caregivers, suggesting that the specific event of becoming the caregiver for a cognitively impaired relative might result in decreased levels of optimism. Interestingly, levels of pessimism did not differ between caregivers and non-caregivers at baseline but a trend ($z = 1.91$) toward higher pessimism among caregivers did emerge three years later. Perhaps more compelling are findings demonstrating that the accumulation of negative life events during the two years before follow-up assessments significantly predicted pessimism ($\beta = .27$) and marginally predicted optimism ($\beta = -.16$) at Year 3 after controlling for baseline levels. However, this was true only among non-caregivers. Additional evidence comes from a study of adult Finns (Kivimäki et al., 2005) who provided assessments of optimism and pessimism in 1997 and 2000. In addition to completing the LOT-R in 2000, participants reported whether they had experienced the death of a spouse or child, severe illness of a spouse, or severe illness of another family member during the previous year. Only 5.5% of the sample experienced such events, but among those who did, having a spouse develop a

serious illness led to a 10% increase in pessimism. Interestingly, none of the events produced statistically significant changes in average levels of optimism.

A final source of evidence comes from a study examining the effectiveness of an intervention intended to improve the recovery of women following surgery to treat breast cancer (Antoni et al., 2001). Assessment of baseline optimism occurred 6-8 weeks after surgery followed by a 10-week program for those women randomly assigned to the intervention condition. At program completion (16-18 weeks after surgery), women in the control condition attended a one-day seminar in which they received a condensed version of the material presented during the intervention program. Post-intervention assessments of optimism occurred for both groups at that point. Women in both groups also provided follow-up reports of optimism at three and nine months after the post-intervention assessment. Results demonstrated that dispositional optimism increased significantly from baseline to the 3-month follow-up and remained significantly higher six months later among women who received the intervention.

Although the effect of time was not statistically significant in the control group, further examination of the data from these women indicated that the average level of optimism dropped by almost one unit between baseline (M = 20.53) and post-intervention (M = 19.72, d = -0.23) assessments, whereas no corresponding drop occurred in the intervention group (d = 0.08). The average level of optimism among participants in both groups increased from post-intervention to the 3-month follow-up (d = 0.27 and 0.10 for the treatment and control groups, respectively) with no further changes six months later (d < .04 for both groups). In terms of overall changes across the study period, optimism increased moderately (d = 0.39) among those who received the intervention and decreased slightly (d = -0.11)

among those who did not. However, the overall rate of change among those who did not receive the intervention indicates some recovery in levels of optimism following the initial drop between the baseline and post-intervention assessments, suggesting that the one-day seminar received by women in the control condition may have provided some benefit.

Collectively, the available evidence regarding changes in optimism/pessimism stemming from the experience of life events seems inconclusive. However, limitations in the studies discussed above prevent clear conclusions regarding the potential influence of major life events from emerging. Specifically, initial or baseline assessments of optimism in these studies occurred either following surgery (Antoni et al., 2001; Helgeson, 1999), before surgery but after diagnosis (Schou et al., 2005), or after becoming the caregiver of a cognitively impaired relative (Robinson-Whelen et al., 1997). Such assessments potentially confound changes in optimism with the actual experience of a major life event (i.e., being *diagnosed* with illness, being *referred* for surgery, or having a relative *become* cognitively impaired) in that changes in optimism following the experience of the event may have already occurred before the study period began. Although Kivimäki et al.'s (2005) work does not have this limitation because participants provided initial optimism/pessimism reports before the event occurred, initial assessments did not obtain information regarding life events. Failure to assess life events at baseline allows for potential confounding of initial levels of optimism/pessimism with the concurrent experience of a severe life event. In addition, the studies by Helgeson (1999) and Schou et al. (2005) span very short periods of time, thereby requiring potential changes in optimism due to new cardiac events or the receipt of bad news about recovery to occur very quickly in time. This issue makes the intervention effectiveness demonstrated by Antoni et al. (2001) much more striking.

Given the limited amount of existing evidence regarding intraindividual changes in optimism in general, links between life events and changes in dispositional optimism/pessimism specifically, and the limitations of the few available studies, three clear conclusions emerge. First, a need exists for research that rigorously examines the stability and lability of dispositional optimism in adulthood using longitudinal data spanning periods longer than two or three years. Second, research that avoids the potential confounds in existing studies and focuses explicitly on investigating whether the experience of specific life events produces long-lasting changes in optimism seems warranted. Finally, and perhaps more importantly, a theoretical framework capable of providing specific predictions regarding how and why optimism might change in response to major life events is necessary. The application of adaptation theory provides a potentially useful framework for studying the influence of major life events on optimism and pessimism.

Adaptation Theory

Adaptation theory originated from a long history of research on human sensory perception and opponent process models of affective dynamics. In terms of sensory perception, adaptation theory provides a compelling explanation for findings that stimuli lose their ability to evoke auditory, visual, olfactory, taste, and touch responses over time (e.g., Hurvich & Jameson, 1957; also see LaBarbera & Caul, 1976, for a non-human analogue using electric shock). For example, the initial experience of a sudden loud noise evokes a physiological response (e.g., a startle). However, the startle response decreases quickly when the experience of a loud noise is persistent. Perceptual mechanisms operate under a general state of homeostasis or equilibrium that react to novel perceptual inputs but quickly return to homeostatic levels once novelty of the stimulus erodes. Opponent process models operate

similarly in that affective reactivity to stimuli occurs but the reaction is only short-lived (see Solomon & Corbit, 1974). Novelty of the stimulus produces either a positive (i.e., elation) or a negative (i.e., dejection) deviation of affect, but internal mechanisms operate to return the system to homeostasis quickly. From such a perspective, stimuli that evoke happy or sad reactions quickly lose their novelty causing a return to the neutral affective state or 'set-point.'

Brickman and Campbell (1971) pioneered the application of adaptation theory to the empirical study of happiness, adding a cognitive component involving comparisons as the determinant of adaptation levels. Specifically, adaptation levels stem from temporal comparisons between the individual's current state and her/his history of reward/punishment across all previous experiences up to the present event. In addition, the adaptation level in any single domain involves comparison to one's standing on other domains or a perceived average level of standing in all other domains. Finally, social comparisons with a similar individual or a perceived average of all similar others influences adaptation levels. According to Brickman and Campbell, the degree of discrepancy that results from these comparisons determines one's level of adaptation. In terms of happiness or satisfaction, cognitive comparisons lead to perceived discrepancies, causing adaptation to the initial event and a return to the set-point. That is, specific events lead to increases or decreases in happiness and satisfaction but discrepant comparisons eventually lead to judgments that one is no more or less happy/satisfied than before the event occurred. Such adaptation processes led Brickman and Campbell to posit that happiness and satisfaction operate on a 'hedonic treadmill' in which life events produce only temporary increases or decreases that eventually fade.

Initial empirical support for adaptation theory appeared in a cross-sectional study comparing happiness among lottery winners, paralyzed accident victims, and individuals who experienced neither event (Brickman, Coates, & Janoff-Bulman, 1978). All participants reported their current level of general happiness as well as prospective reports of how happy they thought they would be in a couple of years. Participants also provided retrospective reports of general happiness before winning the lottery, before the crippling accident, or six months before the study for those who experienced neither event. Results revealed that average levels of past, present, or future happiness among lottery winners did not differ from average levels in the control group. Comparisons between those who experienced an accident and the control group revealed that accident victims reported being significantly happier before the accident and significantly less happy currently. However, accident victims and controls did not differ in how happy they expected to be in a couple of years. Unfortunately, the lack of longitudinal assessments in this study cannot rule out biases in both retrospective and prospective reports of happiness. However, these findings suggested that lottery winners did not experience long-term increases in happiness when compared to controls. These findings also indicated a significant decline in happiness among those who experienced a severe accident but that these individuals expected to return to pre-accident levels of happiness within a couple of years.

Brickman et al.'s (1978) demonstration of apparent adaptation among lottery winners and accident victims quickly raised questions regarding the influences of personality and major life events on subjective well-being (SWB). On one hand, personality psychologists viewed stable personality dimensions, including extraversion and neuroticism, as the major determinants of SWB (e.g., Costa & McCrae, 1980; also see DeNeve & Cooper, 1998). On

the other hand, social psychologists posited that the experience of major life events contributed to SWB (see Diener, 1984, 1996). Adaptation theory added complexity to the issue suggesting that major life events provide little long-term influence on SWB as people quickly adapt to minor fluctuations caused by life experiences.

In an attempt to reconcile these three competing perspectives, Headey and Wearing (1989) examined the roles that personality factors, major life events, and adaptation play in determining SWB. Data from a longitudinal study of adults revealed that personality factors including extraversion and neuroticism remained very stable over time and that SWB demonstrated moderate stability as well. In addition, life event experiences were moderately stable over time, suggesting that certain life events keep occurring for some people, or that individuals with particular personality characteristics are more likely to recall certain types of life event experiences. Examination of the link between personality and life event experiences revealed that extraversion related to the experience of favorable events, neuroticism related to the experience of unfavorable events, and openness to experience consistently related to the experience of both types of life events. In addition, levels of extraversion and neuroticism predicted SWB measured two years later, indicating a consistent influence due to personality. However, the experience of favorable and unfavorable events during the period between the personality and SWB assessments also predicted subsequent SWB, net of influences due to personality. Based on these findings, Headey and Wearing concluded that neither personality factors, life event experiences, nor adaptation theory provide an adequate account of the dynamic nature of SWB (also see Bowling, Beehr, Wagner, & Libkuman, 2005, for a similar integrative perspective regarding stability and change in job satisfaction). Rather, they proposed an integrated model positing

that individuals maintain equilibrium in both life event experiences and SWB, and that both equilibria stem from personality factors. Experiences that disrupt the life event equilibrium produce deviations from the SWB equilibrium, but stable personality dimensions force both to return to prior levels, causing changes in SWB to be short-lived.

Essentially, the equilibrium model proposed by Headey and Wearing (1989) reflects a modification of adaptation theory such that set-points for SWB are not necessarily neutral (see Kahneman, 1999). Rather, set-points are typically valenced in one direction or the other reflecting happiness/satisfaction or sadness/dissatisfaction. In addition, personality factors contribute to determining set-points, which reflect stable individual differences. Existing research provides some evidence supporting this conceptualization. For example, retrospective reports of life event experiences associate moderately with SWB at three months, less so at six months, and not at all after one year (Suh, Diener, & Fujita, 1996). Similarly, attempts to predict happiness from a number of seemingly important demographic factors including socioeconomic and marital status revealed only very weak associations (Lykken & Tellegen, 1996). Together, these findings suggest that recent events influence SWB but that long-term changes due to distant events do not occur and that those who are financially secure or married are no happier than those who lack financial security or someone with whom they can share their lives. Both conclusions are strikingly consistent with those of Brickman et al. (1978), in that neither a financial windfall nor a tragic accident produced a dramatic change in expected future happiness.

Recent research provides evidence consistent with adaptation theory in that the experience of positive or negative life events does produce dramatic short-term changes in SWB that diminish over time. However, the existing literature also presents compelling

evidence that set-points can and do change in response to one's experiences (see Fujita & Diener, 2005). For example, in a longitudinal study of SWB, individuals who got married experienced dramatic changes (both positive and negative reactions) in life satisfaction during the period two years before and two years after marriage. However, average levels of life satisfaction five years after marriage did not differ from average levels of life satisfaction two years prior to marriage, suggesting that the initial change in satisfaction experienced shortly before and after one's marriage fades over time. However, individuals varied significantly in both their initial reactions to marriage and their level of life satisfaction five years later. In fact, initial reactions associated very strongly with later life satisfaction indicating that people adapted differently. Specifically, those who experienced strong positive reactions to marriage (i.e., one standard deviation above the average reaction) maintained significantly higher levels of life satisfaction five years later, whereas those who experienced strong negative reactions to marriage (i.e., one standard deviation below the average reaction) remained significantly less satisfied than they were before marriage. A similar pattern emerged in response to widowhood, in which levels of life satisfaction among those who experienced the average negative reaction returned to baseline levels approximately eight years later. Once again, significant variability in the magnitude of the initial negative reaction indicated that levels of life satisfaction among those who experienced a severe reaction did not return to baseline levels (Lucas, Clark, Georgellis, & Diener, 2003).

A second study examined adaptation to divorce (Lucas, 2005) and yielded findings consistent with those regarding marriage and widowhood. Specifically, those who divorced experienced a dramatic change in life satisfaction during the period closely surrounding

marital dissolution. However, average levels of life satisfaction five years after divorce remained significantly lower than levels of life satisfaction before divorcing, suggesting that complete adaptation did not occur. Once again, significant variability in the severity of initial reactions influenced individual adaptation levels. Perhaps more importantly, remarriage following divorce moderated adaptation such that those who remarried adapted significantly better than average, whereas those who remained single demonstrated larger discrepancies between initial and post-divorce life satisfaction.

Additional research demonstrates that these adaptive patterns extend beyond life events linked with relationships. For example, a longitudinal study of physical disability and life satisfaction indicated that those who were only mildly impaired eventually returned to baseline levels of life satisfaction whereas those who experienced severe disability did not demonstrate complete adaptation over the same period (Lucas, 2007a; Oswald & Powdthavee, 2006; also see Frederick & Loewenstein, 1999). Further examination of adaptation outside of relationship contexts (Lucas, Clark, Georgellis, & Diener, 2004) revealed that unemployment produced adaptive changes in life satisfaction consistent with previous findings in that complete adaptation did not occur. In addition, persistent or recurrent unemployment significantly influenced adaptation in various ways. Specifically, those who experienced unemployment before the beginning of the study reported lower average levels of life satisfaction than did those with no history of unemployment. Recurrent or prolonged unemployment during the initial reaction period was associated with a more severe negative reaction and less adaptive return to baseline levels. Finally, a second experience with unemployment during recovery from the first experience resulted in substantially lower levels of life satisfaction during the adaptation phase.

Collectively, studies of changes in SWB following major life events are partially consistent with adaptation theory in that most people adapt to or recover from some events (e.g., marriage, widowhood). However, the existing research also clearly demonstrates that adaptation takes time and that complete adaptation does not occur in some cases (e.g., divorce, unemployment). Rather, the initial reaction to a particular event subsides only slightly over time resulting in the establishment of a new set-point (see Diener, Lucas, & Scollon, 2006). In addition, adaptation appears to differ across individuals who experience the same event, occurring more slowly for some or not occurring at all for others. Finally, recurring experiences of the same event slows adaptation, suggesting that the experience of multiple different events might influence adaptation as well (see Frederick & Loewenstein, 1999). Although life satisfaction possesses trait-like qualities (see Diener, 1996), it clearly remains amenable to change and often does so in a manner consistent with adaptation theory predictions.

Currently, much of the research examining adaptation focuses narrowly on life satisfaction and SWB, providing no immediate connection to the study of optimism. Establishing such a connection clearly requires empirical and theoretical reasons for doing so. The existing literature provides overwhelming empirical evidence linking dispositional optimism to various facets of SWB including depression (e.g., Carver & Gaines, 1987; Carver et al., 1994; Scheier & Carver, 1985, 1987), anxiety (e.g., Bromberger & Matthews, 1996; Carver et al., 1994; Mroczek et al., 1993; Robbins et al., 1991; Scheier et al., 1994; Smith et al., 1989), and life satisfaction (e.g., Carver et al., 1994; Chang, 1998; Chang, Maydeu-Olivares, & D'Zurilla, 1997; Chang & Sanna, 2001; Lucas et al., 1996). Theoretically, some have suggested that hedonic adaptation reflects cognitive processes

involving the adjustment or changing of goals and reinterpretation of situations (see Diener & Lucas, 1999). Similarly, Frederick and Loewenstein (1999) argue that adaptation processes such as goal changing serve protective functions, limiting expenditure of effort on unsolvable tasks and redirecting motivation and effort toward other tasks that seem solvable. This view of hedonic adaptation is very consistent with Scheier and Carver's conceptual definition, in that optimism sustains effort and motivation toward achieving goals and pessimism leads to disengagement from goal pursuit (Scheier & Carver, 1985; also see Carver & Scheier, 2001, 2003). The conceptual overlap between cognitive processes purportedly associated with both hedonic adaptation and dispositional optimism raises a valid and interesting question concerning whether adaptive changes in dispositional optimism/pessimism occur following the experience of positive or negative life events.

The Current Study

This work addresses three interrelated research goals regarding specific gaps in our knowledge about dispositional optimism. Existing literature in personality psychology provides ample evidence that global dimensions such as the Big-5 demonstrate moderate stability over time (e.g., Costa & McCrae, 1994; Costa et al., 2000; Roberts & DelVecchio, 2000; Terracciano et al., 2006), but also remain amenable to meaningful changes across adulthood (e.g., Costa et al., 2000; Mroczek & Spiro, 2003; Small et al., 2003). In addition, studies of lower-level personality constructs and facet-level indicators linked to the Big-5 reveal patterns of stability and change that are consistent with findings for the global dimensions (e.g., Costa et al., 2000; Helson et al., 2002; Roberts et al., 2002). However, the stability and lability of dispositional optimism/pessimism during adulthood has received little empirical attention. Therefore, the first goal of this work focused on examining the general

course of optimism and pessimism among adults followed longitudinally over a span of nine years. Because intraindividual variability can (and often does) occur within the context of population stability, such an investigation necessitates an examination of multiple change dimensions at both the population and individual level. Determining whether stability exists at the population level requires assessment of differential (i.e., rank-order) and absolute (i.e., mean-level) stability. At the individual level, appropriate investigation of stability requires an examination of intraindividual trajectories or the course of optimism/pessimism for each person. Evidence for intraindividual stability exists to the extent that longitudinal patterns of optimism/pessimism among individuals differ little from the overall population trajectory. Alternatively, significant variability in the average pattern of change indicates that the rate of change for some individuals differs in direction and/or speed (i.e., slope) from that of others. Such variability in the direction or rate of change allows for the examination of factors (e.g., demographic characteristics, life event experiences, etc.) that may predict differences between individual trajectories.

Based on the view that dispositional optimism constitutes a personality dimension or trait (Carver et al., 1994) and not a transitory affective state, examination of change during adulthood should yield findings that are generally consistent with existing evidence regarding the stability/lability of other personality constructs such as extraversion or neuroticism. Specifically, multiple assessments of optimism/pessimism should demonstrate moderate (e.g., 40%-50% overlap) to high (e.g., 50%-80% overlap) levels of differential or rank order consistency over time (*Hypothesis 1a*). Dispositional optimism/pessimism should also demonstrate moderate absolute or mean-level stability as evidenced by a lack of substantial differences in average levels over time (*Hypothesis 1b*).

Regardless of whether evidence supporting *Hypotheses 1a* and *1b* emerges, intraindividual change remains possible. Consistent with findings that demonstrate intraindividual change on other personality constructs (e.g., Helson et al., 2002; Small et al., 2003), individual patterns of change in optimism/pessimism should vary substantially from the overall population trajectory (*Hypothesis 1c*). Although existing research provides some evidence for complex nonlinear patterns of change on other personality constructs (see Helson et al., 2002; Mroczek & Spiro, 2003), *a priori* hypotheses regarding such trajectories for optimism/pessimism at the population level are less clear. Therefore, this study examined nonlinear trajectories (when applicable) but did so in a largely exploratory fashion. In terms of predicting intraindividual change, the existing literature provides consistent evidence for normative or maturational changes that occur on other personality dimensions as people age (e.g., Mroczek & Spiro, 2003; Srivastava et al., 2003). Specifically, normative/maturational changes suggest movement toward better overall adjustment across adulthood. Therefore, consistent maturational patterns reflecting better adjustment as evidenced by small but nontrivial increases in optimism and decreases in pessimism as a function of age should emerge (*Hypothesis 1d*).

The second goal of this research focused on further investigation of whether one's optimism/pessimism changes in response to the experience of major life events. As discussed earlier, the existing research yields mixed findings, with some studies demonstrating no change in optimism (e.g., Helgeson, 1999; Schou et al., 2005) and others suggesting that life events seem to matter (Antoni et al., 2001; Atienza et al., 2004; Robinson-Whelen et al., 1997). The current study attempted to clarify the relationship between life events and optimism/pessimism while avoiding two major limitations in the extant literature. First, the

longitudinal data used in this study contain information regarding various life events at each assessment. This feature aids in disentangling changes in optimism/pessimism that result from the experience of previous, concurrent, and oppositely valenced life events (see Lucas et al., 2003). For example, these data allow for the identification of people who experience a given event without prior experience or future recurrence of the same event. The second unique feature of these data involves the length of time over which assessments occur. Existing studies looking at links between life events and changes in optimism did so over relatively short periods of time, potentially missing meaningful changes that take longer to unfold. By contrast, the present study examined potential relationships between life event experiences and changes in optimism/pessimism over a longer period of nine years.

The inconsistent findings regarding links between life events and changes in optimism prevents derivation of clear *a priori* predictions. However, consistent findings regarding the *reactivity* of life satisfaction during the time shortly before and after life event experiences (see Lucas, 2005; Lucas et al., 2003, 2004) indicate a general process that yields testable hypotheses. Specifically, the experience of positive life events such as marriage, a promotion at work, or financial gain should produce an increase/decrease in one's level of optimism/pessimism (*Hypothesis 2a*). Conversely, optimism/pessimism should decrease/increase following the experience of a negative life event such as divorce, illness or death of a loved one, or unemployment (*Hypothesis 2b*). In addition, experiencing multiple same-valenced life events should additively influence the direction of change in optimism/pessimism. For example, optimism should increase shortly after getting married *or* receiving a promotion at work. However, the magnitude of the increase should be larger among those who marry *and* receive a promotion (*Hypothesis 2c*). Finally, the experience of

oppositely valenced life events during the same period should produce competing reactive changes that manifest as an apparent lack of substantial change (*Hypothesis 2d*).

These hypotheses assume additive influences in which the absolute change (i.e., increase or decline) in optimism/pessimism that corresponds to a single event experience should increase in a linear fashion as the number of same-valenced life event experiences increases. Alternatively, it is possible that changes in optimism/pessimism following life event experiences do not occur in a linear fashion. For example, the experience of a single negative life event may correspond to a one-unit decrease in optimism, whereas the experience of two negative life events might produce decreases in optimism that are larger than two units. Given the possibility of such multiplicative influences, the current study examined both linear and nonlinear associations between the number of life events experienced and reactive changes in optimism and pessimism.

The final goal of this research involved the extension of adaptation theory to the study of changes in dispositional optimism and pessimism over time. Existing research provides compelling evidence that life satisfaction follows adaptive patterns of change in response to major life events (Lucas, 2005, 2007a, 2007b; Lucas et al., 2003, 2004; Oswald & Powdthavee, 2006). The empirical connection between dispositional optimism and life satisfaction (e.g., Carver et al., 1994; Chang, 1998; Lucas et al., 1996) and the conceptual link between optimism and adaptation through cognitive processes involving goal changing and situation reinterpretation (Diener & Lucas, 1999; Frederick & Loewenstein, 1999) suggest specific hypotheses that provide a direct test of adaptation theory predictions. Specifically, adaptation theory predicts that the experience of a positive life event should produce a temporary reactive increase in optimism (or decrease in pessimism) shortly

following the event (see *Hypothesis 2a*). However, levels of optimism/pessimism after the initial reaction (e.g., two years later; see Lucas, 2005; Lucas et al., 2003, 2004) should be no different from levels before the event occurred (*Hypothesis 3a*). Similarly, the experience of a negative life event should produce a temporary reactive reduction in optimism (or increase in pessimism) shortly after the event (see *Hypothesis 2b*) followed by a returning to pre-event levels over time (*Hypothesis 3b*). Research findings regarding life satisfaction following event experiences suggest that an individual's life satisfaction does not necessarily return to a preexisting baseline level or set-point following some kinds of events. Instead, some life events including marriage, divorce, widowhood, and unemployment produce relatively permanent changes in levels of life satisfaction for some people, suggesting that set-points do change and that adaptation theory requires a modification (see Diener et al., 2006). This proposed modification provides two alternative predictions regarding potential adaptive changes in optimism/pessimism following certain life event experiences. Specifically, adaptive declines in optimism (or increases in pessimism) following the initial reaction to a positive event such as marriage should not reflect a complete return to pre-event (baseline) levels (*Hypothesis 3c*). Similarly, the adaptive increase in optimism (or decrease in pessimism) following an initial reactive change associated with negative event experiences such as unemployment should not yield a complete return to one's initial level or set-point (*Hypothesis 3d*).

METHOD

Study Sample

Data for the current study come from the adult caregivers participating in the first four waves of the Family and Community Health Study (FACHS). A central goal of FACHS involves investigating the influence of neighborhood factors on the physical and psychological well-being of African American families living in primarily rural areas. Sampling for FACHS began by locating families that contained an African American child between the ages of 10 and 12 who lived in moderate-to-small cities, suburbs, small towns, and rural areas in Iowa or Georgia. To make sampling practical, Block Group Areas (BGAs) defined by the U. S. Census Bureau for the 1990 decennial census were selected in each state in which at least 10% of the residents were African American and the proportion of families living below the poverty line varied between BGAs.

Although the Census Bureau strives to define BGAs using naturally occurring boundaries, BGAs vary in size, the number of blocks each contains, and population. In 1990, BGAs contained an average of 452 housing units or approximately 1,100 people. BGAs identified in Georgia (N =115) were located within 12 counties of which 10 counties contained fewer than 30,000 people. BGAs identified in Iowa (N = 144) were located within the two cities of Waterloo and Des Moines with populations of 65,000 and 193,000 people, respectively. Comparisons of this sample to 1990 census data indicated that the FACHS sample reasonably represented neighborhoods in the two states with the exception of an under representation of affluent BGAs in Georgia (see Cutrona et al., 2000).

Sampling involved the construction of rosters enumerating families that met the study criteria in Iowa through information provided by public schools, and in Georgia through

information provided by community organizations such as churches, youth organizations, and community centers. Of the potentially eligible families identified in both states, interviewers could not contact 19%, and 25% did not meet eligibility requirements. Of those families that were both eligible to participate and contacted, 24% refused to participate and 5% did not complete the first interview, yielding data for 467 families in Iowa and 422 families in Georgia (N = 889 at Wave 1).

Data collection from adult caregivers during Wave 1 took place between February 1997 and July 1998 at which time participants completed computer-assisted personal interviews (CAPI) either in their homes or at another convenient location. Wave 2 assessments took place approximately two years later between February 1999 and December 2000. The research team successfully collected data from 85% (N = 754) of the original sample. Data collection for Wave 3 occurred approximately three years later between April 2002 and November 2003. The research team successfully obtained data from 86% (N = 761) of the original Wave 1 sample. The most recent data collection efforts at Wave 4 began in March 2005 and concluded in August 2006. Wave 4 interviews were completed by approximately 81% (N = 723) of the original participants, demonstrating reasonable retention across the nine-year study period. A unique feature of the FACHS sample involves the frequency of moving by study participants. For example, approximately 35% of the participants relocated between the Wave 1 and Wave 2 assessments, with a similar proportion (37%) moving between the Wave 2 and Wave 3 interviews. Intensive efforts to locate participants at each wave of the study have been very effective yielding at least two assessments from over 93% of study participants, at least three assessments from 84% of

participants, and all four assessments from 68% of the original Wave 1 sample of adult caregivers.

The sample of adult caregivers participating in FACHS consists primarily of women (93%) with a much smaller proportion of men (7%). Women averaged 37.64 years of age (range = 24 – 81; *SD* = 8.15) and most reported being African American (90.8%) or Caucasian (6.2%) at the Wave 1 interview. Education levels among women ranged from less than high school (19.1%) to advanced degrees (3.7%) with a median of high school graduate/GED (39.1%). Women reported having approximately three children (*M* = 3.30, *Mdn* = 3.00) of whom two to three (*M* = 2.67, *Mdn* = 2.00) were under age 18 and living in the home at Wave 1. The male primary caregivers participating in FACHS at the time of the Wave 1 interview ranged in age between 24 and 70 years and were slightly older on average than the women (*M* = 40.5; *SD* = 7.93). The majority of the men also reported being African American (91.5%). Education levels among men ranged from less than high school (11.9%) to advanced degrees (11.9%) with most completing high school (25.4%) or some college (32.2%). Male caregivers reported having approximately four children (*M* = 4.29, *Mdn* = 3.00) of whom approximately three (*M* = 2.73, *Mdn* = 3.00) were under age 18 and living in the home at Wave 1.

Personality Measures

Dispositional Optimism/Pessimism

Each wave of data collection in FACHS assessed optimism using the Life Orientation Test (LOT; Scheier & Carver, 1985). The LOT contains eight items assessing generalized outcome expectancies and four additional filler items. Four positively worded items (e.g., "You are always optimistic about your future.") assess optimistic expectancies and four

negatively worded items (e.g., “If something can go wrong for you, it will.”) assess pessimistic expectations for the future. Participants indicated agreement with each item using a 4-point scale anchored with ‘strongly agree’ (1) and ‘strongly disagree’ (4). Although the original LOT used a 5-point response scale, studies employing the 4-point scale demonstrate no substantial decrement in the performance of the measure after removing a ‘neutral’ response category from the original response alternatives (e.g., Carver, et al., 1993, Carver et al., 1994; Cutrona et al., 2000).

Typically, the LOT yields a single optimism score after reversing the negatively-worded items and summing responses across all eight of the items. As mentioned above, numerous studies justify a distinction between optimism and pessimism and many researchers have examined the positive and negative halves of the LOT separately. The current study followed this approach using the positively worded items as indicators of optimism and the negatively worded items as indicators of pessimism, employing necessary reverse coding so that high scores on items reflect high levels of the construct. Internal consistency estimates for composite scores for optimism (ranging from $\alpha = .73$ to .76) and pessimism (ranging from $\alpha = .69$ to .78) demonstrated adequate levels of reliability across all four waves of the study. These levels of internal consistency are similar to alpha coefficients reported for the optimism ($\alpha = .75$) and pessimism ($\alpha = .80$) subscales when using the LOT with a previous sample of African American adults (Mattis, Fontenot, Hatcher-Kay, Grayman, & Beale, 2004). Cutrona et al. (2000) reported a positive correlation between the LOT and positive affectivity and a negative correlation between the LOT and psychological distress, providing evidence for the validity of the LOT in the FACHS sample.

Positive and Negative Affect

Participants completed the Brief Temperament Survey (BTS; Clark & Watson, 1995) at Waves 1 and 2. The BTS contains two subscales assessing positive and negative temperament. Participants indicate whether the 14 statements on each subscale are 'true' or 'false.' Sample items include, "You like to meet new people" (positive temperament) and "Small problems often irritate you" (negative temperament). Scores on the BTS obtained at the Wave 1 interview indicated adequate internal consistency for both the positive and negative affect subscales (*KR-20* = .71 and .84, respectively, for the composite scores based on the dichotomously scaled items). The current study used only the positive/negative affect scores provided at the Wave 1 assessment.

Life Event Experiences

At each wave of data collection, FACHS participants reported whether they had experienced various positive or negative life events in multiple domains during the previous year. Although the experience of any single event might be rare, the combination of related events into specific categories related to work, finances, personal relationships, victimization, and accidents/illnesses both increases the likelihood of event occurrence and provides conceptual links to the types of events used in tests of adaptation theory in the SWB literature. The specific life event items used in each domain are described below. Rates of event occurrence across all four waves of the FACHS study appear in Table 1.

Table 1. *Frequency of Life Event Experiences across Study Waves*

	Percentage of Sample Experiencing Event[1]			
Life Event	Time 1	Time 2	Time 3	Time 4
Health (self)				
Serious accident	4.3	1.7	1.5	2.1
Serious illness/injury	11.9	8.0	9.7	7.6
Health (other)				
Death of close relative	44.5	36.2	35.1	33.7
Serious injury/illness	21.4	14.2	19.5	18.0
Work events				
Unemployed	18.1	10.5	14.7	11.0
Wages cut	19.3	14.5	18.0	15.2
Laid off	8.8	6.4	11.4	6.3
Fired	4.7	3.1	4.7	2.8
Positive employment change	39.9	33.6	24.4	22.3
Relationship events				
Unwanted pregnancy	2.5	1.1	1.3	0.1
Stillbirth/miscarriage	3.1	1.5	3.3	0.8
Relationship breakup	12.9	7.9	8.3	7.5
Divorce/separation	12.1	7.0	8.0	6.4
Partner affair	2.5	2.5	7.1	1.0
Married[2]	---	6.8	5.9	3.9
Financial events				
Eviction	1.2	0.9	2.5	1.6
Moved to worse residence	3.9	2.2	3.0	3.6
Repossession	3.6	1.3	6.2	2.1
Home foreclosure	0.6	0.3	3.0	0.6
Other foreclosure	0.6	0.1	2.2	0.1
Dip heavily into savings	16.3	9.1	21.3	12.0
Positive financial change	30.9	25.6	14.7	15.1

[1] Percentages calculated based on $N = 889$.
[2] Information for determining marriages prior to Wave 1 is not available.

Table 1. (continued)

Life Event	Percentage of Sample Experiencing Event[1]			
	Time 1	Time 2	Time 3	Time 4
Victimization				
Robbed	7.8	4.2	3.9	2.9
Sexually harassed	2.6	0.4	1.0	0.7
Sexually assaulted	0.4	0.3	1.1	0.2
Physically assaulted	3.3	0.7	1.6	0.9
Threatened with weapon, held captive, kidnapped	2.0	0.4	0.9	0.2
Any Life Event Experience				
Positive	49.8	49.7	36.8	35.1
Negative	77.9	72.7	77.0	71.3

Injuries/Illnesses

Items related to the experience of injury or illnesses reflect events involving the respondent and the respondent's family members, relatives, and close friends. To assess events experienced by the respondent, participants indicated whether they 1) were involved in a life-threatening accident or 2) had a serious illness or injury. To assess events experienced by loved ones, respondents indicated whether 1) a family member had a serious illness or injury or 2) a close friend or relative had died. Because events occurring to one's self might be more influential to levels of optimism/pessimism, self-experienced or other-experienced injuries/illnesses were treated separately in the analyses.

Financial Events

Participants responded to a number of items assessing negative life events related to personal finances. Specifically, respondents indicated whether they 1) were evicted, 2)

moved to a worse residence/neighborhood, 3) had a car, furniture, or other item repossessed, 4) had a home loan foreclosed, 5) had other loans foreclosed, or 6) had to dip heavily into savings due to financial problems. In addition to negative financial events, participants also indicated whether they had a big increase in income or improvement in their financial situation reflecting a positive financial event experience.

Work Events

At each wave of data collection participants reported whether they had 1) taken a cut in wages or salary, 2) been laid off, or 3) been fired from their job. Participants reporting either full or part-time employment (i.e., not retired or disabled) at each wave also reported whether they had become unemployed during the last year. In addition to these negative work events, participants also reported whether they had experienced a positive change in their employment situation during the past year reflecting a positive work-related life event.

Relationship Events

Respondents indicated whether they had experienced a number of negative events involving their personal relationships during the previous year. Negative relationship events include the experience of 1) an unwanted pregnancy, 2) a stillbirth or miscarriage, 3) a steady relationship break-up, 4) a divorce or separation, or 5) a partner's affair. Although participants did not directly report the experience of positive relationship events, they did indicate whether they were married, cohabitating in a marriage-like relationship, in a steady relationship with one person, dating but not steadily, or not currently dating at each wave of data collection. This information allowed for a determination of whether positive relationship events occurred across the three most recent waves of data collection. For example, someone who reported being in a steady relationship with one person at Wave 1 but reported being

married at Wave 2 was considered to have experienced a positive relationship event (i.e., marriage).

Victimization Events

FACHS participants also reported on a number of events related to victimization. This information allows for an examination of potential adaptive changes in optimism and pessimism that coincide with the experience of a unique class of life events that have not yet been studied in relation to SWB. At each wave of the study, respondents indicated whether they had been robbed or burglarized, physically attacked or assaulted, threatened with a weapon, held captive, or kidnapped. In addition, participants indicated whether they were sexually harassed, or sexually molested, assaulted, or raped in the 12-month period prior to each assessment.

RESULTS

Data analysis began by examining two important issues. The first issue involved exploring the extent of missing data on the measures used in the current study. The section that follows presents results from a series of analyses intended to examine whether missing data created potential problems for later analyses to address the study goals. A second issue involved the extension of this study to African American adults. Existing research examining personality stability in adulthood has done so with predominately white samples. Currently, longitudinal study on personality stability among African Americans is extremely rare. In addition, very little existing research has focused on optimism and pessimism among African Americans. Therefore, results from a series of preliminary analyses intended to assess whether statistical and validity evidence supported a distinction between optimism and pessimism among African American adults are presented following the section on missing data. Finally, results from analyses to address each of the three study goals are presented following the section examining the distinction between optimism and pessimism in the current sample.

Missing Data

FACHS faces two problems involving missing data that are common in longitudinal studies. The first problem involves "wave missingness," in which particular respondents do not participate in a given wave of data collection. Under such circumstances, the assumptions underlying most existing methods for dealing with missing data are not necessarily tenable. Specifically, methods such as multiple imputation and full information maximum likelihood estimation (FIML) assume that data are missing at random (MAR) or that the reason for missingness on a given measure is unrelated to what the score would have been if observed.

In the FACHS sample, failure to participate at any given wave does not necessarily reflect a random event. For example, the study design of FACHS required that adult participants were the primary caregivers of a target child at Wave 1. If the primary caregiver at Wave 1 was no longer the primary caregiver at Wave 2, that individual did not participate in the study during the second wave of data collection. Therefore, missingness at Wave 2 could reflect the occurrence of major life changes (i.e., no longer caring for a child) between the first and second waves of data collection for some of the original study participants. For example, primary caregivers who participated at Wave 1 may have experienced a major life event such as divorce, severe illness, or loss of income/employment that forced them to give up the primary caregiver role for the target child before Wave 2 of the study.

Although FACHS made efforts to locate original study participants at later waves (i.e., Waves 3 and 4), refusals to participate and contact failures still reflect potential nonrandom reasons for not participating, and could result in data that are not missing at random (NMAR). The best method currently available for dealing with an NMAR process involves including missingness as a predictor variable in the analysis. In cases where wave missingness reflects complete study dropout, such modeling essentially reflects an attrition analysis to examine whether those who drop out differ from those who remain in the study. FACHS is unusual in that participants who did not participate at one wave may have returned at subsequent waves of data collection allowing for a more thorough examination of potential biases resulting from incomplete data. For example, some of the participants who did not participate at Wave 2 returned at Wave 3, whereas others may have dropped out of the study completely after Wave 2. Comparisons between those who dropped out, those who missed a

particular wave but returned, and those who provided complete data across all waves of assessment provide a wealth of information for determining whether missingness matters.

The second potential missing data problem involves item missingness in which participants do not respond to particular items during a given wave of data collection. For example, 1.0% of the original FACHS participants failed to respond to one of the LOT items during the Wave 1 interview with a smaller percentage (0.2%) failing to respond to two or three of the LOT items. Item missingness presents a potentially more complex problem specifically related to the life event measures. Because many of these items assess experiences of rarely occurring events (e.g., being robbed, severely injured, etc.), information provided at earlier or later assessments may not be useful for determining whether missing responses to any single item at a particular assessment are influential. Before testing the study hypotheses, rigorous attrition and sensitivity analyses were conducted for all study measures to determine the most efficient and appropriate way to deal with missing data in the primary study analyses.

Item Missingness for Positive and Negative Affect

At Wave 1, 39 participants failed to respond to at least one of the 14 positive affect items. Item missingness was less common for the negative affect measure, with 19 cases failing to respond to at least one of the 14 items. Inspection of positive and negative affect responses indicated no clear pattern to suggest problematic items. In addition, inspection of responses to the same items at Wave 2 (although not used in the current study) did not reveal consistent non-response to particular items among those who did not provide complete data at Wave 1. That is, participants who failed to respond to an item at Wave 1 typically did

respond to the same item at Wave 2, suggesting that non-response at Wave 1 might stem from a random process during the interview procedure.

One approach to dealing with this type of item missingness involves computing a total score that simply replaces missing values with the mean of the other values on the scale for each individual. This approach does not introduce bias resulting from missingness when the assumption that data are missing completely at random (MCAR) is tenable, as would be the case for random skipping of items during a computer assisted interview. In addition, mean imputation based on individual data (i.e., each person's responses to other scale items) is preferable to other single imputation methods if the proportion of missing data is not large (i.e., < 10%; see Engels & Diehr, 2003). However, this procedure can artificially reduce the variability of scores causing variance to shrink as the proportion of missing data increases.

Descriptive analyses comparing total scores for positive and negative affect either computed by summing responses to all available information for each participant or by multiplying the mean of all responses by 14 (the number of items) revealed no appreciable differences resulting from the use of individual mean imputation. Standard deviations of the mean-imputed and summed positive affect scores differed only slightly (2.61 vs. 2.62, respectively), whereas the standard deviations of the mean-imputed and summed negative affect scores did not differ noticeably (3.58 for both scores). Finally, the correlation between positive and negative affect (r = -.23) did not differ as a function of whether the scores reflected mean-imputed or summed values.

Positive and Negative Affect as Predictors of Wave Missingness

A series of logistic regression models examined whether levels of positive and negative affect at Wave 1 predicted the likelihood of respondents participating in subsequent

waves of FACHS. Results from these analyses indicated no statistically significant (all *p*s > .15) associations between positive and negative affect and the likelihood of participation at later study waves. A second set of logistic regression analyses examined whether levels of positive and negative affect at Wave 1 predicted eventual study dropout. Determination of study dropout after Wave 3 is not currently definitive because failure to participate at Wave 4 could reflect dropout or simply wave missingness for participants who return to participate at Wave 5. Therefore, analyses examining associations between positive/negative affect and the likelihood of study dropout were limited to dropout following Waves 1 and 2. Results indicated that neither positive nor negative affect at Wave 1 related significantly to the likelihood of dropping out of the study after Waves 1 or 2 (all *p*s > .11).

Wave Missingness for Life Event Items

To determine whether the experience of specific life events at one assessment related to the likelihood of not participating in the following wave of data collection, a series of analyses examined each life event separately. Table 2 presents the results for analyses examining whether life event experiences before Wave 1 related to the likelihood of participation at Wave 2. Values in the first four columns reflect the proportion of participants (N = 889) who either did or did not experience a particular event before Wave 1 and either did or did not participate at Wave 2. Subscripts for these column headings reflect event experience (Y = yes, N = no) and subsequent participation (Y = yes, N = no). For example, values in the column labeled P_{YY} reflect the proportion of respondents who experienced a particular event before Wave 1 and participated in Wave 2, whereas values in the column labeled P_{YN} reflect the proportion of respondents who experienced a particular event before Wave 1 but did not participate at Wave 2.

Table 2. *Life Event Experiences at Time 1 as Predictors of Missing Data at Time 2*

	Event at T1*Completed T2					
Life Event	P_{YY}	P_{NY}	P_{YN}	P_{NN}	χ^2	*p*
Self						
Serious accident	.037	.811	.006	.147	0.131	.72
Illness/injury	.101	.746	.018	.134	0.001	.97
Other						
Death	.381	.467	.065	.087	0.172	.68
Illness/injury	.193	.655	.021	.131	5.075	.02
Work						
Unemployment	.159	.691	.024	.126	0.592	.44
Cut in wages	.173	.675	.020	.132	3.714	.05
Laid off	.079	.769	.009	.143	1.623	.20
Fired from job	.042	.806	.006	.130	0.372	.54
Positive work change	.342	.506	.059	.094	0.159	.69
Financial						
Eviction	.011	.837	.001	.151	0.323	.57
Move to worse residence	.030	.817	.009	.143	1.647	.20
Repossession	.029	.819	.007	.145	0.324	.57
Home foreclosure	.003	.845	.002	.150	2.398	.12
Other foreclosure	.005	.843	.001	.151	0.090	.76
Dip into savings	.135	.713	.028	.124	0.559	.46
Positive financial change	.265	.583	.044	.108	0.299	.59
Relationship						
Unwanted pregnancy	.019	.831	.006	.144	1.066	.30
Stillbirth/miscarriage	.026	.824	.006	.144	0.189	.66
Breakup	.107	.741	.023	.130	0.491	.48
Divorce/separation	.101	.747	.020	.132	0.204	.65
Partner affair	.022	.825	.003	.150	0.052	.82
Victimization						
Robbed	.063	.785	.015	.137	0.768	.38
Sexually harassed	.023	.825	.003	.149	0.085	.77
Sexually assaulted	.003	.845	.001	.151	0.299	.58
Physically assaulted	.029	.819	.003	.149	0.549	.46
Threatened w/ weapon	.018	.830	.002	.150	0.239	.63

Results from chi-square tests appear in the last two columns on the right side of the table. Only the experience of a severe illness/injury to a close other and a cut in wages at work related significantly to the likelihood of participation at Wave 2. However, in both cases, the results indicated that the proportion of respondents who experienced the event before Wave 1 and participated at Wave 2 was *higher* than the proportion of respondents who did not experience the event and participated at Wave 2. For example, 90% of the respondents who experienced a severe illness/injury to a close other returned to participate at Wave 2, whereas only 83% of the respondents who did not experience the same event before Wave 1 participated at Wave 2. Therefore, the results shown in Table 2 indicate that the experience of a particular life event before Wave 1 did not *decrease* the likelihood of participating at Wave 2.

Similar analyses on data from the 754 participants who participated at Wave 2 examined whether the experience of each life event before Wave 2 related to the likelihood of participating at Wave 3. Results from these analyses presented in Table 3 indicated only a marginal association between being evicted before Wave 2 and participating at Wave 3. Closer inspection indicated that the proportion of respondents who were evicted before Wave 2 and did not participate at Wave 3 was higher than the proportion of respondents who were not evicted and participated at Wave 3. Although this finding suggests an association between eviction and subsequent participation, it is important to note that the proportion of respondents evicted before Wave 2 was very small (1.10%). Of these individuals, the majority did participate at Wave 3 and a continuity correction for the small cell sizes (i.e., ≤ 3 observations) reduced the chi-square statistic to 1.14, indicating little association ($\phi = .07$, $p > .05$) between being evicted before Wave 2 and returning to participate at Wave 3.

Table 3. *Life Event Experiences at Time 2 as Predictors of Missing Data at Time 3*

	Event at T2*Completed T3					
Life Event	P_{YY}	P_{NY}	P_{YN}	P_{NN}	χ^2	*p*
Self						
Serious accident	.019	.906	.001	.074	0.018	.89
Illness/injury	.089	.835	.005	.070	0.424	.52
Other						
Death	.400	.524	.028	.048	0.900	.34
Illness/injury	.160	.765	.008	.068	1.716	.19
Work						
Unemployment	.113	.812	.011	.064	0.202	.65
Cut in wages	.157	.767	.015	.061	0.199	.66
Laid off	.069	.855	.007	.069	0.125	.72
Fired from job	.033	.891	.004	.072	0.408	.52
Positive work change	.370	.555	.028	.048	0.219	.64
Financial						
Eviction	.008	.916	.003	.073	3.503	.06
Move to worse residence	.024	.900	.003	.073	0.172	.68
Repossession	.013	.911	.003	.073	1.437	.23
Home foreclosure	.003	.922	.001	.074	2.852	.09
Other foreclosure	.001	.923	.000	.076	0.082	.77
Dip into savings	.100	.824	.008	.068	0.004	.95
Positive financial change	.277	.648	.027	.049	0.664	.42
Relationship						
Unwanted pregnancy	.013	.919	.000	.076	0.834	.36
Stillbirth/miscarriage	.016	.908	.001	.075	0.000	.99
Breakup	.087	.838	.007	.069	0.022	.88
Divorce/separation	.077	.847	.005	.071	0.125	.72
Partner affair	.030	.894	.000	.077	1.878	.17
Victimization						
Robbed	.048	.876	.001	.074	1.321	.25
Sexually harassed	.004	.920	.001	.074	1.742	.19
Sexually assaulted	.004	.920	.000	.076	0.247	.62
Physically assaulted	.008	.916	.000	.076	0.496	.48
Threatened w/ weapon	.005	.919	.000	.076	0.330	.57

A final set of analyses examined data for the 761 participants who participated at Wave 3. As shown in Table 4, many of the life events related significantly to not participating at Wave 4 initially. However, continuity corrections for small cell sizes (i.e., ≤ 3 observations) reduced chi-square values for some tests to less than 1.00. Although chi-square tests indicated that experiencing wage cuts, repossessions, home foreclosures, and having to dip heavily into savings for financial reasons before Wave 3 related significantly to being less likely to participate at Wave 4, the magnitude of these associations was small (ranging from $\phi = .09$ for repossessions and dipping into savings to $\phi = .12$ for home foreclosure).

Together, the results presented above do not suggest strong and consistent associations between particular event experiences and failure to participate at the following wave of data collection. Although some of the negative events related to work (i.e., wage cuts) and finances (i.e., repossessions, home foreclosure, and dipping into savings) did associate with the likelihood of participating at Wave 4, the associations were small. One likely explanation for these small associations involves an increase in the percentage of respondents who reported experiencing these events before Wave 3 in comparison to the percentages of respondents who reported experiencing these events at other waves of the study (see Table 1).

Table 4. *Life Event Experiences at Time 3 as Predictors of Missing Data at Time 4*

	Event at T3*Completed T4					
Life Event	P_{YY}	P_{NY}	P_{YN}	P_{NN}	χ^2	*p*
Self						
Serious accident	.016	.879	.001	.104	0.111	.74
Illness/injury	.109	.786	.008	.097	1.290	.26
Other						
Death	.371	.524	.055	.050	3.099	.08
Illness/injury	.209	.686	.027	.078	0.261	.61
Work						
Unemployment	.155	.741	.017	.087	0.036	.85
Cut in wages	.181	.714	.037	.068	8.835	< .01
Laid off	.123	.772	.015	.090	0.019	.89
Fired from job	.051	.844	.007	.099	0.087	.77
Positive work change	.265	.630	.031	.074	0.003	.96
Financial						
Eviction	.026	.869	.004	.101	0.237	.63
Move to worse residence	.031	.864	.005	.100	0.554	.46
Repossession	.060	.835	.015	.090	5.702	.02
Home foreclosure	.026	.869	.011	.094	10.906	< .01
Other foreclosure	.020	.874	.007	.098	4.595	.03
Dip into savings	.218	.677	.040	.065	6.343	.02
Positive financial change	.165	.730	.014	.091	1.399	.24
Relationship						
Unwanted pregnancy	.015	.880	.001	.103	0.059	.81
Stillbirth/miscarriage	.030	.866	.003	.102	0.119	.73
Breakup	.089	.806	.012	.093	0.236	.63
Divorce/separation	.086	.809	.011	.094	0.049	.83
Partner affair	.076	.818	.011	.095	0.323	.57
Victimization						
Robbed	.044	.851	.004	.101	0.146	.70
Sexually harassed	.010	.885	.003	.102	1.326	.25
Sexually assaulted	.010	.885	.004	.101	4.088	.04
Physically assaulted	.015	.880	.004	.101	1.812	.18
Threatened w/ weapon	.007	.888	.004	.101	6.270	.01

Item Missingness on Life Event Items

At Wave 1, 42 participants failed to provide complete information for the life event items. In some cases, missing item information related to skip patterns during the computer assisted interviews. Specifically, participants who indicated that they were retired, disabled, or fulltime homemakers were not asked to respond to life event items involving work (e.g., unemployment or positive work changes). Similarly, individuals who indicated that they were not currently in a serious romantic relationship did not respond to items assessing negative relationship events (e.g., breakup, partner affair). Finally, male participants interviewed as the primary caregiver did not provide information regarding the experience of an unwanted pregnancy or a stillbirth/miscarriage. Although some of the missing item information could be traced back to skip patterns in the interview, many cases failed to provide information on the skip pattern indicators (e.g., a participant failing to indicate whether they were retired, disabled, or a fulltime homemaker).

Missing information for the life event items was less problematic at Wave 2, with only 15 participants failing to provide complete life events data. Once again, however, the information necessary to determine whether the missing data for these cases occurred due to the skip pattern was also unavailable. At Wave 3, 40 cases failed to provide complete information regarding life event experiences. Of these cases, 28 failed to report any information regarding life event experiences, except for information regarding unemployment. This occurred because the remaining life event items were contained in a homework questionnaire and not part of the computer-assisted interview. Missing life event information occurred most often at Wave 3 because participants did not complete the homework questionnaire or particular questions in the homework questionnaire may not have

been applicable. For example, three respondents failed to report information about being fired, but all three did indicate that they were employed continuously during the previous year. Of the 12 cases that did complete the homework questionnaire but did not provide complete life event information, 10 cases failed to respond to only one item. At Wave 4, the life event items returned to being part of the computer-assisted interview. Consequently, only 12 respondents failed to provide complete life event information. As with previous waves, information necessary to determine whether the missingness occurred due to the skip patterns was unavailable.

Sensitivity of Optimism and Pessimism to Life Event Item Missingness

Sensitivity analyses examined whether non-response to the life event items influenced average levels of optimism and pessimism at each wave of FACHS. Independent samples *t*-tests compared means on composite scores of optimism and pessimism for groups who either did or did not experience at least one positive or negative life event. Initial analyses examined mean differences on optimism and pessimism among those who provided complete life event information. Additional *t*-tests compared means on optimism and pessimism after treating missing values on the life event items as indicating either that no events occurred for those who did not respond or that those who did not respond experienced at least one life event in the 12 months before the assessments of optimism and pessimism.

For the complete data at Wave 1, average levels of optimism did not differ between those who experienced at least one positive event ($M = 3.104$, $SD = 0.446$) and those who experienced no positive events ($M = 3.060$, $SD = 0.432$; $t_{(876)} = -1.46$, $p = .14$). However, those who experienced at least one positive event ($M = 2.177$, $SD = 0.504$) reported significantly lower levels of pessimism than did those who reported experiencing no positive

events (M = 2.336, SD = 0.515; $t_{(875)}$ = 4.64, p < .001). Treating the three cases who did not provide complete positive event information at Wave 1 as experiencing an event or not experiencing an event resulted in no changes to the influence of positive event experience on optimism and pessimism observed in the complete data. Average levels of optimism and pessimism at Wave 1 did not differ as a function of negative life event experiences among those who provided complete life event data (both ps > .50). Treating the 41 cases who did not provide complete life event information as either not experiencing at least one negative event or experiencing at least one negative life event before the Wave 1 interview did not result in changes to the lack of association between negative life event experiences and average levels of optimism and pessimism (all ps > .50).

Average levels of both optimism and pessimism at Wave 2 differed significantly as a function of positive life event experiences before the Wave 2 assessment for those who provided complete life event information. Those who experienced at least one positive event reported higher average levels of optimism than did those who reported no positive event experiences (M = 3.126, SD = 0.435 vs. M = 3.057, SD = 0.434; $t_{(747)}$ = 2.18, p = .03). Similarly, those who experienced at least one positive event (M = 2.095, SD = 0.481) reported significantly lower levels of pessimism than did those who experienced no positive events (M = 2.266, SD = 0.501; $t_{(737)}$ = 4.77, p < .001). However, average levels of optimism and pessimism did not differ as a function of negative life event experiences among those who provided complete life event information (both ps > .21). Treating respondents who did not provide complete positive (n = 2) and negative (n = 15) life event information as either experiencing or not experiencing an event resulted in no changes to the results observed from the complete data.

At Wave 3, the associations between positive life event experiences and optimism/pessimism differed as a function of item missingness. In the complete data, respondents who experienced at least one positive life event reported marginally higher average levels of optimism (M = 3.169, SD = 0.497) than did those who reported no positive life event experiences (M = 3.103, SD = 0.427; $t_{(731)}$ = -1.94, p = .053). In addition, those who experienced at least one positive event reported significantly lower levels of pessimism (M = 2.113, SD = 0.515) than did those who reported no positive life event experiences (M = 2.198, SD = 0.497; $t_{(731)}$ = 2.23, p = .03). Treating the respondents (n = 28) who provided incomplete positive life event information as experiencing no positive life events before the Wave 3 assessment resulted in a significant difference in average levels of optimism between those who experienced no positive events (M = 3.098, SD = 0.427) and those who experienced at least one positive event (M = 3.169, SD = 0.497; $t_{(759)}$ = -2.13, p = .03). However, treating non-response as experiencing no positive events did not alter the association between positive event experience and pessimism observed in the complete data. Conversely, treating non-response as experiencing at least one positive event negated the differences in optimism ($t_{(759)}$ = -1.56, p = .12) and pessimism ($t_{(759)}$ = 1.92, p = .06) observed in the complete data. The same pattern of sensitivity did not occur for associations between optimism, pessimism, and negative life event experiences. Average levels of optimism and pessimism did not differ as a function of negative life event experiences among those who provided complete negative event information (both $ts_{(719)} < 0.20$). In addition, treating respondents who did not provide complete negative life event information (n = 40) as either experiencing or not experiencing at least one negative event did not alter the findings observed in the complete data.

Sensitivity analyses conducted to examine missingness on the positive life event items in the Wave 4 data yielded findings very similar to those obtained at Waves 1 and 2. Among respondents who provided complete data, those who reported experiencing at least one positive life event reported significantly higher levels of optimism (M = 3.244, SD = 0.495) than did those who reported no positive life event experiences (M = 3.143, SD = 0.426; $t_{(720)}$ = -2.89, $p < .01$) before the Wave 4 assessment. In addition, those who experienced at least one positive event reported significantly lower levels of pessimism (M = 1.975, SD = 0.540) than did those who reported no positive life event experiences (M = 2.141, SD = 0.564; $t_{(720)}$ = 3.83, $p < .001$). Treatment of the single respondent who did not provide complete positive life event information as either experiencing no event or experiencing at least one event did not influence the associations observed in the complete data. Results from the sensitivity analyses on the negative life event items at Wave 4 did not differ from results obtained at the previous three waves of the study. Negative life events did not relate to average differences in optimism or pessimism among those who provided complete data (both ts$_{(709)} < 1.00$), nor did differential treatment of the cases who did not provide complete information (n = 12) alter the lack of associations between negative life event experiences, optimism, and pessimism observed in the complete data.

Sensitivity analyses for missingness on the life event items across the four study waves yielded generally consistent results. Those reporting positive life event experiences also reported higher levels of optimism and lower levels of pessimism at each assessment, whereas negative life event experiences were not related to average differences in optimism or pessimism. Treating respondents who did not provide complete life event information as either experiencing or not experiencing at least one life event generally did not alter

associations observed in the data from respondents who did provide complete information, with the single exception of missing information regarding positive life event experiences at Wave 3.

Although average differences in optimism and pessimism were sensitive to missing information regarding positive life event experiences only at Wave 3, the sensitivity is somewhat unclear. Treating cases with missing information as experiencing at least one positive event *decreased* the average level of optimism from 3.169 for cases with complete data to 3.155 when including the cases with missing data. Similarly, treating missingness as experiencing at least one positive life event *increased* the average level of pessimism from 2.113 for cases with complete data to 2.126 when including cases with missing data. In both analyses, treating cases with missing information as experiencing at least one positive event negated the associations between event experience and optimism/pessimism. Given the general associations between positive life event experiences and optimism/pessimism, one might expect that if the respondents who provided incomplete information actually did experience at least one positive event, average levels of optimism should *increase* when these cases are included in the group of respondents who reported positive life event experiences. Similarly, average levels of pessimism should *decrease* when these cases are included in the group of respondents who reported positive life event experiences.

Alternatively, if the respondents who did not provide complete information actually did not experience a positive life event, average levels of optimism should *decrease* and average levels of pessimism should *increase* when including these cases in the group of respondents who reported no positive event experiences. Some evidence supports this expectation in that when including cases with missing information in the group of

respondents who reported no positive event experiences, average levels of optimism decreased slightly from 3.103 to 3.098 and average levels of pessimism increased slightly from 2.198 to 2.202. Both changes are similar in magnitude, but only the change in average levels of optimism influenced the test of differences between the 'event experience' and 'no event experience' groups. Although not definitive, these findings seem more consistent with missingness on the positive life event items at Wave 3 reflecting no event experience rather than reflecting the unreported experience of at least one positive life event.

Effect of Item and Wave Missingness on Optimism and Pessimism

Across all study waves, the majority of respondents who participated at each assessment provided complete information regarding optimism (97.4%, 99.5%, 99.6%, and 99.3% for Wave 1, 2, 3, and 4, respectively) and pessimism (98.5%, 99.3%, 99.6%, and 99.6% for Waves 1, 2, 3, and 4, respectively). For those who did not provide complete information at any specific assessment, most of the item missingness occurred due to respondents failing to complete the second half of the computer-assisted interview. Respondents who failed to complete the second half of the computer-assisted interviews at any assessment were treated as wave missing in the analyses presented below. In cases where participants completed the second half of the computer-assisted interview but still failed to provide complete optimism and pessimism information, missingness typically involved only one of the items.

A series of multilevel regression analyses examined whether wave missingness related to levels of optimism and pessimism over time by fitting univariate growth curves to each of the LOT items. Growth curve modeling allows for estimation of both individual initial levels and trajectories or rates of change over time on a construct of interest. Within

the multilevel regression framework, repeated assessments reflect Level 1 observations that are nested within individuals and individuals reflect the Level 2 unit of analysis. Time is considered a Level 1 predictor variable that specifies the hypothesized shape (e.g., linear, quadratic) of the trajectory or change over time. Initial levels and rates of change reflect random effects that can vary across individuals. Aggregation of the growth parameter estimates across individuals yields an average initial level and average rate of change over time for the entire sample, with an estimate of individual variability around the average initial level and average rate of change. Growth curve models do not require complete data across all waves or within any particular assessment. Rather, information available at each assessment contributes to estimation of the growth parameters. In addition, growth curve models allow for the inclusion of predictor variables at both Level 1 (e.g., time-varying covariates) and Level 2 (e.g., individual characteristics).

The growth curve models used to examine the potential relationship between missing data and levels of optimism/pessimism specified a linear trajectory over time (i.e., *Time* = 0, 2, 5, and 8 years for Waves 1, 2, 3, and 4, respectively), which set the initial level or intercept parameter equal to levels of optimism/pessimism at Wave 1. In addition, the models included a dichotomous predictor variable (*miss*) that reflected whether respondents provided complete data (*miss* = 0) or failed to provide complete data (*miss* = 1) across the study period. That is, participants who dropped out of the study or did not participate at a particular assessment (including those who participated but failed to complete the second half of the interview) were assigned a value of '1' to reflect any missing data.

Three additional dichotomous variables (*T1*, *T2*, and *T3*) reflected whether participants remained in the study (coded 0 on all three variables) or had dropped out of the

study after Wave 1 (i.e., *T1* = 1), after Wave 2 (i.e., *T2* = 1), or after Wave 3 (i.e., *T3* = 1). As mentioned above, failure to participate at Wave 4 does not necessarily reflect study dropout. Therefore, influences resulting from the *T3* variable may not truly reflect effects due to dropout but rather, differences due to wave missingness at Wave 4. Including this variable in the model reflects a conservative approach in which the cases missing at Wave 4 are assumed to have dropped out of the study after Wave 3. Finally, the growth curve models included interactions between the dichotomous predictors (*miss*, *T2*, and *T3*) and time to examine whether optimism and pessimism trajectories differed as a function of missing data or study dropout. However, the *T1*Time* interaction was not included in the models because it is redundant with the effect of *T1*. That is, no trajectory over time exists for participants who dropped out of the study after Wave 1.

Results of the growth curve models for each of the optimism and pessimism items appear in Table 5. The significant effect of time on each of the LOT items indicates that responses are increasing on average for the optimism items and decreasing on average for the pessimism items over time. None of the missing data indicators significantly influenced any of the optimism items. However, respondents who did not have complete data but remained in the study (i.e., missing at any of the four assessments) responded higher on average (more pessimistic) to the fourth pessimism item at Wave 1 than did participants with complete data and participants who dropped out of the study. As shown in the fourth column of Table 5, responses to the LOT items for those who dropped out of the study after Wave 1 did not differ on average from responses by other study participants at Wave 1.

Table 5. *Results from Multilevel Attrition Models for Assessing Study Dropout on LOT Items*

Item	Main Effect Estimates						Interaction Effect Estimates			
	β_0	$\beta_{(time)}$	$\beta_{(miss)}$	$\beta_{(T1)}$	$\beta_{(T2)}$	$\beta_{(T3)}$	$\beta_{(time*miss)}$	$\beta_{(Time*T1)}$	$\beta_{(Time*T2)}$	$\beta_{(Time*T3)}$
Optimism 1	3.070*	0.007*	-0.028	0.093	0.053	-0.110	0.010	---	0.048	-0.011
Optimism 2	3.110*	0.014*	0.019	0.021	0.027	-0.044	-0.004	---	-0.074	-0.017
Optimism 3	3.071*	0.014*	0.070	0.014	-0.015	0.003	-0.004	---	0.043	-0.021
Optimism 4	3.042*	0.015*	-0.015	-0.066	0.067	-0.021	-0.002	---	< -0.001	-0.020
Pessimism 1	2.385*	-0.014*	0.098	0.027	-0.357*	-0.269*	-0.003	---	0.103	0.004
Pessimism 2	2.163*	-0.020*	-0.022	-0.084	0.015	-0.065	0.008	---	0.065	0.004
Pessimism 3	2.134*	-0.017*	0.069	-0.109	-0.203	-0.166	-0.015	---	0.115	0.009
Pessimism 4	2.316*	-0.029*	0.207*	-0.108	-0.148	-0.356*	-0.023	---	-0.034	0.031

Note. The Time*T1 interaction is redundant with the main effects of Time and T1 and therefore, not included in the model.
* $p < .05$

Participants who dropped out of the study after Wave 2 did differ significantly from other study participants in that they responded significantly *lower* (i.e., less pessimistic) to the first pessimism item at Wave 1. Finally, those who may have dropped out of the study after Wave 3 (i.e., Wave 4 missingness) responded significantly *lower* (less pessimistic) to the first and fourth pessimism items than did other study participants at Wave 1.

Interpretation of the main effects for the missing data indicators is somewhat unclear as dropout after Wave 1 did not relate to responses on any of the optimism and pessimism items at Wave 1. However, results regarding dropout following Wave 2 and potential dropout following Wave 3 suggest that those who left the study were, at least partially, less pessimistic two and five years earlier than were participants who remained in the study. Of particular importance, the results from these analyses indicated no significant modification of the effect for time due to missing data or dropout status. This finding suggests that the rate of change in optimism and pessimism over time does not differ as a function of whether participants provided complete data, did not participate at a particular assessment, or dropped out of the study completely.

In order to rule out potential idiosyncratic effects related to the individual items, the attrition analyses were repeated using composite scores for optimism and pessimism. Figures 1a and 1b present plots of the optimism and pessimism trajectories for the different missing data patterns and for respondents who provided complete data. Results from these analyses were consistent with the item-level findings regarding the significant effect of time in that average levels of optimism increased and average levels of pessimism decreased over the 9-year study period. Also consistent with the item-level analyses, none of the missing data indicators predicted significant differences in optimism at Wave 1. As in the pessimism item

analyses, the *T3* variable reflecting potential study dropout after Wave 3 remained statistically significant and negative, indicating that those who did not participate at Wave 4 (and may have dropped out after Wave 3) reported being *less pessimistic* on average at Wave 1 than did other study participants. Finally, and consistent with the item-level results, none of the missing data indicators moderated the effect of time on optimism or pessimism.

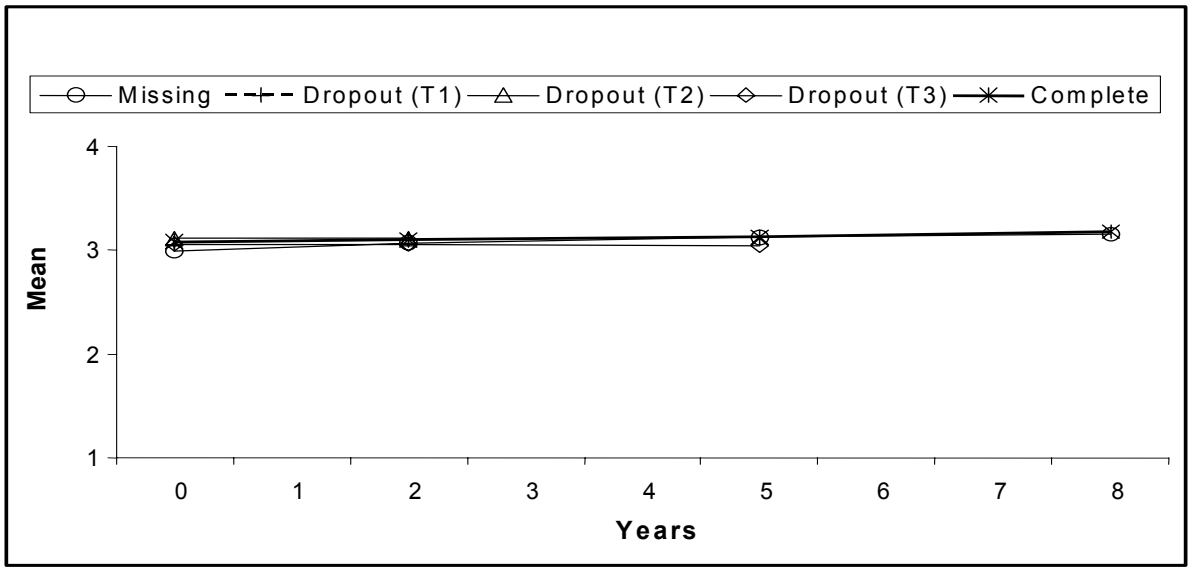


Figure 1a. Optimism Trajectories for Different Patterns of Missing Data

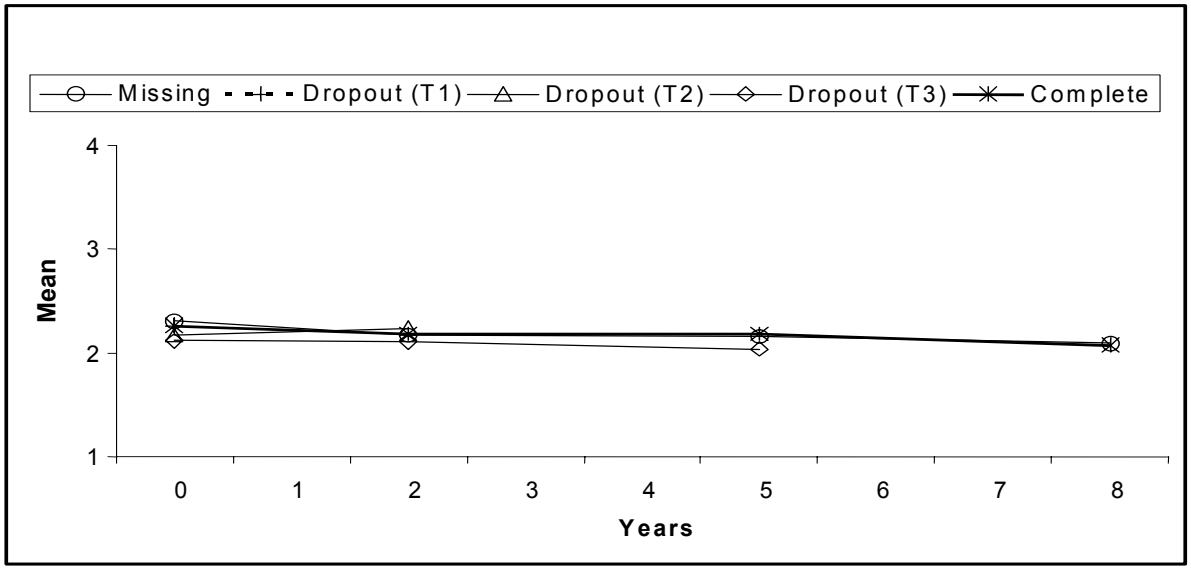


Figure 1b. Pessimism Trajectories for Different Patterns of Missing Data

Collectively, the results of these attrition analyses indicate that wave missing data and study dropout did not relate to *changes* in optimism and pessimism. This important finding suggests that the particular mechanism responsible for missingness or dropout is not one's level of optimism or pessimism. That is, missing data and study dropout are more likely the result of a missing at random (MAR) process than a "not missing at random" (NMAR) process. In addition, missingness and dropout do not relate consistently to initial levels of optimism or pessimism. The single exception suggests that participants who did not provide data at Wave 4 (and may have dropped out after Wave 3) reported significantly lower levels of pessimism nine years earlier than did other study participants. This finding seems inconsistent with what one might expect if the missing data mechanism were NMAR (i.e., highly pessimistic participants being more likely to drop out of the study). Such a process would likely result in trajectories that differed dramatically across missing data patterns. Although these results do not definitively demonstrate that the missing data mechanism is MAR, the assumption seems tenable given that the findings are inconsistent with what should occur if the likelihood of missing data depended on levels of optimism and pessimism (i.e., an NMAR process).

Optimism and Pessimism as Separate Constructs among African American Adults

Previous research examining the factor structure underlying the LOT items provides substantial statistical evidence that supports treating optimism and pessimism as partially distinct constructs (e.g., Carifio & Rhodes, 2002; Chang et al., 1994; Creed et al., 2002; Lai & Yue, 2000; Marshall & Lang, 1990; Marshall et al., 1992; Scheier & Carver, 1985; Scheier et al., 1994). However, none of these previous studies examined the factor structure of the

LOT using data from African American adults. To examine whether optimism and pessimism reflect partially distinct constructs among African Americans, a series of confirmatory factor analysis (CFA) models tested whether a single underlying factor or two correlated factors provided a better approximation to the underlying structure of the LOT items.

Statistical Evidence for Distinguishing Optimism and Pessimism

Preliminary data screening of the complete case data for optimism and pessimism items indicated moderate departures from multivariate normality ($z_{\text{MV-skew}} = 57.28$, $z_{\text{MV-kurtosis}} = 31.29$). Because departures from multivariate normality can severely influence the results obtained from analyses that use structural equation modeling techniques (e.g., Curran, West, & Finch, 1996), all latent variable models were estimated using the MLR estimator available in Mplus (Muthén & Muthén, 2006; also see Muthén & Muthén, 1998-2005). The MLR estimator (Yuan & Bentler, 2000) reflects an extension of robust maximum likelihood-based estimation methods (see Chou, Bentler, & Satorra, 1991; Satorra & Bentler, 1994) that produce corrected chi-square statistics for evaluating and comparing models as well as corrected standard errors that are robust to violations of the multivariate normality assumption. In addition, the MLR estimator extends to applications with missing data in much the same way as full information maximum likelihood methods (FIML; see Arbuckle, 1996) provided data are missing at random (see Yuan & Bentler, 2000).

Model testing at each assessment involved estimating two models within each wave separately. The single-factor model specified one factor as the underlying latent variable upon which the eight LOT items loaded. The alternative model specified two factors, each with four measured indicators, to reflect separate latent variables for optimism and

pessimism. The two-factor model specified that optimism and pessimism items loaded only on their respective factors (i.e., no cross-loadings), with the latent variable correlation freely estimated. Residual correlations were fixed at zero in both CFA models.

Comparisons between two nested models typically rely on a chi-square difference test. When robust ML estimation methods are used, the difference between two model chi-square statistics does not follow an asymptotic chi-square distribution, requiring a scaling procedure to appropriately compare the fit of two competing models (Satorra & Bentler, 2001). Computing a scaled chi-square difference test requires simple hand calculations based on output for the models of interest estimated with both ML and robust ML methods. Satorra and Bentler (2001) note that in some extreme cases, the scaled chi-square difference test can result in a negative (and inappropriate) value. One particular case occurs when the more constrained model (the single-factor model in the present analyses) represents a severely misspecified model that is not a reasonable approximation to the data. In cases where the scaled chi-square difference is negative, using the model chi-squares is not appropriate and other methods for comparing the models are necessary.

Various fit indices other than the model chi-square provide one approach to evaluating the fit of models and recommendations suggested by Hu and Bentler (1999) provide general guidelines for determining whether a particular model approximates the underlying data structure. Specifically, Hu and Bentler (1999) recommend that model evaluation should include at least one index of overall model fit (e.g., *RMSEA* or *SRMR*) and one comparative index of fit (e.g., *CFI*). According to Hu and Bentler, *RMSEA* values lower than .06, *SRMR* values lower than .08, and *CFI* values greater than .95 provide evidence to suggest that a particular model provides a reasonably good fit to the data.

Results for the CFA analyses shown in Table 6 indicate that the single-factor model does not adequately fit the data at any assessment. In fact, the single-factor model reflects such a severe misspecification at Waves 1 and 2 that scaled chi-square difference tests yielded negative values. At each assessment, the fit of the two-factor model reflecting partially distinct optimism and pessimism constructs provided a marked improvement in model fit. Results for the two-factor model at Waves 2–4 show that the model chi-square is not statistically significant ($p > .05$), indicating that the model fits the data very well. Although the model chi-square remained statistically significant at Wave 1, assessment of model fit based on fit indices provided evidence to support the separation of optimism and pessimism. Values in the last column of Table 6 reflect the latent variable correlations between optimism and pessimism at each assessment. Although optimism and pessimism correlated negatively and significantly at each assessment, the strength of the associations (ranging from -.29 to -.44) also supports a distinction between the two constructs.

Table 6. *Comparison of the Single-factor and Two-factor Models for the LOT Items*

Model	χ^2_{MLR}	*p*	$\Delta\chi^2_{MLR}$	*CFI*	*RMSEA*	*SRMR*	ϕ
Single-factor (T1)	383.04	< .01		.512	.144	.115	
Two-factor (T1)	31.87	.03	---	.983	.028	.029	-.31*
Single-factor (T2)	516.93	< .01		.448	.182	.142	
Two-factor (T2)	20.40	.37	---	.998	.010	.021	-.29*
Single-factor (T3)	361.11	< .01		.587	.150	.115	
Two-factor (T3)	28.48	.08	505.26	.989	.026	.026	-.39*
Single-factor (T4)	327.94	< .01		.636	.146	.109	
Two-factor (T4)	19.20	.44	356.93	1.000	.004	.019	-.44*

Note: The scaled chi-square difference [$\Delta\chi^2_{MLR}$] test was undefined (negative) for comparisons of the two models at Times 1 and 2 due to extremely poor fit of the single-factor model. Degrees of freedom are 20 and 19 for the single- and two-factor models, respectively. $\Delta\chi^2_{MLR} > 3.841$ are statistically significant ($p < .05$) with 1 degree of freedom.

Together, these results are extremely consistent with previous findings from predominately white samples showing that optimism and pessimism reflect two separate but correlated constructs (e.g., Carifio & Rhodes, 2002; Chang et al., 1994; Creed et al., 2002; Lai & Yue, 2000; Marshall & Lang, 1990; Marshall et al., 1992; Scheier & Carver, 1985; Scheier et al., 1994). In addition, the strength of the latent variable associations between optimism and pessimism observed in this sample of African American adults is consistent with the range (i.e., -.02 to -.39) reported in previous studies of adults in the U.S. (e.g., Mroczek et al., 1993), China (Lai, 1994), the Netherlands (Mook et al., 1992), and Sweden (Plomin et al., 1992). Therefore, these findings provide compelling evidence to support the notion that the underlying structure of optimism and pessimism does not differ appreciably among African American women and men.

Validity Evidence for Distinguishing Optimism and Pessimism

Previous research has also demonstrated that optimism and pessimism relate differentially to other personality constructs. For example, Marshall et al. (1992) demonstrated that optimism no longer related to negative affect but remained associated with positive affect after controlling for the influence of pessimism. Similarly, pessimism remained associated with negative affect but no longer associated with positive affect after controlling for variance shared with optimism. To examine whether optimism and pessimism maintain similar differential associations among African American adults, analyses tested whether positive and negative affect at Wave 1 remained uniquely associated with latent levels of optimism and pessimism at each assessment.

Results indicated that positive affectivity (ranging from $\beta = .35$ at Wave 1 to $\beta = .23$ at Wave 4) and negative affectivity (ranging from $\beta = -.28$ at Wave 1 to $\beta = -.11$ at Wave 4)

both remained significantly related to latent levels of optimism after controlling for pessimism at each wave of the study. When controlling for optimism, however, only the association between negative affect and pessimism (ranging from $\beta = .39$ at Wave 1 to $\beta = .29$ at Wave 4) remained statistically significant at each assessment. These results are partially consistent with previous findings in that the association between positive affect and pessimism is not unique to the shared variance between optimism and pessimism. Although controlling for shared variance between optimism and pessimism did not eliminate the association between negative affect and optimism in the current sample, positive and negative affect associated uniquely with optimism, suggesting that the distinction between optimism and pessimism is valid among African American adults.

A second series of analyses examined whether controlling for initial levels of positive/negative affect and total counts of concurrent positive and negative life event experiences could account for the latent variable correlation between optimism and pessimism at each assessment. At Wave 1, the residual correlation between optimism and pessimism remained statistically significant but decreased from -.31 to -.17 after controlling for affect and life event experiences. At each of the remaining assessments, the correlation between optimism and pessimism remained statistically significant after controlling for initial levels of positive and negative affect and concurrent life event experiences. However, removing the influence of affect and life events did reduce the correlation between optimism and pessimism to some extent (-.29 to -.18 at Wave 2; -.39 to -.28 at Wave 3; -.44 to -.37 at Wave 4) at each of the remaining assessments.

Testing Study Hypotheses

Presentation of results from analyses to address specific hypotheses is organized around the three major goals of the current study. The first section below presents results from analyses that examined the general course (stability and change) of optimism and pessimism among adults over the nine-year study period. The second section presents results from analyses conducted to assess whether major life event experiences are linked with short-term reactive changes in optimism and pessimism. The final section presents results from analyses that tested whether adaptation theory and the set-point model of SWB could be extended as an adequate explanation for long-term changes in optimism and pessimism following the experience of specific life events.

Assessing Stability and Change in Optimism/Pessimism

The first goal of this work involved examining the stability of dispositional optimism and pessimism over time. The initial step in doing so required fitting a longitudinal confirmatory factor analysis (LCFA) model to the optimism and pessimism LOT items. Based on the results from the CFA models at each assessment, the LCFA model included separate latent variables for optimism and pessimism over time. Initial estimation of the LCFA model placed no equality constraints on any of the model parameters and allowed residual correlations among the same items over time. The initial model also estimated correlations among all of the latent optimism and pessimism variables. Factor loadings for the first optimism and pessimism items were fixed to one at each assessment for identification purposes. Although the choice of items to use for identification was arbitrary, use of different items for these purposes would not influence the substantive results of the model. The LCFA model also estimated latent variable means for optimism and pessimism at

each assessment. It is important to note that establishing a metric for the latent variable means typically involves setting one of the means equal to zero. In the current LCFA model, this option was not possible because doing so required setting one latent optimism mean and one latent pessimism mean to zero to establish a latent variable metric for both constructs. Imposing these constraints forces equality of the latent optimism and pessimism means for the chosen assessment, which is inconsistent with the data. Therefore, the manifest variable intercepts (i.e., item means) of the two items used for identification purposes were fixed to zero at each assessment (see Sayer & Cumsille, 2001, for use of this approach in latent growth curve applications), providing a metric for the latent means that is consistent with the metric of the measured items (i.e., a 1 – 4 scale). Although the choice of scaling items was again arbitrary, use of any other items would not change the substantive results of the model.

Initial estimation of the unconstrained LCFA model suggested a poor fit to the data based on the model chi-square [$\chi^2_{MLR}(388, N = 887) = 463.22, p < .01$]. However, examination of the fit indices indicated that the unconstrained LCFA model fit the data reasonably well (*CFI* = .988, *RMSEA* = .015, *SRMR* = .032). Optimism and pessimism items loaded significantly on their respective factors, with loadings ranging from .47 to .85 for the optimism items (average $\lambda = .65$) and .48 to .79 for the pessimism items (average $\lambda = .66$). All of the latent variable correlations between optimism and pessimism were statistically significant ranging from .11 to .63 in absolute value.

The second step necessary for examining the stability of optimism and pessimism over time involved establishing factorial stability. Factorial stability requires placing constraints on the factor loadings to force equality of the loadings for identical items across all assessments. In addition, when latent variable means are of interest, equality constraints

that force the intercepts of the manifest variables to be equal across time are necessary for establishing that the latent variables reflecting optimism and pessimism at each assessment represent the same underlying construct. Determination of factorial invariance proceeded in a stepwise manner, in which constraints on the factor loadings were tested first (the λ-equivalent model) and constraints on the manifest variable intercepts were tested second (the τ-equivalent model).

As expected, imposing the factor loading constraints increased the model chi-square for the λ-equivalent model [$\chi^2_{MLR}(406, N = 887) = 480.28, p < .01$]. However, model fit indices suggested that the λ-equivalent model still provided reasonable fit to the data (*CFI* = .988, *RMSEA* = .014, *SRMR* = .035). A scaled chi-square difference test also indicated that removing the factor loading constraints did not significantly improve the fit of the model [$\Delta\chi^2_{MLR}(18, N = 887) = 17.57, p = .48$].

Similar results were obtained for the τ-equivalent model in that the model chi-square increased due to the equality constraints on the manifest variable intercepts [$\chi^2_{MLR}(424, N = 887) = 520.77, p < .01$] but fit indices suggested that the τ-equivalent model still fit reasonably well with the data (*CFI* = .984, *RMSEA* = .016, *SRMR* = .036). However, a scaled chi-square difference test between the τ-equivalent and λ-equivalent models indicated that the set of equality constraints on the manifest variable intercepts significantly reduced the fit of the model [$\Delta\chi^2_{MLR}(18, N = 887) = 44.57, p < .01$]. Examination of modification indices for the τ-equivalent model indicated problems with the constraints on factor loadings and manifest variable intercepts for the second and third optimism items at Waves 3 and 4. In addition, constraints on the loading and manifest mean for the fourth pessimism item at

Wave 1 resulted in large modification indices. A second estimation of the τ-equivalent model relaxing the factor loading constraint on the third optimism item at Wave 3 reduced the remaining modification indices related to the optimism items to nonsignificant levels. Interestingly, the value for this factor loading (.70) did not differ when freely estimated. A third estimation of the τ-equivalent model relaxed the factor loading constraint for the fourth pessimism item at Wave 1, which again reduced modification indices to nonsignificant levels. As with the relaxed constraint for the single optimism item, the value of this loading (.53) did not differ when freely estimated.

Table 7 presents estimated latent variable means and correlations for the unconstrained and τ-equivalent models. Examination of the parameter estimates for the two models reveals no appreciable differences. The most likely explanation for the decrease in model fit due to imposing equality constraints on both the factor loadings and the manifest variable intercepts involves differences in the variances of the measured variables over time. Because relaxing the constraint on either the loading or the manifest variable mean produced the same result (i.e., no problems with model fit), it is also possible that the lack of fit due to imposing both types of constraints is sample-specific. Given these possibilities, and the evidence suggesting that the τ-equivalent model adequately fit the data, subsequent analyses retained all of the factorial invariance constraints.

Table 7. *Estimates of Latent Variable Means and Correlations from the LCFA Models*

	Optimism				Pessimism			
	(T1)	(T2)	(T3)	(T4)	(T1)	(T2)	(T3)	(T4)
Optimism (T1)		.55	.42	.36	-.31	-.25	-.25	-.19
Optimism (T2)	.55		.59	.41	-.19	-.29	-.24	-.17
Optimism (T3)	.42	.59		.45	-.24	-.21	-.39	-.23
Optimism (T4)	.37	.42	.46		-.11	-.17	-.16	-.43
Pessimism (T1)	-.31	-.20	-.24	-.11		.63	.60	.46
Pessimism (T2)	-.25	-.29	-.20	-.17	.63		.59	.58
Pessimism (T3)	-.25	-.24	-.39	-.16	.61	.59		.52
Pessimism (T4)	-.18	-.17	-.23	-.43	.47	.58	.52	
Mean (UN)	3.072	3.078	3.089	3.137	2.388	2.335	2.328	2.267
Mean (TE)	3.065	3.073	3.099	3.138	2.394	2.347	2.327	2.248

Note: Correlations above the diagonal reflect estimates from the unconstrained (UN) model. Correlations below the diagonal reflect estimates from the τ-equivalent (TE) model

Testing the General Stability of Optimism/Pessimism (Hypotheses 1a – 1c)

Hypothesis 1a posited that dispositional optimism and pessimism should demonstrate moderate (40% -50% overlap) to high (50% to 80% overlap) levels of differential stability over time. Specifically, the correlations between adjacent assessments (e.g., Waves 1 and 2 or Waves 2 and 3) of optimism and pessimism should fall between .60 and .90. In addition, if differential stability is consistent over time, constraining the correlations between adjacent assessments of optimism and pessimism to be equal over time should not significantly

degrade the fit of the model, indicating that differential stability is independent of specific measurement occasions. Results from the τ-equivalent LCFA model provide support for the first part of *Hypothesis 1a*, in that the correlations between adjacent assessments of optimism and pessimism fell between .45 and .65. However, the average correlation among adjacent assessments of optimism (.53) and pessimism (.58) indicates that the shared variance (28% and 34% for optimism and pessimism, respectively) across assessments separated by two or three years is only moderate at best. Data were consistent with the second part of *Hypothesis 1a*, in that equality constraints placed on correlations between adjacent assessments of optimism and pessimism did not significantly degrade the fit of the model [$\Delta\chi^2_{MLR}(4, N = 887) = 4.62, p = .33$]. In addition, placing equality constraints on the correlations between optimism and pessimism separated by one assessment (e.g., Waves 1 and 3 or Waves 2 and 4) did not significantly reduce the fit of the model [$\Delta\chi^2_{MLR}(2, N = 887) = 1.03, p = .60$]. However, the set of constrained correlations did not provide compelling evidence for a particular correlation structure such as an autoregressive pattern in which associations degrade as the period between assessments lengthens. For example, the average correlations between assessments of optimism (.41) and pessimism (.59) separated by approximately five years were not dramatically different than the average correlations observed over the shorter two or three year intervals.

Although not hypothesized, analyses examining the structural stability between optimism and pessimism yielded interesting findings. Placing equality constraints on the correlation between optimism and pessimism at the same assessment period significantly degraded the fit of the τ-equivalent model [$\Delta\chi^2_{MLR}(3, N = 887) = 8.61, p < .05$]. Examination of modification indices indicated that the correlation between optimism and pessimism at

Wave 4 (-.43) differed significantly from the correlation between optimism and pessimism at earlier assessments (-.33). These findings provide preliminary evidence suggesting that the relationship between optimism and pessimism becomes stronger over time and may increase as a function of age.

To examine this possibility, participants were classified into one of five groups (i.e., 20-30, 31-40, 41-50, 51-60, and over 60 years) based on their age at the Time 1 assessment. Correlations between composite scores for optimism and pessimism were compared across these groups over the four time points of the study. Results indicated no clear pattern of association between age and the strength of the correlation between optimism and pessimism. For example, the strength of the correlation between optimism and pessimism did increase over time among those who were between the ages of 51 and 60 at Time 1 but the strength of the correlation decreased over time among those over the age of 60 at the first assessment. Among those who were between the ages of 41 and 50 at Time 1, the strength of the correlation between optimism and pessimism decreased between the first two assessments, increased over the next three years, then decreased again over the last three years of the study period. Collectively, these findings provide no clear support for an association between age and the structural stability of optimism and pessimism over time.

Hypothesis 1b posited that dispositional optimism and pessimism should demonstrate high levels of absolute stability over time. To test this hypothesis, the latent means for optimism and pessimism were constrained to be equal over time in the τ-equivalent LCFA model. Imposing these constraints significantly degraded the fit of the model [$\Delta\chi^2_{MLR}(6, N = 887) = 58.37, p < .01$], indicating that at least one of the latent optimism/pessimism means differed significantly from the latent means for the same construct at one of the study

assessments. Examination of the fit indices for the constrained model indicated large influences on model fit due to constraints imposed on the latent means for optimism at Wave 4 and pessimism at Waves 1 and 4. These findings are not consistent with *Hypothesis 1b*, in that the latent mean of optimism at Wave 4 was significantly higher than the average latent levels of optimism reported at earlier waves. Similarly, average latent levels of pessimism were significantly higher at Wave 1 and significantly lower at Wave 4 when compared to the remaining study waves.

The findings that contradict *Hypothesis 1b* suggest the possibility of a structure or trajectory that adequately describes changes in latent levels of optimism and pessimism over time. To examine this possibility, latent growth components reflecting initial levels and linear rates of change over time for optimism and pessimism were added to the τ-equivalent LCFA model. Initial latent levels of optimism and pessimism were set at the Wave 1 assessment using appropriate slope coefficients (i.e., 0, 2, 5, and 8 years for Waves 1-4, respectively) to model separate linear rates of change in latent levels of optimism and pessimism over the study period. The second-order latent growth curve (LGC) model included residual correlations between latent levels of optimism and pessimism at Waves 2-4 but the residual correlation at Wave 1 was fixed to zero because that parameter is redundant with the correlation between the second-order initial level growth components.

Results for the LGC model indicated that the model did not fit the data well based on the model chi-square statistic [$\chi^2_{MLR}(445, N = 887) = 648.83, p < .001$] but fit indices suggested reasonable fit with the data (*CFI* = .959, *RMSEA* = .029, *SRMR* = .048). A scaled chi-square difference test between the LGC and τ-equivalent LCFA models indicated that specification of linear growth processes for optimism and pessimism significantly degraded

the fit of the model, $\Delta\chi^2_{MLR}(21, N = 887) = 124.71, p < .001$. One explanation for the lack of fit for the LGC model involves the possibility of a nonlinear (i.e., quadratic) rate of change in latent levels of optimism, pessimism, or both constructs.

To examine this possibility, the LGC was modified to include two additional second-order latent variables reflecting quadratic rates of change over time. Estimation of the quadratic LGC model encountered serious convergence problems (i.e., negative variances for the quadratic slopes) that could not be solved adequately enough to obtain a proper solution. A stepwise approach that added a quadratic rate of change for each construct separately also failed to yield proper solutions. Although not an entirely correct approach, the latent-level parameter estimates (i.e., correlations, variances, and means) from the τ-equivalent LCFA model were analyzed separately for optimism and pessimism treating the summary data as manifest or observed information. This approach is not optimal as the sample size specified in the analysis is not entirely correct due to missing data methods used in the LCFA analyses. However, results from these analyses might help clarify where the lack of fit in the LGC model was occurring.

Estimation of a quadratic growth curve model for optimism converged to a proper solution and fit the data very well, $\chi^2_{MLR}(1, N = 887) < 1.00, p = .94$. Examination of the parameter estimates indicated that the means for the linear and quadratic rates of change did not differ significantly from zero. However, individual variability in the rates of linear and nonlinear change was statistically significant. Estimation of a quadratic growth curve model for pessimism using the same approach did not converge to a proper solution. Given that fitting a quadratic model to four waves of manifest or observed data leaves only a single degree of freedom, the model chi-square reflects whether the shape of the trajectory in the

data differs significantly from the shape of the data specified in the growth curve model. In the present case, the failure of the quadratic model to converge to a proper solution suggests that the rate of change in pessimism over time deviates significantly from quadratic form (i.e., a cubic trend).

Unfortunately, it is not possible to estimate cubic trends over four waves of data without imposing severe (and often unjustifiable) constraints on the residual variances at the manifest and latent levels of the growth curve model. In addition, the increased statistical power stemming from estimation of the LGC as a second-order latent variable model heightens model fit sensitivity to even small departures from linearity that may only reflect sample-specific noise. Figures 2a and 2b present plots of both the estimated linear trajectories for optimism and pessimism from the LGC model and the estimated latent means for optimism and pessimism from the τ-equivalent LCFA model. As shown in Figure 2a, the linear trajectory for optimism matches quite closely with the plotted latent means.

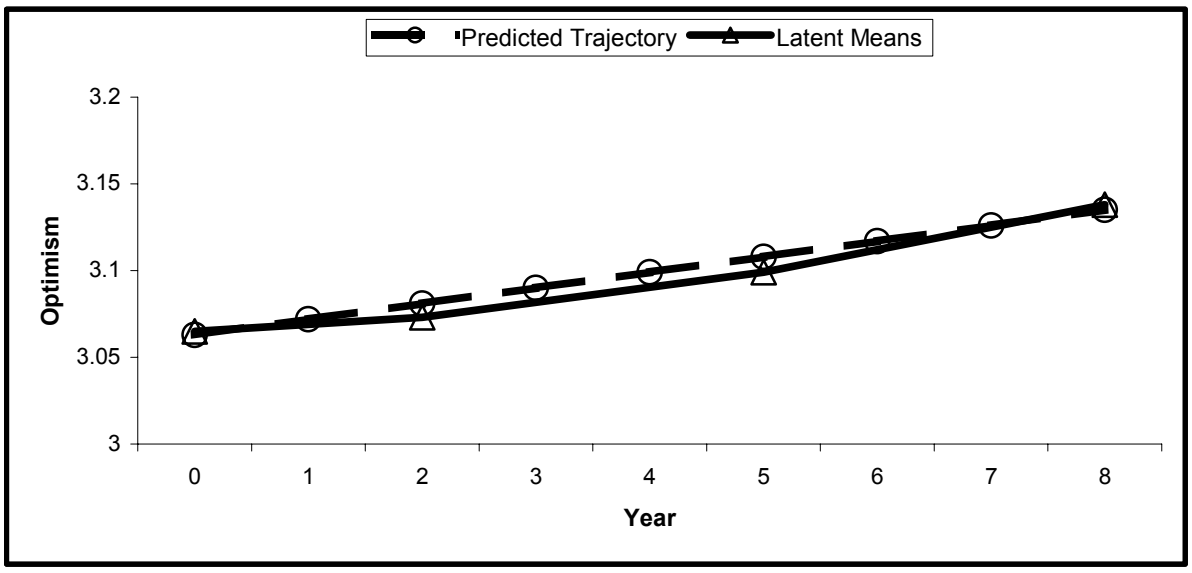


Figure 2a. Optimism Trajectories from the LCFA and LGC Models

Similarly, Figure 2b shows that a linear trajectory matches closely with average latent levels of pessimism but the departure from linearity is certainly more evident. Rather than a clear quadratic trend, the latent means for pessimism suggest a linear decline that slows slightly between Waves 2 and 3 and then resumes between Waves 3 and 4. Based on the plots in Figures 2a and 2b, and little compelling evidence for a clear nonlinear trajectory for either optimism or pessimism, the linear LGC model was retained for subsequent analysis.

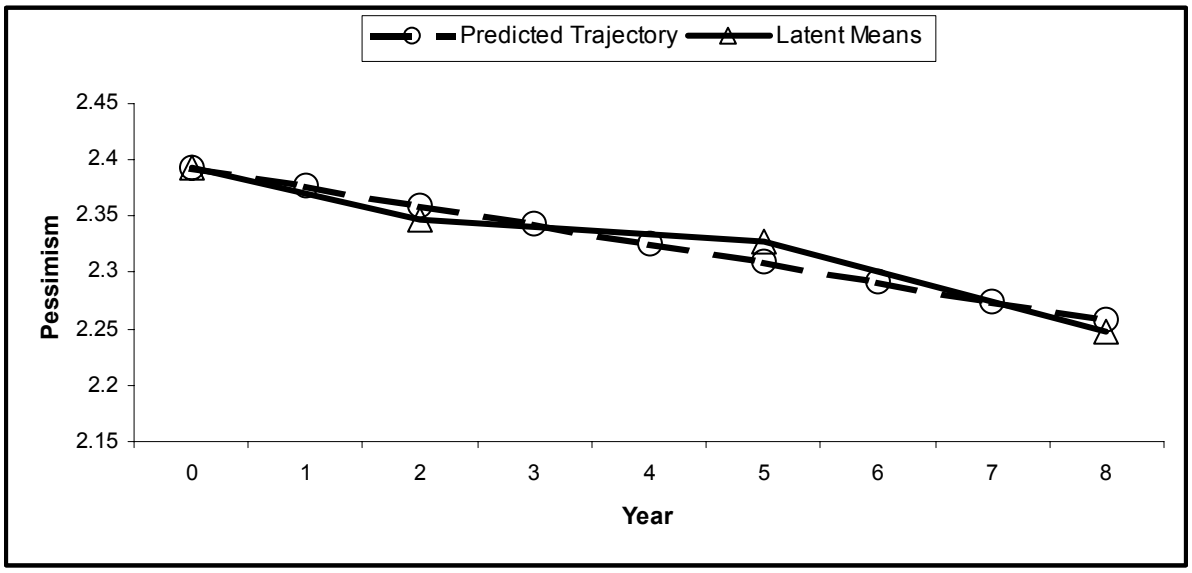


Figure 2b. Pessimism Trajectories from the LCFA and LGC Models

Examination of the parameter estimates from the LGC model indicated that the initial latent levels of optimism (3.063) and pessimism (2.394) both differed significantly from zero, as they should given the metric used to scale the latent variables in the τ-equivalent LCFA model. Inconsistent with *Hypothesis 1b*, average rates of linear change in both optimism (0.009; $d = 0.23$) and pessimism (-0.017; $d = -0.43$) also differed significantly from zero, indicating that average latent levels of optimism and pessimism increased and decreased, respectively, across the study period. Individual variability around average initial levels (0.081) and the linear rate of change (0.001) in optimism differed significantly from

zero, as did the individual variability around initial levels (0.138) and the linear rate of change (0.002) in pessimism. Significant individual variability around the initial levels of optimism and pessimism indicates that latent levels of the two constructs differed significantly across participants at Wave 1. The significant individual variability for the linear rates of change in optimism and pessimism is consistent with *Hypothesis 1c* and indicates that the slopes of the linear changes differ across participants. It is important to note that significant variability on a slope parameter could indicate differences in magnitude *or direction* of the linear change. For example, optimism might be increasing sharply, increasing slowly, remaining stable, or decreasing for different individuals.

Results from specification of the LGC with prediction paths between the growth parameters indicated strong negative associations between initial levels and rates of change for both optimism (-.63) and pessimism (-.53). As shown in Figure 3a, the negative association between the initial level and rate of change in optimism indicated a larger increase in optimism over time among those who scored one standard deviation below the average initial level. However, optimism actually decreased slightly over time among those whose initial level of optimism was one standard deviation above the mean. Similarly, the negative association between initial levels of pessimism and the rate of change in pessimism over time indicated a larger decrease in pessimism among those whose initial levels were one standard deviation above the mean. However, as shown in Figure 3b, pessimism did not change substantially over time among those whose initial level of pessimism was one standard deviation below the mean.

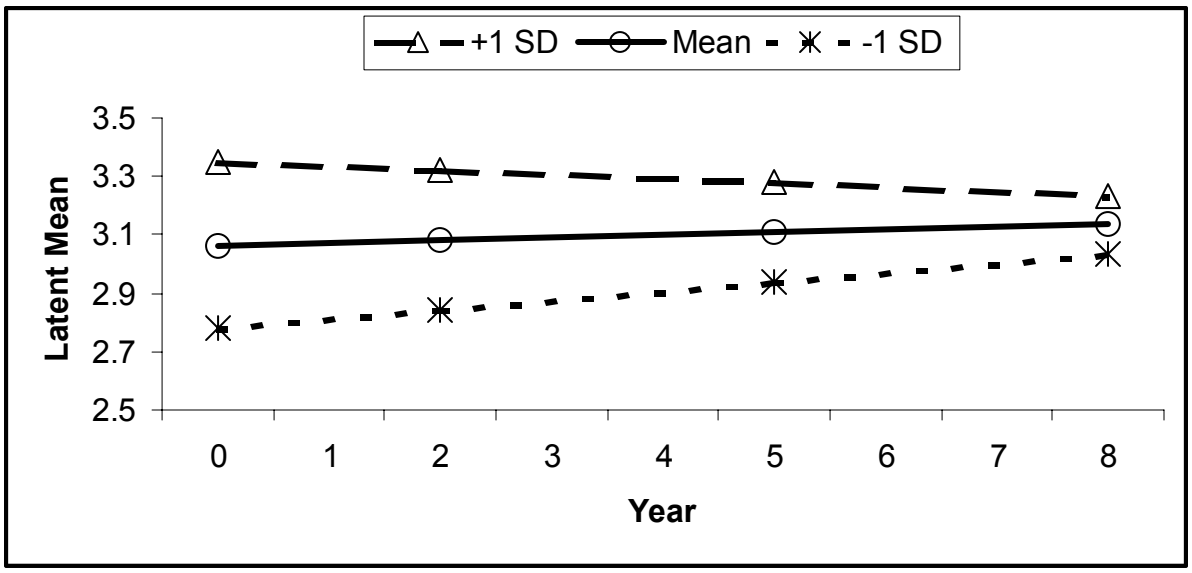


Figure 3a. Rates of Change in Optimism as a Function of Initial Level

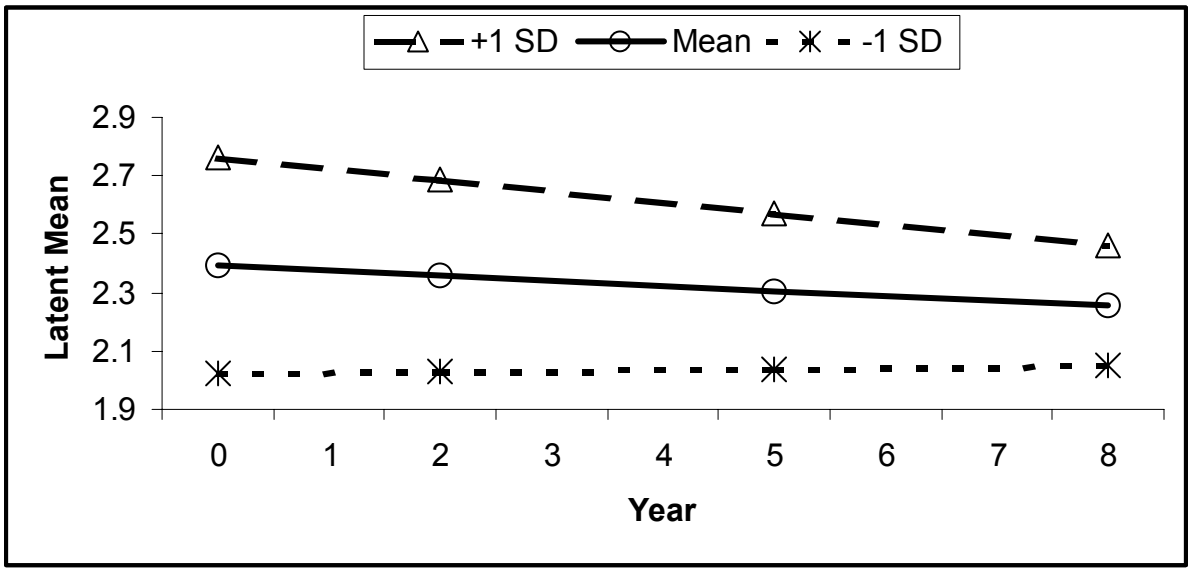


Figure 3b. Rates of Change in Pessimism as a Function of Initial Level

As expected, initial levels of optimism and pessimism correlated moderately (-.35). Initial levels of optimism did not significantly predict the rate of change in pessimism (β = -.04), nor did initial levels of pessimism significantly predict the rate of change in optimism (β = -.02). Finally, the significant negative residual correlation (-.25) between the rate of change in optimism and the rate of change in pessimism indicated that as the rate of change

on one construct increased the rate of change on the other construct decreased. For example, if individuals experienced large increases in optimism over the study period, they were likely to experience small decreases (e.g., remain stable) in pessimism over the same time, indicating that changes in optimism and pessimism are not a parallel process in which an increase on one is related to a decrease on the other. Rather, this finding suggests that optimism and pessimism might change, at least partially, independently of one another, further strengthening the validity of examining the two constructs separately.

Predicting General Changes in Optimism/Pessimism (Hypothesis 1d)

Statistically significant individual variability for the growth parameters observed from the LGC analysis allows for the examination of individual characteristics as potential predictors of both initial levels and rates of change over time in optimism and pessimism. Previous research demonstrates consistent links between optimism/pessimism and positive/negative affectivity (e.g., Chang & Sanna, 2001; Mroczek et al., 1993; Plomin et al., 1992; Robbins et al., 1991; Smith et al., 1989). In addition to these personality constructs, education is often associated with levels of optimism (Brody, Murry, Kim, & Brown, 2002; Heinonen et al., 2006; Isaacowitz, 2005) and pessimism (Heinonen et al., 2006; Mattis et al., 2004). Given these consistent associations, levels of positive/negative affectivity and formal education at Wave 1 were included in the LGC model as predictors of initial levels and rates of change in optimism and pessimism. The education variable was scored categorically to approximate years of education (i.e., 12 = high school graduate); however, no natural zero-point existed for this variable. To simplify interpretation of potential associations between education and rates of change in optimism and pessimism, education was median-centered at

12 such that zero reflected high school completion. Positive and negative affect were not rescaled as both measures included a meaningful zero point.

Model results were generally consistent with previous findings in that positive (β = .36) and negative (β = -.30) affect both significantly predicted initial levels of optimism, whereas only negative affect (β = .36) significantly predicted initial levels of pessimism. Education did not relate significantly to initial levels of optimism (β = -.02) but did predict initial levels of pessimism (β = -.32) such that initial levels of pessimism were lower among individuals with higher levels of education. As a set of predictors, positive/negative affect and education accounted for 27% and 28% of the variance in initial levels of optimism and pessimism, respectively. However, these predictor variables generally did not relate to the rates of change in optimism or pessimism. The only statistically significant association between any of the predictors and the slope parameters involved a small (β = .16) *positive* association between negative affect and the rate of change in optimism over time. The positive nature of the relationship indicates that the rate of increase in optimism over time was slightly greater among individuals with higher levels of negative affect. None of the remaining associations between the predictor variables and slope parameters exceeded .09 in absolute value. As a set, positive/negative affect and education accounted for very little of the individual variability in rates of change in optimism (4.5%) and pessimism (0.7%).

Hypothesis 1d posited that optimism and pessimism should demonstrate maturational changes over time reflecting better adjustment in a manner consistent with findings regarding other personality constructs (e.g., Mroczek & Spiro, 2003; Srivastava et al., 2003). To test this notion, participant age at the Wave 1 assessment was added to the LGC model. To ease

interpretation of potential associations between age and rates of change in optimism and pessimism, age was median-centered at 36 years (M = 37.74) to provide a meaningful zero point. Correlations suggested small but statistically significant associations between age and initial levels of optimism (.10) and pessimism (-.10). However, these associations did not remain statistically significant after controlling for positive/negative affect and education. Regardless of whether the control variables were included in the model, age did not linearly influence rates of change in optimism (β = -.04 and -.06 with and without controls, respectively) or pessimism (β = .05 regardless of whether controls were included).

A second analysis examined whether age related to the growth parameters in a nonlinear manner by including the squared term for age. Without including the set of control variables, age associated positively (.13) and significantly with initial levels of optimism. In addition, the linear (-.21) and nonlinear (.15) influence of age significantly predicted initial levels of pessimism. Neither the linear nor squared age terms associated significantly with rates of change in optimism and pessimism. After controlling for positive/negative affect and education, none of growth parameters associated significantly with age in either a linear or nonlinear fashion. The full set of predictors accounted for only 28% of the variance in initial levels of optimism (R^2 = .275) and pessimism (R^2 = .279) and even smaller proportions of the individual variability in rates of change in optimism (4.8%) and pessimism (1.6%) over time. Collectively, these findings provide no support for *Hypothesis 1d* in that age never influenced the slope parameters and associated very weakly with initial levels, with the associations diminishing after controlling for positive/negative affect and education. These findings suggest that changes in optimism/pessimism over time did not result from a maturational

effect linked with age. This finding raises interesting questions regarding the potential influence of life event experiences on changes in optimism/pessimism.

Life Events, Affect, and Optimism/Pessimism

Before examining whether life event experiences predict changes in optimism and pessimism, it was necessary to determine whether stable individual characteristics prospectively predict the experience of life events. In addition, it was important to assess whether the experience of particular life events reflects a stable process. That is, whether individuals continually experience positive life events or negative life events over time. Findings reported by Headey and Wearing (1989) suggested that certain types of life events occur more often for certain types of individuals. For example, people who experience many positive events at one point in time are likely to experience many positive events in the future. Headey and Wearing's findings indicated that affect was a likely explanation for why certain people continually experience certain types of events. Specifically, their findings indicated that people with high levels of negative affect were more likely to experience or recall experiencing negative life events in the future. To examine these potential associations a series of analyses examined associations between total numbers of positive and negative life events over time and whether other study variables (positive/negative affect, optimism/pessimism) could adequately explain why certain people are more likely to experience certain types of life events.

A first step in these analyses involved correlating the total numbers of positive and negative life event experiences reported at each assessment over time to determine whether events experienced at one point in time related to the experience of similar events in the future. Results from this analysis were generally consistent with previous findings in that the

total number of positive life event experiences at any given assessment correlated significantly (ranging from $r = .15$ to $r = .31$) with the total number of positive life event experiences at all other study waves. Similarly, the total number of negative life events reported at any given wave correlated significantly (ranging from $r = .18$ to $r = .33$) with the total number of negative life events reported at all other assessments. Results were less clear regarding the co-occurrence of positive and negative life events at any given time in that the correlations between positive and negative event totals were statistically significant only at the first ($r = .09$) and fourth ($r = .10$) assessments. In addition, correlations between positive life event experiences at any given assessment and negative life event experiences at all other assessments were often not statistically significant and generally small in magnitude (all rs < .11). These findings suggest that certain people do experience specific types of life events more so than do other people but the reason for the association is unclear. The following analyses attempted to determine whether other constructs of interest in the current study could account for the associations between specific types of life event experiences.

A series of linear regression analyses examined whether levels of formal education at Wave 1 predicted concurrent and subsequent total counts of positive and negative life event experiences. Education related consistently to the experience of positive life events such that those with higher levels of education also reported experiencing greater numbers of positive life events. However, education accounted for only 2.4% of the variance in positive life events at Wave 1 and accounted for a similar proportion (2.8%) of the variance at Wave 2. The influence of education then decreased over time explaining only 1.9% and less than 1% of the variance in total positive life event experiences at Waves 3 and 4, respectively. Interestingly, levels of formal education at Wave 1 did not relate consistently to the total

number of negative life event experiences across time. In fact, education did not significantly predict total number of negative life events at Waves 1, 2, and 4. Although higher levels of education associated significantly with experiencing fewer negative life events at Wave 3, education accounted for less than 1% of the variance in negative life event experiences.

Previous research findings suggest that high levels of negative affectivity prospectively predict the occurrence of negative life event experiences (Headey & Wearing, 1989). To examine this possibility, a second set of linear regression analyses tested whether levels of positive and negative affect at Wave 1 predicted total numbers of later positive and negative life events. Higher levels of positive affect related significantly to greater numbers of positive life event experiences at Waves 3 and 4 and to fewer negative life event experiences at Wave 4; however, in all three cases positive affect accounted for less than 1% of the variability in positive and negative life event experiences. High levels of negative affect related significantly only to a greater number of negative life event experiences at Wave 3 but again, the proportion of variance in total number of negative life events accounted for by negative affect was small (1.8%). These results are somewhat compatible with previous findings but the pattern of associations between positive/negative affect and positive/negative life event experiences observed in the present data was inconsistent and the strength of these associations was much weaker than previous research findings suggest.

Additional analyses examined whether optimism and pessimism at Wave 1 predicted subsequent experiences of positive and negative life events. In these analyses, latent variables representing optimism and pessimism at Wave 1 were used to predict the total number of positive and negative life event experiences at subsequent study waves. Optimism did not relate significantly to the experience of life events at any of the study waves. High levels of

pessimism did significantly predict fewer positive life events at Wave 2 (R^2 = .018) and greater numbers of negative life event experiences at Wave 3 (R^2 = .013), but pessimism was unrelated to the total numbers of positive and negative life events at the remaining study waves.

A final set of analyses added positive and negative affect to the latent variable model containing optimism and pessimism to determine whether Wave 1 levels of the four constructs uniquely predicted subsequent life event experiences. Results were generally consistent with those discussed above in that positive affect continued to predict the total numbers of positive events at Wave 3 and negative events at Wave 4. Similarly, the association between negative affect and total number of negative events at Wave 3 remained statistically significant. Wave 1 levels of optimism did not relate uniquely to the number of life event experiences at subsequent study waves and levels of pessimism at Wave 1 were only associated uniquely with the total number of positive events at Waves 2 and 4. As a set of predictors, Wave 1 levels of positive/negative affect, optimism, and pessimism explained less than 2.7% of the variance in total numbers of subsequent positive and negative life event experiences.

Taken together, the results presented above do not provide evidence for strong and consistent associations between initial levels of positive/negative affect or optimism/pessimism and subsequent life event experiences. When associations did occur, the strength of the relationship was typically quite small, suggesting that the future experience of positive or negative life events is not largely determined by personality constructs. These findings are very important for establishing potential prospective relationships between life event experiences and changes in optimism or pessimism. A plausible alternative explanation

for such relationships would suggest that optimistic individuals are simply more likely to experience positive life events and less likely to experience negative life events, or that pessimistic individuals are simply less likely to experience positive life events and more likely to experience negative life events. However, weak and inconsistent associations between optimism/pessimism and the experience of future life events observed in these data do not provide much support for this alternative explanation.

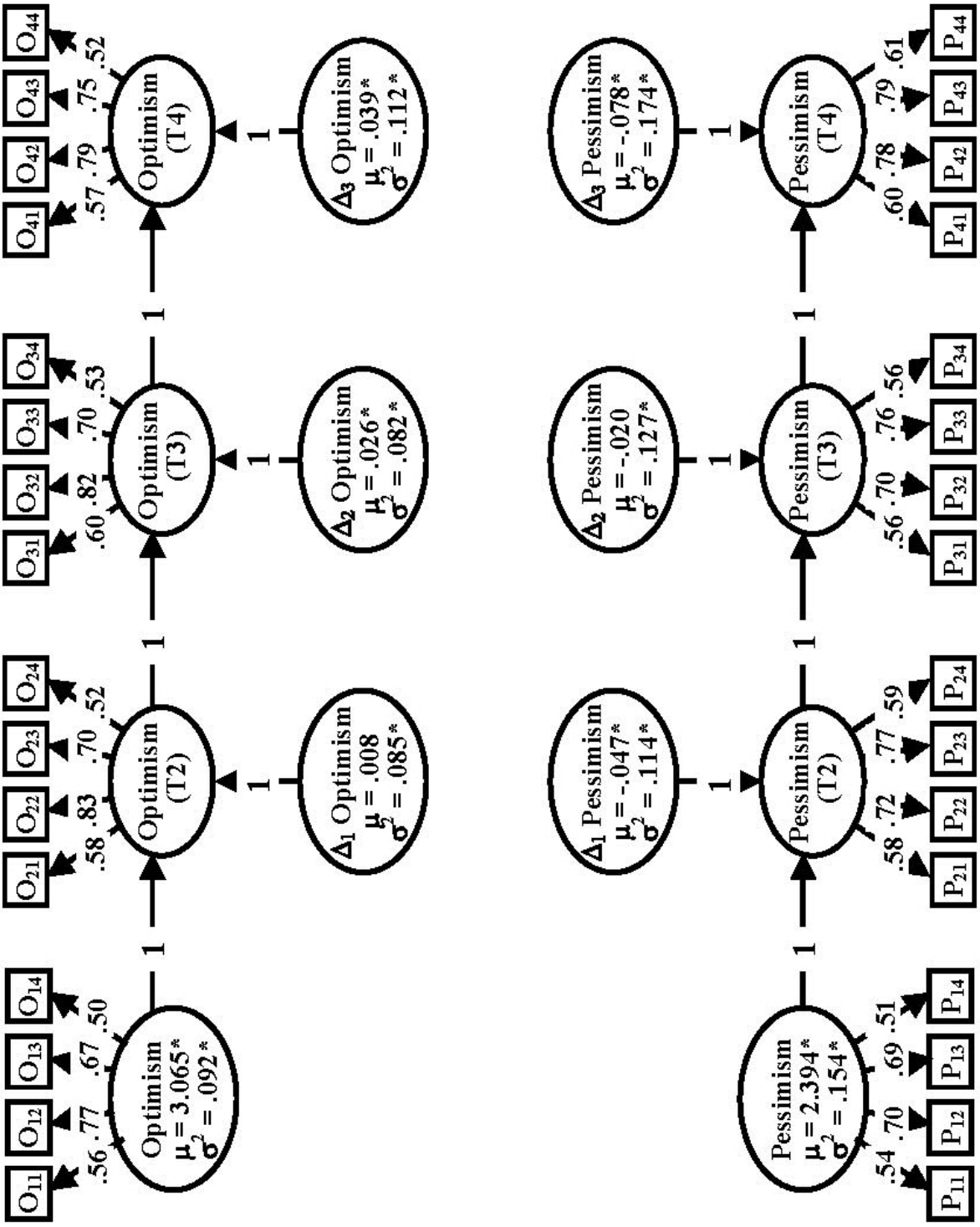
To examine whether positive and negative life events predict changes in optimism and pessimism, the τ-equivalent LCFA model was modified to capture latent differences on both constructs between assessments. The latent difference score (LDS) model added six additional second-order latent variables reflecting differences in latent levels of optimism and pessimism between Waves 1-2, Waves 2-3, and Waves 3-4. Structural constraints in the LDS model specified that each first-order latent variable was predicted perfectly by the first-order latent variable at the preceding time[1]. For example, latent levels of pessimism at the second assessment were predicted perfectly by latent levels of pessimism at the first assessment and the latent difference in pessimism between the two assessments. Therefore, residual variances for the first-order latent variables at Waves 2-4 were fixed to zero. The first-order latent means for these assessments were also constrained to equal zero. However, the second-order latent means for the differences in optimism and pessimism were freely estimated. Model specification allowed estimation of all possible correlations among the second-order

[1] McArdle (2001) and colleagues (e.g., Hamagami & McArdle, 2001) proposed an alternative bivariate latent difference score (BLDS) model that accounts for coupling (e.g., links between the change in pessimism at one point in time and the level of optimism at the preceding point in time) between constructs over time. Although intuitively appealing, the BLDS model has not been extended to models with first-order latent variables. Attempts to fit the BLDS model in the current study were unsuccessful, yielding growth parameter estimates that lacked straightforward interpretations. However, estimates of the second-order latent change scores obtained from the BLDS model did not differ appreciably from those obtained using the LDS model presented in Figure 4.

latent differences as well as correlations between the second-order differences and the first-order optimism and pessimism variables at Wave 1 (i.e., the initial levels of optimism and pessimism). Because the LDS model simply reflects a different but equivalent parameterization of the τ-equivalent LCFA model, the fit of the LDS and τ-equivalent LCFA model is identical (see p. 91).

Figure 4 presents a graphical depiction of the LDS model including estimated means and variances for both initial levels and latent differences in optimism and pessimism. As shown in the figure, average initial latent levels of optimism and pessimism remained unchanged from those presented for the τ-equivalent LCFA model. Examination of the means for the latent differences in optimism and pessimism indicates a pattern very consistent with the plotted first-order latent means in Figures 2a and 2b. Specifically, the change in optimism between Waves 1 and 2 was not statistically significant (0.008), indicating that levels of optimism did not increase on average across these two assessments. However, the latent differences between Waves 2 and 3 (0.026) and between Waves 3 and 4 (0.039) were both statistically different from zero and positive, indicating that average levels of optimism increased across both periods. Alternatively, the latent difference in pessimism between Waves 1 and 2 was significant and negative (-0.047), indicating an average decrease over the two-year span. The average difference in pessimism between Waves 2 and 3 was also negative but not statistically different from zero (-0.020), indicating that the decrease observed between Waves 1 and 2 slowed (i.e. flattened out) between Waves 2 and 3. However, the difference in pessimism between Waves 3 and 4 was statistically significant and negative (-0.078), indicating that the decrease observed between Waves 1 and 2 resumed between Waves 3 and 4.

Figure 4. Parameter Estimates from the LDS Model



Results from the LDS model also point to where the lack of fit occurred for the linear growth processes specified in the LGC. Specifically, a linear trajectory in the latent means for optimism or pessimism should result in latent difference scores that are approximately equal in magnitude over time (i.e., $\Delta_{(T1, T2)} = \Delta_{(T2, T3)} = \Delta_{(T3, T4)}\ldots$), whereas unequal latent differences are consistent with a nonlinear trajectory. One potential explanation for the unequal differences in optimism/pessimism over time involves the different lengths of time between the assessments over which change could occur. For example, the lack of significant change in optimism between the first two assessments may stem from the shorter two-year interval, whereas the subsequent significant changes in optimism occurred over comparatively longer three-year intervals. Although differences in time intervals between assessments might have contributed to the patterns of change in optimism, such an explanation for the changes in pessimism is less compelling because significant changes occurred over both the two- and three-year assessment intervals.

Correlations between initial levels of optimism and pessimism and the latent differences are presented in Table 8. Consistent with previous findings, initial levels of optimism and pessimism correlated moderately (-.31). Initial levels of optimism also correlated significantly with the changes in optimism between Waves 1 and 2 (-.44) and Waves 2 and 3 (-.14), indicating that increases in optimism over these two assessments were smaller among those with higher initial levels. Similarly, initial levels of pessimism correlated with changes between Waves 1 and 2 such that those with higher initial levels tended to change less over the two-year span. Two particularly interesting aspects of these associations deserve attention. First, although initial levels of optimism and pessimism related moderately to changes over Waves 1 and 2 (-.44 and -.42, respectively), initial levels

did not associate strongly with changes between the later assessments. This finding suggests that initial levels of optimism and pessimism did not relate strongly to changes later in time or that the association dissipated over time. The second important point involves correlations among the changes in optimism and pessimism shown in the upper and lower halves of the diagonal in Table 8. In all cases, the associations are statistically significant and negative, indicating that larger changes between any two assessments associate with smaller changes between any other two assessments. For example, individuals who experienced a dramatic change in pessimism between Waves 1 and 2 were less likely to experience large changes between Waves 2 and 3 (-.49) or between Waves 3 and 4 (-.50).

Table 8. *Correlations among Initial Levels of and Changes in Optimism and Pessimism between Assessments*

	(O_0)	(ΔO_1)	(ΔO_2)	(ΔO_3)	(P_1)	(ΔP_1)	(ΔP_2)	(ΔP_3)
(O_0)								
(ΔO_1)	-.44*							
(ΔO_2)	-.14*	-.33*						
(ΔO_3)	-.04	-.13*	-.39*					
(P_0)	-.31*	.12	-.06	.12*				
(ΔP_1)	.08	-.21*	.18*	-.10	-.42*			
(ΔP_2)	-.01	.07	-.29*	.20*	-.03	-.49*		
(ΔP_3)	.04	.01	.09	-.41*	.07	.16*	-.50*	

Note: O = Optimism, P = Pessimism; Δ indicates a latent difference. Subscripts indicate Time 1 (0) and the spans between Times 1-2 (1), Times 2-3 (2), and Times 3-4 (3).
* $p < .05$

Of particular interest from the results for the LDS model, all of the variances for the latent differences were statistically significant indicating that changes in optimism and pessimism between assessments differed across individuals. For example, individual variability around the average decrease in pessimism between Waves 1 and 2 indicates that the change may have been large or small for some individuals and nonexistent or in the reverse direction for others. This significant individual variability allows for the examination of individual characteristics (e.g., demographics, personality, and life event experiences) that might predict changes in optimism and pessimism.

Affect and Education as Predictors of Change

Preliminary analyses added positive/negative affect and level of education to the LDS model to examine whether personality and demographic characteristics could account for the differences in optimism and pessimism between assessments. Results were consistent with findings reported earlier regarding associations between the control variables and initial levels of optimism and pessimism. Specifically, positive ($\beta = .34$) and negative ($\beta = -.28$) affect significantly predicted initial levels of optimism accounting for 24% of the initial level variance. Alternatively, only negative affect ($\beta = .34$) and education ($\beta = -.29$) related significantly to initial levels of pessimism accounting for a similar 24% of the initial level variance. Levels of education did relate significantly to changes in optimism between Waves 2 and 3 ($\beta = .10$) and between Waves 3 and 4 ($\beta = -.10$). These small associations indicate that changes in optimism among those with higher levels of education were slightly larger between Waves 2 and 3 and slightly smaller between Waves 3 and 4 than the changes experienced by individuals with lower levels of education. Aside from these two associations, the control variables did not significantly predict the remaining changes in

optimism and pessimism. As a set, positive/negative affect and education accounted for less than 1.4% of the variance in the latent changes in optimism and pessimism.

Life Event Influences on Levels of Optimism and Pessimism (Hypotheses 2a – 2d)

The second goal of this research focused on whether optimism and pessimism change in response to the experience of major life events. Preliminary analyses to examine this possibility added a number of variables to the LCFA model and retained positive/negative affect and education as control variables. Positive and negative affect scores were mean-centered to move the natural zero point (i.e., answering 'no' to every item) to a more realistic value at the sample mean for each measure. It is important to note that mean centering does not alter associations between variables but does assist in the interpretation of model results. To capture cumulative life event experiences, a *life events* index was created by subtracting the total number of negative events from the total number of positive events at each assessment. Descriptive information for the *life events* index is presented in Table 9.

Table 9. *Descriptive Statistics for the Life Events Index*

	M	*SD*	*Mdn.*	*Mode*	*Min*	*Max*	Zero (*N*)
Life events (Time 1)	-1.38	2.08	-1	0	-13	2	227
Life events (Time 2)	-0.82	1.78	-1	0	-13	3	212
Life events (Time 3)	-1.69	2.22	-1	0	-14	3	175
Life events (Time 4)	-1.20	1.77	-1	0	-8	2	220

Note: Values in the last column indicate the number or respondents either who experienced no life events, or who experienced equal numbers of positive and negative life events.

As shown in the last column of the table, a substantial proportion of respondents received a score of zero at each assessment. However, it is important to note that a zero does not necessarily indicate the absence of any life event experiences. Although cases that did not experience any life events at a particular assessment did receive a score of zero, respondents who experienced an equal number of positive and negative life events at any assessment also received a zero on the *life events* index. Therefore, the analysis included an additional dichotomous variable (*equal events*) to differentiate those who experienced no events (coded 0) and those who experienced equal numbers of positive and negative events (coded 1) at each assessment. Although interest in these analyses involved reactive changes in optimism and pessimism as a function of life event experiences, levels of optimism and pessimism at each assessment were regressed on both proximal and distal life event experiences that occurred before a particular assessment and on levels of optimism/pessimism reported at the previous assessment. For example, levels of pessimism at Wave 3 were predicted by all life events that occurred before Wave 3, including those reported at Waves 1, 2, and 3 after controlling for levels of optimism/pessimism reported at Wave 2.

Initial results indicated few statistically significant associations between life event experiences and levels of optimism and pessimism. Total number of life events reported at Wave 1 did associate negatively (-.10) with initial levels of pessimism, indicating that those who experienced more positive events than negative events reported slightly lower levels of pessimism at the first assessment. In addition, the total number of life events reported at Wave 2 associated negatively (-.13) with levels of pessimism at Wave 2, indicating that those who reported a greater number of positive life events at the Wave 2 assessment also reported lower levels of pessimism after controlling for the influence of life events, optimism, and

pessimism at Wave 1. These preliminary findings provide limited support for *Hypotheses 2a* and *2b* but associations between life event experiences and levels of optimism/pessimism were not overwhelmingly consistent. Although the significant linear associations discussed above suggest support for *Hypothesis 2c* regarding additive influences due to multiple same-valenced event experiences, the pattern of associations was not definitive.

Of particular interest, the variable comparing those who experienced equal numbers of life events with those who experienced no life events at a particular assessment related significantly to levels of optimism at Wave 2 and levels of pessimism at Wave 4. In both cases, the association was negative indicating that those who experienced equal numbers of life events reported lower levels of optimism and pessimism than did those who experienced no life events at Waves 2 and 4, respectively. Although not statistically significant, those who experienced equal numbers of positive and negative life events also tended to report higher levels of optimism at Wave 4 than did individuals who experienced no life events at that assessment. Each of these associations corresponded to what Cohen (1988) termed a small effect (ranging from $d = 0.22$ to 0.25) when expressing mean differences between groups on a standard deviation metric. These findings are not consistent with *Hypothesis 2d* regarding competing reactive influences following oppositely-valenced event experiences in that the influence of particular positive or negative events seems to outweigh the influence of other event experiences.

A second preliminary analysis added nonlinear (i.e., squared) terms for the *life events* index to examine whether life event experiences multiplicatively influence levels of optimism and pessimism. Addition of the nonlinear terms did not change the associations reported above for the linear (i.e., additive) influences of life events on optimism and

pessimism. However, only the squared term at Wave 4 related significantly to levels of optimism and pessimism, such that those who experienced greater numbers of positive events during the year prior to the Wave 4 assessment tended to report lower levels of pessimism than did those who experienced fewer numbers of positive life events. This single association accounted for an increase of only 1.3% of the total variance in levels of pessimism at Wave 4. Given that no other squared terms for the *life events* index associated significantly with levels of optimism and pessimism and that the single observed association was very small, subsequent analyses did not include nonlinear (i.e., multiplicative) life event influences.

Because the preliminary analyses examined cumulative influences due to total life event experiences, it is possible that influences due to event experiences across different domains (i.e., work, health, etc.) could effectively cancel one another out when combined into a single index. In addition, the third goal of this study focused on examining whether potential changes in optimism/pessimism following life event experiences are followed by an adaptive return to pre-event levels over time. The most direct way to assess this possibility involves separating out individuals who did not experience any life events at Wave 1, reported experiencing positive or negative events at Wave 2, and then experienced no other events at Waves 3 or 4. Unfortunately, attempts to isolate such a group were unsuccessful when considering events across all domains. For example, separation of respondents who exhibited this pattern of life event experiences using the cumulative *life events* index resulted in identification of only nine cases. In addition, attempts to isolate a comparison control group that reported no life event experiences across the study period identified only three individuals when using the *life events* index. Therefore, reactive and adaptive changes related to life event experiences were examined separately within particular domains. Although this

approach does not allow for control of potential influences due to experiences of events in different domains, it is consistent with the approach used to examine reactive and adaptive changes in SWB following life event experiences (e.g., Frederick & Loewenstein, 1999; Lucas, 2005, 2007a; Lucas et al., 2003, 2004; Oswald & Powdthavee, 2006). The general modeling approaches used to examine reactivity and adaptation are discussed next, followed by presentation of results within each domain separately.

Testing Reactivity and Adaptation (Hypotheses 3a – 3d)

To examine reactive changes in optimism and pessimism, total counts of positive and negative life events at each assessment within each domain were added to the LDS model. For domains in which only negative life events were assessed (i.e., self health, other health, and victimization), the reactivity model included only total counts of negative events. For the domains in which positive and negative life events were assessed (i.e., financial, work, and relationship), the reactivity model included total counts of positive events, total counts of negative events, and the interaction term involving the total number of positive and negative events. In order to control for distal influences, the reactivity models for all domains also included lagged terms such that the latent difference between any two assessments was predicted by events in the year before that assessment and events reported in the year before the prior assessment. For example, the latent change in optimism between Waves 3 and 4 was predicted by event experiences reported in the 12 months preceding both the Wave 3 and Wave 4 assessments. Finally, the reactivity models retained positive/negative affect and education as statistical controls. In simplified terms (i.e., holding the controls constant at the sample mean and median level of education), the reactivity model in domains for which positive and negative items were assessed is:

$$\Delta Y_{(t,\, t+1)} = \alpha + \beta_1(\textit{positive events}) + \beta_2(\textit{negative events}) + \beta_3(\textit{Positive*Negative}),$$

where $\Delta Y_{(t,\, t+1)}$ reflects the change in optimism or pessimism between two adjacent assessments and α reflects the intercept (i.e., mean) of the latent change. Note that the reactivity model in domains including only negative events is identical but does not include indicators of positive events or the interaction term. When both predictors equal zero in the above equation, the intercept for each latent change reflects the average latent change for individuals who experienced no life events. When *negative events* equals zero and *positive events* equals one, the average latent difference for those who experienced only a positive event becomes ($\alpha + \beta_1$) and the statistical test of β_1 compares this group to those who reported no life event experiences. Similarly, when *positive events* equals zero and *negative events* equals one, the average latent difference for those who experienced only a negative event becomes ($\alpha + \beta_2$) and the statistical test of β_2 compares this group to those who reported no life event experiences. Finally, for individuals that reported experiencing one positive and one negative event, the interaction term becomes one and the average latent difference for these individuals becomes ($\alpha + \beta_1 + \beta_2 + \beta_3$). The statistical test of β_3 compares those who experienced both types of events to those who experienced no life events.

To examine whether adaptive changes in optimism and pessimism occur following life event experiences, groups of individuals who experienced the most appropriate sequence of life events (i.e., no event at Wave 1, events at Wave 2, and no subsequent events at Waves 3 and 4) were identified within each domain. This approach identified small groups (n = 18 to n = 56) for whom life event experiences followed the optimal pattern for assessing

adaptive processes. Unfortunately, when considering both positive and negative events in the relevant domains (i.e., financial, work, and relationship events), group sizes were too small to make meaningful comparisons. For example, of the 18 individuals who met the sequence criteria for negative financial events, only three reported the experience of a positive financial event at Waves 2-4. Therefore, potential adaptive processes following positive and negative events were examined separately in these domains.

To test competing hypotheses regarding the nature of adaptive changes following event experiences (i.e., complete vs. incomplete adaptation), a dichotomous variable (*adapt*) was added to the LDS model to contrast those with the optimal sequence of event experiences (coded 0) against the rest of the study sample (coded 1). The total count measures of life events were removed from the adaptation model due to the extremely low frequency of individuals who reported multiple same-valenced life events among those in the optimal sequence group. Therefore, initial levels and latent changes in optimism and pessimism were regressed only on group membership to determine whether the pattern of change in optimism/pessimism differed between the two groups after controlling for positive/negative affect and education. When holding the control variables constant, the adaptation model simplifies to:

$$\Delta Y_{(t,\, t+1)} = \alpha + \beta_1(adapt),$$

where $\Delta Y_{(t,\, t+1)}$ reflects the change in optimism or pessimism between two adjacent assessments and α reflects the intercept (i.e., mean) of the latent change, as in the reactivity model. However, coding individuals who experienced the optimal sequence of events as zero changes the interpretation of the intercept to reflect the average latent change in optimism/pessimism among those in the optimal sequence group. The statistical test of α

indicates whether the average change among these individuals differs significantly from zero. Alternatively, the average change for the rest of the study sample becomes ($\alpha + \beta_1$) and the test of β_1 indicates whether changes in optimism/pessimism differ between the two groups. Finally, to test whether changes following life event experiences were more consistent with complete or incomplete adaptation, a linear constraint [$\alpha_3 = (\alpha_1 + \alpha_2)$; or $\alpha_2 = (-1 * \alpha_1)$ if more appropriate] was placed on the intercepts of the latent differences in optimism and pessimism. This constraint specified that the average latent difference between Waves 3 and 4 among those in the optimal event sequence group equaled the sum of the changes that occurred between Waves 1 and 2 and between Waves 2 and 3. For example, if the latent change in optimism following a negative event at Wave 2 is equal to –0.50 and the latent change during the adaptive recovery period between Waves 2 and 3 is equal to +0.50, then the latent difference in optimism between Waves 3 and 4 should equal zero [$\alpha_3 = (-0.50 + 0.50)$] if complete recovery occurs. Alternatively, if the latent change in optimism at Wave 2 is equal to –0.50 and the latent change during the adaptive recovery period between Waves 2 and 3 is equal to +0.25, then the latent difference in optimism between Waves 3 and 4 would not equal zero [$\alpha_3 = (-0.50 + 0.25)$], indicating that adaptive recovery is incomplete. Evidence supporting incomplete adaptation existed if the appropriate constraint placed on the difference score intercepts significantly reduced the fit of the adaptation model.

Reactivity and Adaptation following Personal Health Events

Health-related negative life events (e.g., a severe illness) did not consistently influence initial levels of or changes in optimism and pessimism. The only statistically significant association involved a lagged influence due to life events reported before Wave 3 on decreases in optimism between Waves 3 and 4 (d = -0.27). However, optimism increased

significantly (d = 0.20) on average among those who did not experience a negative health event during the same period, suggesting that negative health events might contribute to changes in levels of optimism. The lagged nature of this potential effect is interesting in that it could reflect an eventual decline in optimism 3 – 4 years after a severe illness/injury, as chronic conditions worsen.

Figures 5a and 5b present plots of the average trajectories for optimism and pessimism for those who reported the optimal event sequence (n = 30) and the rest of the sample. As shown in Figure 5a, changes in optimism among those who experienced only a negative event at Wave 2 closely mirror changes for the rest of the sample. Consistent with this interpretation, no statistically significant differences between the two groups were observed regarding changes in optimism.

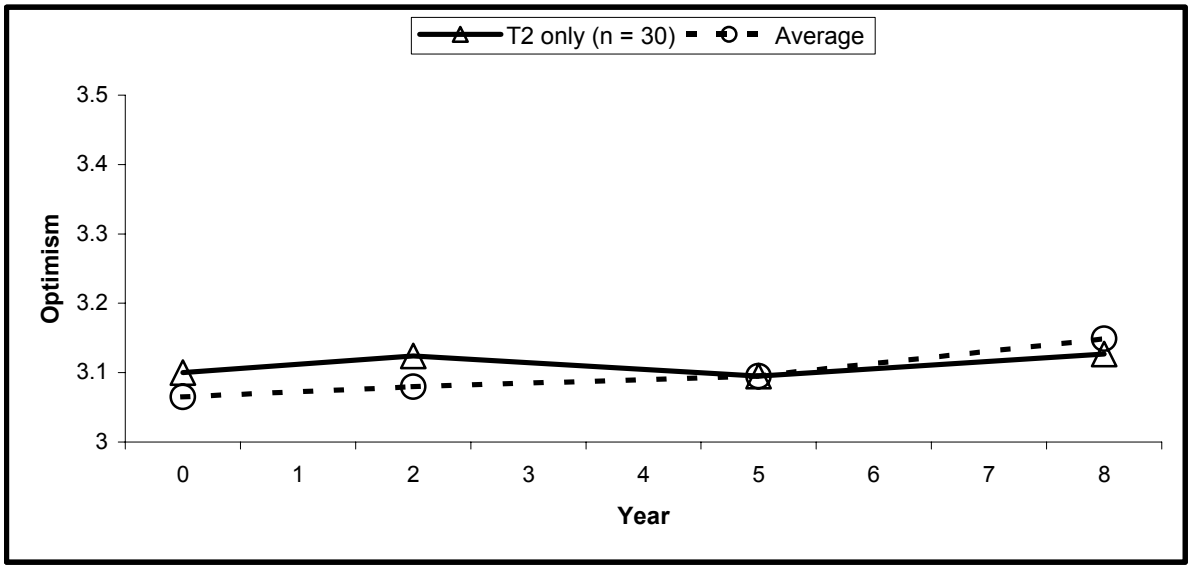


Figure 5a. Adaptive Trend in Optimism following Personal Illness/Injury

The trajectory for pessimism shown in Figure 5b indicates a clear departure from the general trend among those who experienced a negative health event in the year before the Wave 2 assessment. Levels of pessimism did not change on average between Waves 1 and 2 among

those who experienced a negative health event before Wave 2. Although not statistically significant, pessimism did increase on average (d = 0.27) among these individuals between Waves 2 and 3. Most notably, the average decline in pessimism between Waves 3 and 4 was statistically significant and moderate (d = -0.46) in size. Comparison of the average level of change between Waves 3 and 4 against changes between previous assessments indicated no statistically significant difference, suggesting that the adaptive recovery in pessimism following experience of a negative health event was complete.

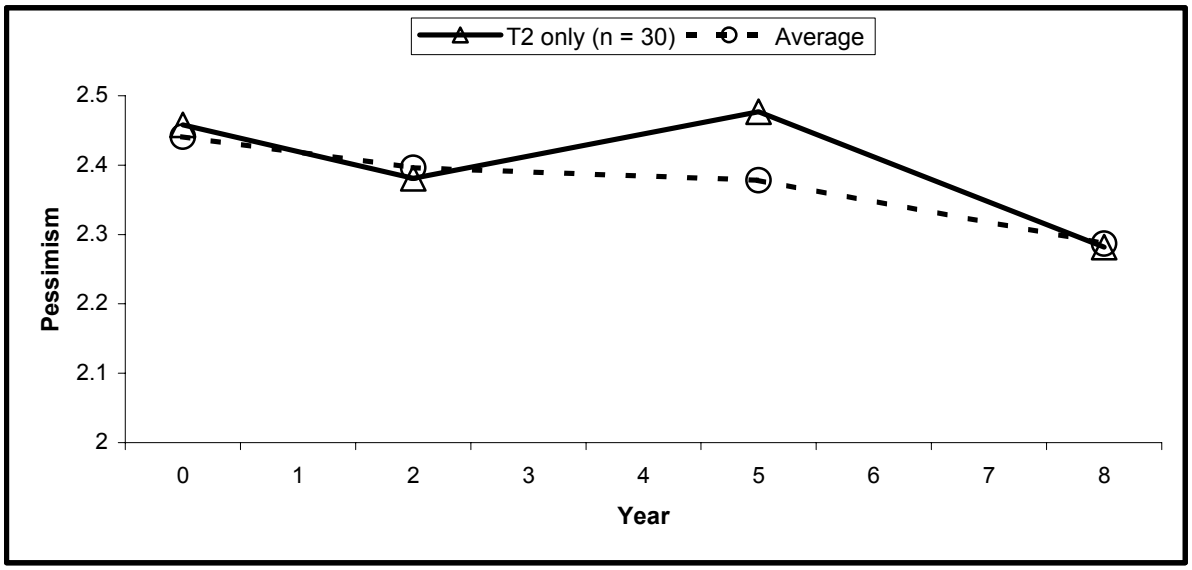


Figure 5b. Adaptive Trend in Pessimism following Personal Illness/Injury

Reactivity and Adaptation following Health Events of Close Others

Having a close relative experience a severe illness/injury or experiencing the death of a loved one did not relate significantly to reactive changes in optimism or pessimism. Similarly, results examining adaptive changes in optimism and pessimism following such events yielded no statistically significant influences. However, the plots in Figures 6a and 6b suggest some degree of change and adaptation may have occurred. In terms of optimism, the change between Waves 1 and 2 among those who experienced a relative's illness, injury, or

death in the 12 months before the Wave 2 assessment (n = 33) corresponded to a small (d = .23) increase, which was followed by small decreases in optimism over the next six years.

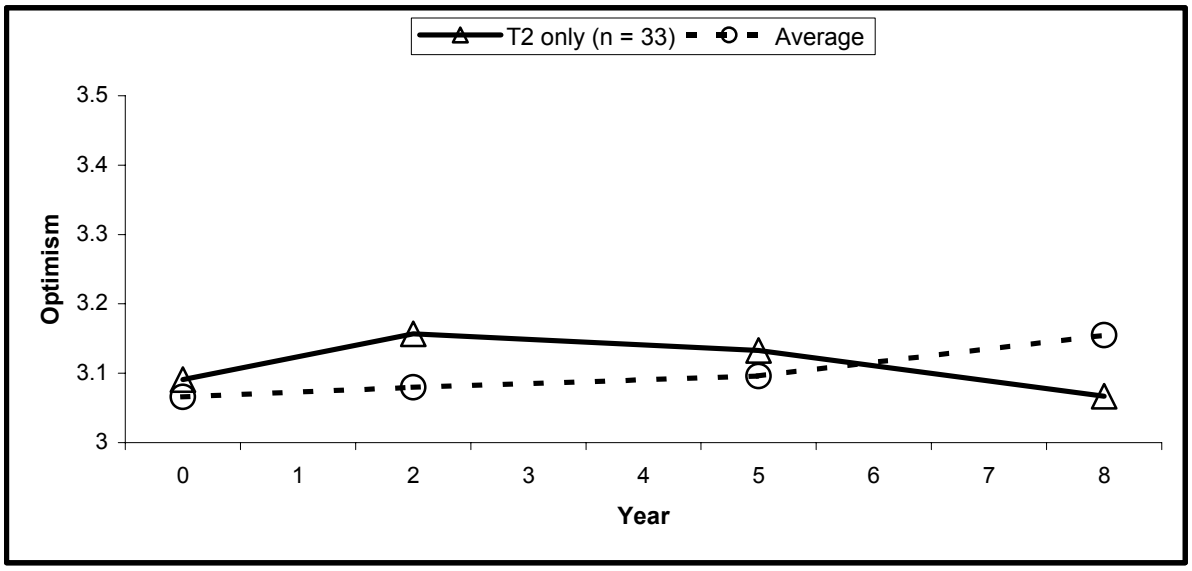


Figure 6a. Adaptive Trend in Optimism following Illness/Injury to Close Others

Similarly, average levels of pessimism increased (d = 0.20) then decreased (d = -0.20) over the same period of time. Although not statistically reliable, these differences are consistent with complete adaptive recovery.

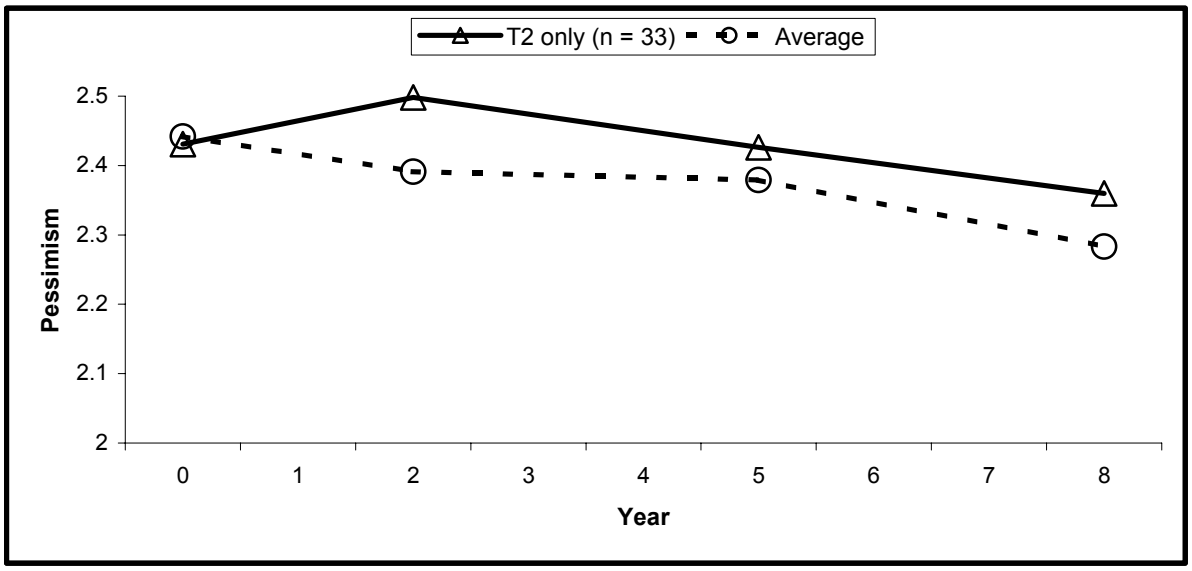


Figure 6b. Adaptive Trend in Pessimism following Illness/Injury to Close Others

Reactivity and Adaptation following Financial Events

The experience of negative financial events (e.g., eviction, moving to a worse neighborhood, etc.) did relate to changes in optimism. Negative events that occurred in the 12 months before the Wave 2 assessment exerted a lagged influence on decreases in optimism between Waves 2 and 3. In addition, the interaction between positive and negative event experiences in the 12 months before the Wave 3 assessment related to significant increases in optimism over the same period, indicating differential influence due to the experience of both types of events. This interaction also exerted a significant negative lagged influence on changes in optimism over the next three years, coupled with a significant relationship between positive financial event experiences before the Wave 3 assessment and increases in optimism between Waves 3 and 4.

Those who reported experiencing positive financial events (i.e., an improvement in financial situation) before the Wave 1 assessment reported significantly lower initial levels of pessimism. The lagged influence of positive events experienced before Wave 1 related to a significant increase (d = 0.27) in pessimism between Waves 1 and 2, whereas positive events that occurred during the year before the Time 2 assessment associated with a significant decrease (d = -0.28) in pessimism between Waves 1 and 2. Positive events that occurred between Waves 1 and 2 also exerted a positive lagged influence on changes in pessimism between Waves 2 and 3, whereas positive events that occurred before the Wave 4 assessment related significantly to decreases in pessimism between Waves 3 and 4. Generally, reactive changes in optimism and pessimism following financial life event experiences were consistent with *Hypotheses 2a* and *2b*. However, the lagged influences between event experiences and later changes in optimism/pessimism were often in the reverse direction,

suggesting potentially interesting carryover effects that might occur when financial events (e.g., an improvement to one's financial situation or a vehicle repossession) are somewhat short-lived with few long-term consequences.

As discussed above, potential adaptive changes following positive and negative financial life event experiences were examined separately due to subsample size limitations in the data. As shown in Figure 7a, the experience of positive financial life events in the 12 months before the Wave 2 assessment did not influence the trajectory of change in optimism.

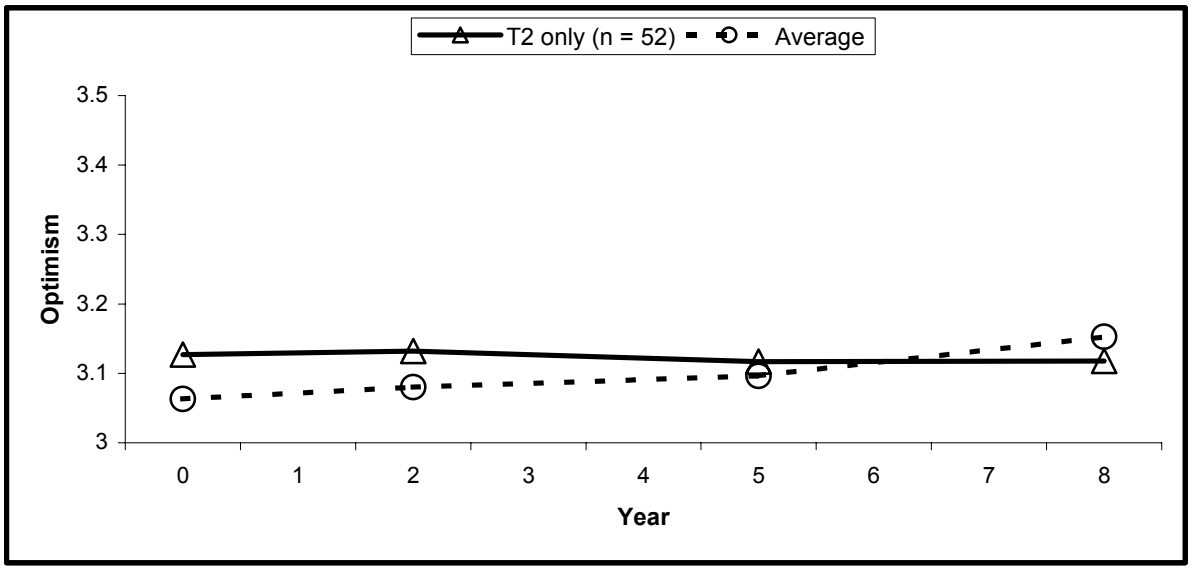


Figure 7a. Adaptive Trend in Optimism following Positive Financial Events

However, Figure 7b shows that the trajectory of change in pessimism among those in the optimal event sequence group (n = 52) was markedly different from the trajectory for the rest of the sample. Average levels of pessimism decreased significantly (d = -0.43) between Waves 1 and 2 for those who reported an improvement in their financial situation during the 12 months before the Wave 2 assessment. This decrease was followed by an approximately equal (d = 0.30) statistically significant increase in pessimism over the next three years before the trajectory of change in pessimism for these individuals returned to mirror that of

the rest of the sample. A linear constraint on the intercepts [i.e., $\alpha_2 = (-1 * \alpha_1)$] for the latent changes between Wave 1 and 2 (α_1) and between Waves 2 and 3 (α_2) did not significantly decrease the fit of the model [$\Delta\chi^2_{MLR}(1, N = 889) < 1.00$], suggesting that adaptive recovery in pessimism following the experience of positive financial events was complete.

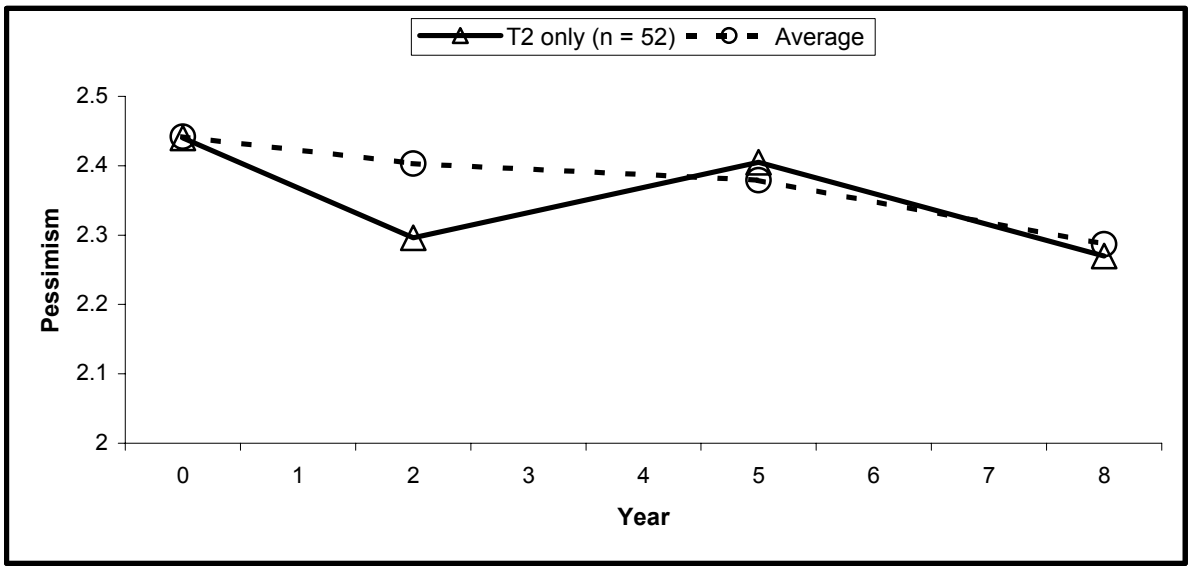


Figure 7b. Adaptive Trend in Pessimism following Positive Financial Events

Negative financial events appear to influence changes in both optimism and pessimism, as shown in Figures 8a and 8b. Average levels of optimism did decrease among those who experienced a negative financial event only in the year before the Wave 2 assessment ($n = 18$) but the decrease was small ($d = -0.18$) and not statistically significant. This decrease was followed by a moderate ($d = 0.56$) and statistically significant increase in optimism over the next three years before realigning with the average optimism trajectory. Average levels of pessimism also increased moderately ($d = 0.38$) between Waves 1 and 2 among those in the optimal event sequence group. This increase was followed by decreases in pessimism over the next six years. Although negative financial events seem to influence changes in optimism and pessimism in a manner that is consistent with reactive and adaptive

processes, it is important to note that group comparisons are based on very few individuals. Given that most of these relationships were not statistically reliable, it is quite likely that the limited amount of information for the optimal sequence group resulted in overestimation of effect sizes.

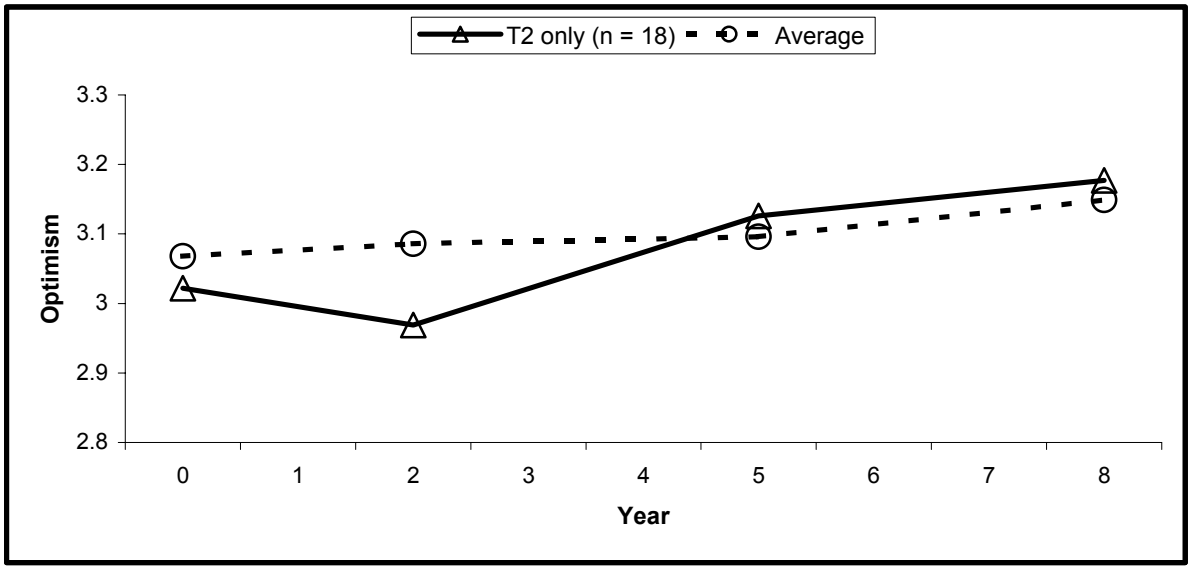


Figure 8a. Adaptive Trend in Optimism following Negative Financial Events

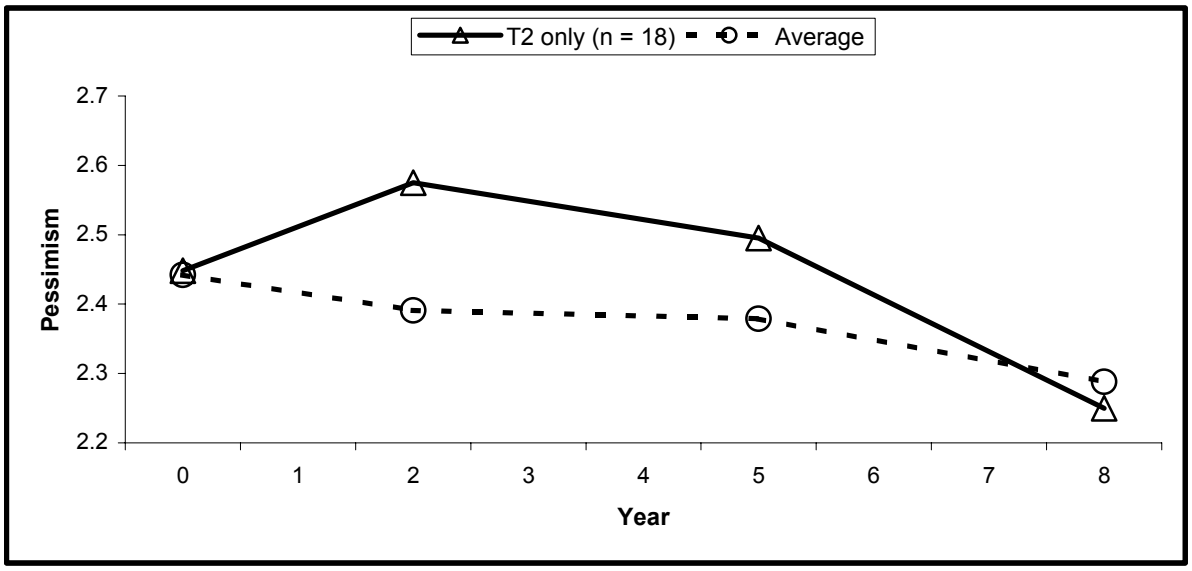


Figure 8b. Adaptive Trend in Pessimism following Negative Financial Events

Reactivity and Adaptation following Work-related Events

Work-related life events did not associate significantly with initial levels or changes in optimism. However, positive (i.e., a positive employment change) and negative work events (e.g., being fired or taking a cut in wages) in the 12 months before Wave 1 did significantly predict initial levels of pessimism. Specifically, average levels of pessimism were significantly lower among those who reported positive work event experiences and significantly higher among those who reported negative work event experiences. In addition, negative work events that occurred before the initial assessment also exerted a significant but small (d = -0.15) negative lagged influence on changes in pessimism between Waves 1 and 2. Experiencing positive work events in the year prior to the Wave 2 and Wave 4 assessments also related significantly to decreases in pessimism between Waves 1 and 2 and between Waves 3 and 4, respectively (both ds = -0.20).

Plots shown in Figures 9a and 9b clearly indicate that positive work event experiences did not influence changes in optimism and pessimism. Generally, changes in optimism and pessimism among those in the optimal event sequence group (n = 56) do not deviate from the average trajectory for the rest of the sample. One potential exception to this pattern involves the changes in optimism and pessimism that occurred between Waves 3 and 4. Although not statistically significant, average levels of optimism and pessimism increased (d = 0.20) and decreased (d = -0.23), respectively, for the rest of the sample. The corresponding changes in optimism and pessimism among those in the optimal event sequence group were much smaller (both ds < .08), suggesting possible influences due to event experiences in other domains during the same period of time.

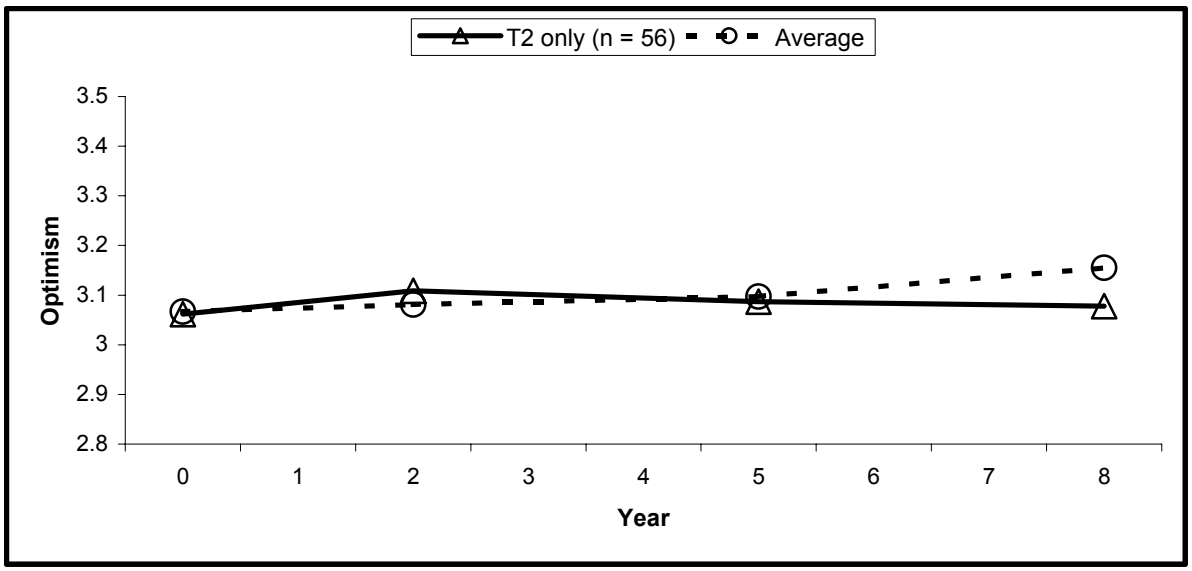


Figure 9a. Adaptive Trend in Optimism following Positive Work Events

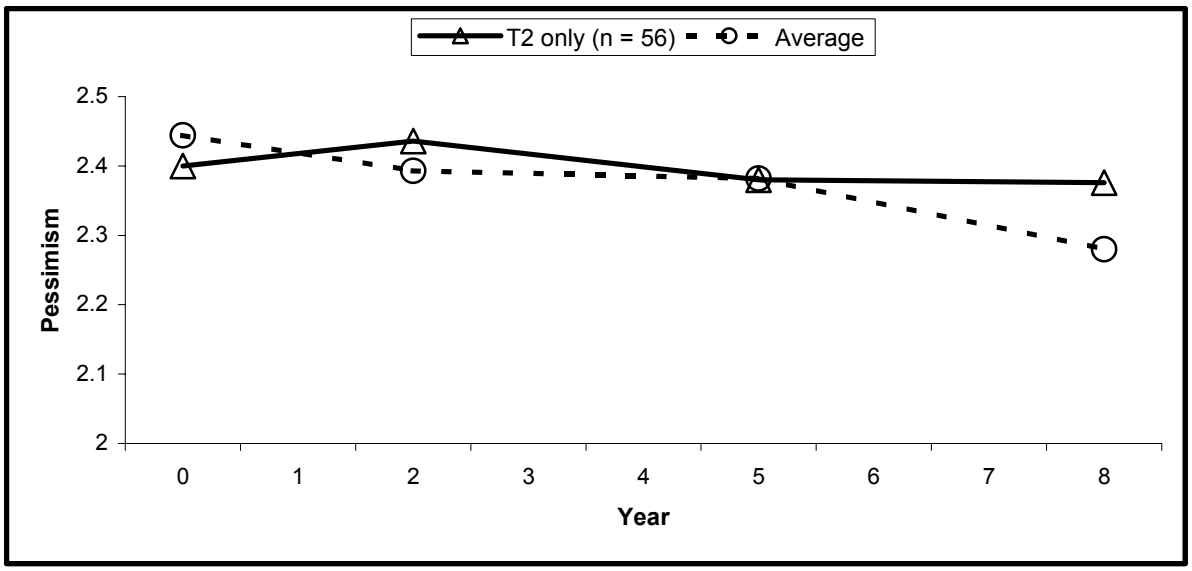


Figure 9b. Adaptive Trend in Pessimism following Positive Work Events

Although positive events did not relate strongly to changes in optimism and pessimism, the plots presented in Figures 10a and 10b suggest that negative work-related events may have influenced changes in optimism but not in pessimism. As shown in Figure 10a, average levels of optimism decreased (d = -0.21) between Waves 1 and 2 among those whose only negative work event experience occurred in the 12 months before the Wave 2

interview (n = 33). This decrease was followed by a slightly larger increase (d = 0.29) over the next three years but neither change was statistically significant. A linear constraint testing the equality of the changes between Waves 1 and 2 and between Waves 2 and 3 did not reduce the fit of the model [$\Delta\chi^2_{MLR}(1, N = 889) < 1.00$], indicating that adaptive recovery was complete if the changes were due to reactive and adaptive processes.

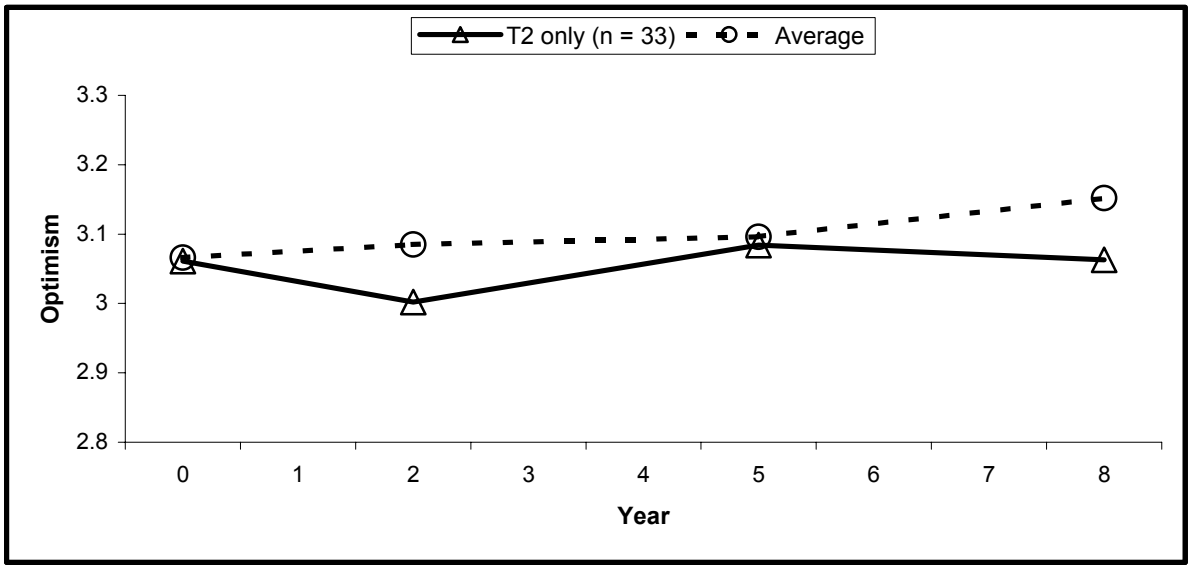


Figure 10a. Adaptive Trend in Optimism following Negative Work Events

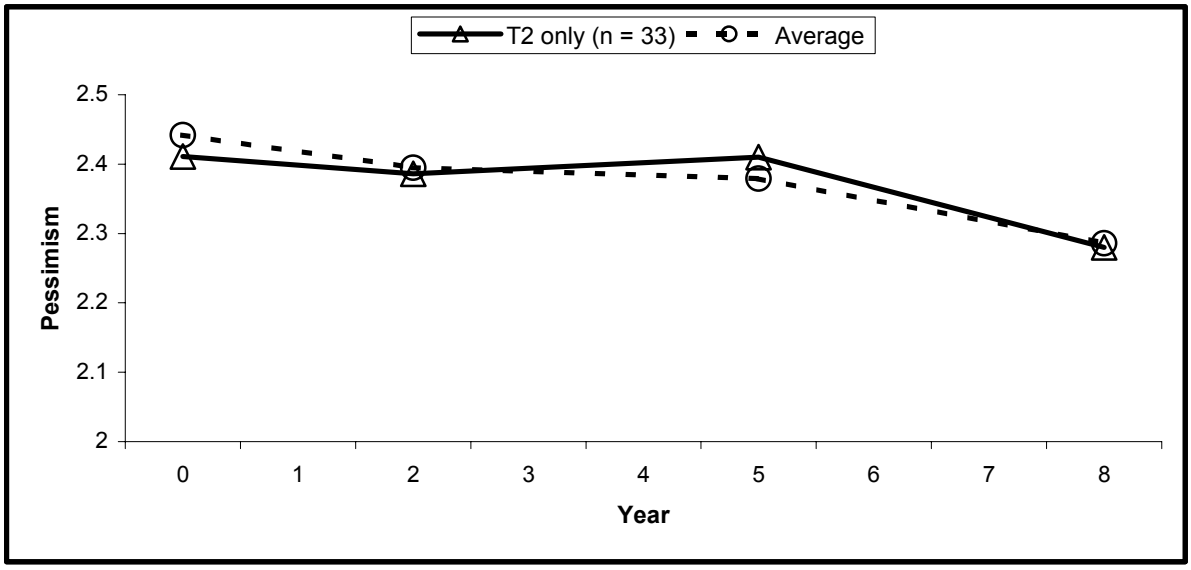


Figure 10b. Adaptive Trend in Pessimism following Negative Work Events

Reactivity and Adaptation following Relationship Events

Negative relationship events (e.g., an unwanted pregnancy, a relationship breakup, etc.) did not generally relate to initial levels of or changes in optimism and pessimism. The interaction reflecting experience of both positive and negative events during the 12 months before the Wave 3 assessment did relate significantly to decreases in optimism between Waves 2 and 3. This finding suggests that the potential boost in optimism that results from getting married can be offset by the experience of a negative event (e.g., a stillbirth/miscarriage or divorce) that occurs relatively close in time. Finally, getting married during the year before the Wave 2 assessment did relate to a significant decrease in pessimism between Waves 1 and 2.

The plot shown in Figure 11a is very consistent with the statistical findings in that the trajectory for changes in optimism among those whose only negative event experience occurred between Waves 1 and 2 (n = 31) does not deviate from the trajectory for the rest of the sample. However, the plot in Figure 11b suggests a different pattern regarding changes in pessimism. Although not statistically significant, pessimism increased (d = 0.16) following a negative event among those in the optimal event sequence group. This increase was followed by a smaller decrease (d = -0.09) over the next three years. Interestingly, the difference between the changes suggests that complete adaptation following negative relationship events may not occur until much later (i.e., 5-7 years after the event occurred) in time but such an interpretation is speculative given the small effects, limited sample size, and lack of statistical support.

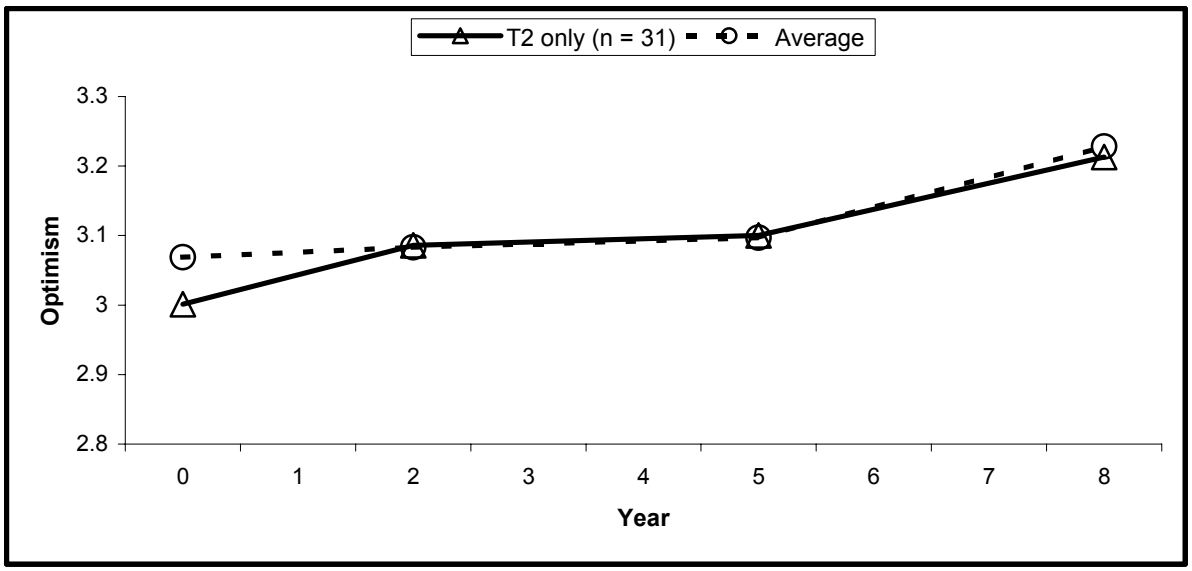


Figure 11a. Adaptive Trend in Optimism following Negative Relationship Events

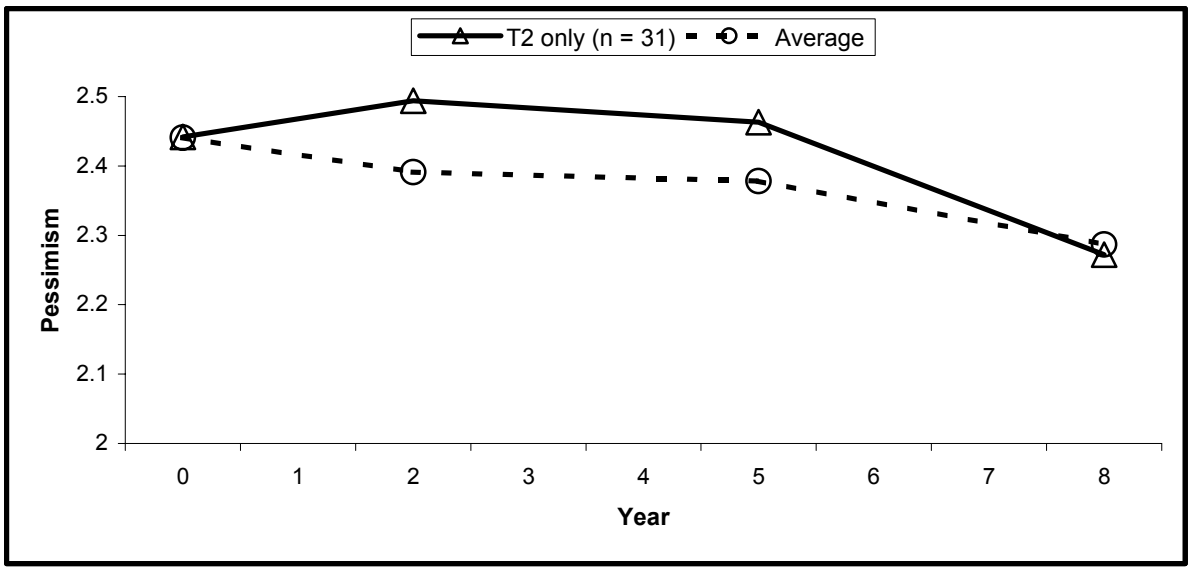


Figure 11b. Adaptive Trend in Pessimism following Negative Relationship Events

Study participants who got married between the Wave 1 and Wave 2 assessments (n = 39) experienced moderate (d = 0.35) but statistically nonsignificant increases in optimism between Waves 1 and 2. In addition, levels of pessimism among these individuals following marriage decreased significantly (d = -0.47) during the same period. As the plots presented in Figures 12a and 12b show, the initial increase in optimism was not followed by an equal

decrease at any point during the study period, nor was the initial drop in pessimism after marriage followed by an equal increase later in time. That is, levels of optimism and pessimism seem to remain elevated and depressed, respectively for a long period of time (i.e., seven years) following marriage, suggesting that influences due to certain events may vary in length depending on whether the event is discrete or continuing.

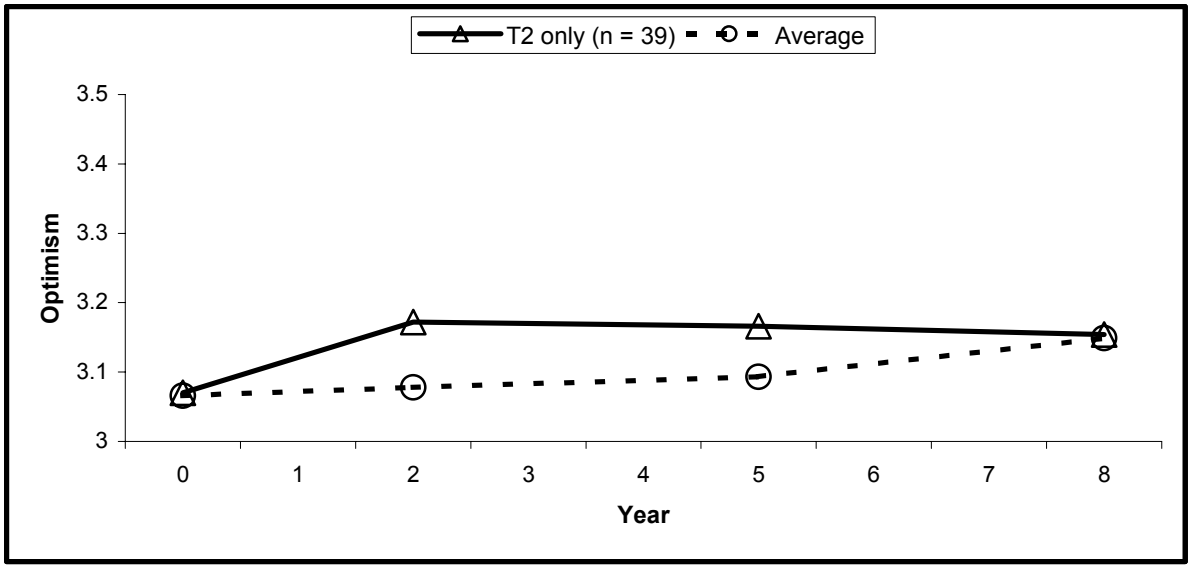


Figure 12a. Adaptive Trend in Optimism following Marriage

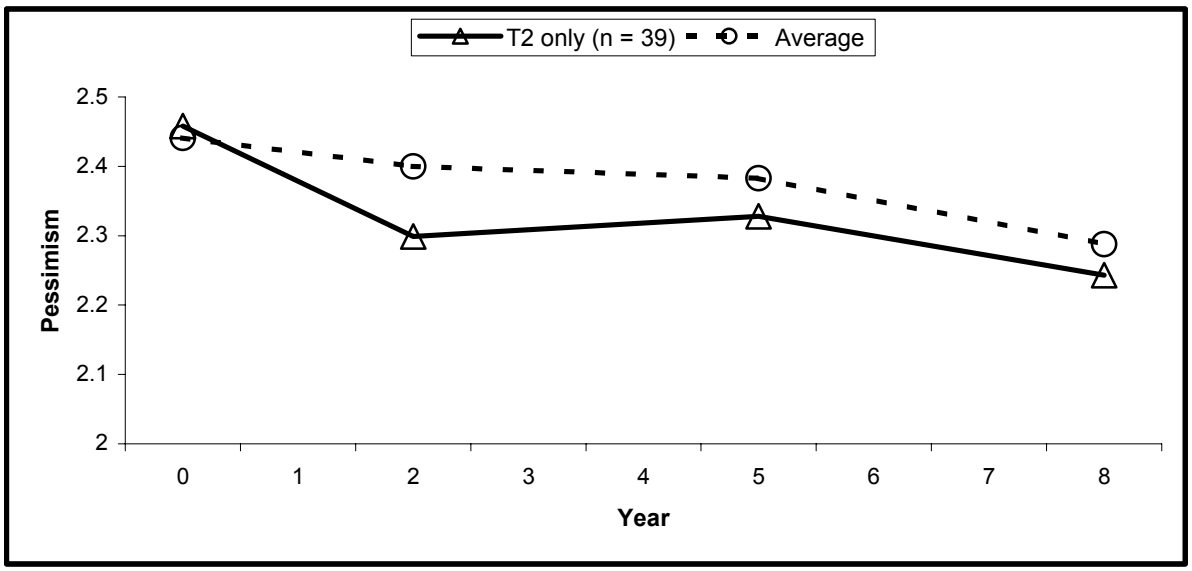


Figure 12b. Adaptive Trend in Pessimism following Marriage

Linear constraints imposed on the intercepts for changes in optimism and pessimism among those who married before the Wave 2 assessment did not achieve statistical significance (both *p*s < .17). However, the small subgroup sample size severely limits the ability to draw conclusions based on statistical evidence, as power for the test was quite low. Although test results indicate that adaptive changes in optimism and pessimism following marriage are complete, the plots suggest marriage may produce long-term changes in optimism and pessimism. Unfortunately, similar analyses to examine the potential influence of divorce were not possible. Identification of individuals who experienced a divorce only between Times 1 and 2 yielded a small group ($n = 28$) of which 20 were included in the optimal event sequence group used to examine adaptive changes following negative relationship events ($n = 31$). Therefore, results from analyses that isolated the experience of a divorce were generally consistent with those presented above.

Reactivity and Adaptation following Victimization Events

Results from the reactivity analyses indicated few relationships between changes in optimism and pessimism and experiences of victimization (e.g., being robbed or assaulted). However, the occurrence of victimization events during the 12 months before the Wave 2 assessment did relate significantly to increases ($d = 0.28$) in pessimism between Waves 1 and 2. Although not statistically significant, these event experiences continued to exert a small ($d = -0.20$) lagged negative influence on changes in pessimism between Waves 2 and 3, suggesting a subsequent decrease in pessimism over the following three years after the event occurred.

Figures 13a and 13b present plots of the trajectories for changes in optimism and pessimism for those whose only victimization experience occurred during the 12 months

before the Wave 2 assessment (n = 19) and the rest of the sample. As shown in Figure 13a, victimization events did not produce noticeable reactive changes in optimism. Rather, those who experienced victimization events showed gradual increases in optimism over the study period that mirror the increase that occurred for the rest of the sample.

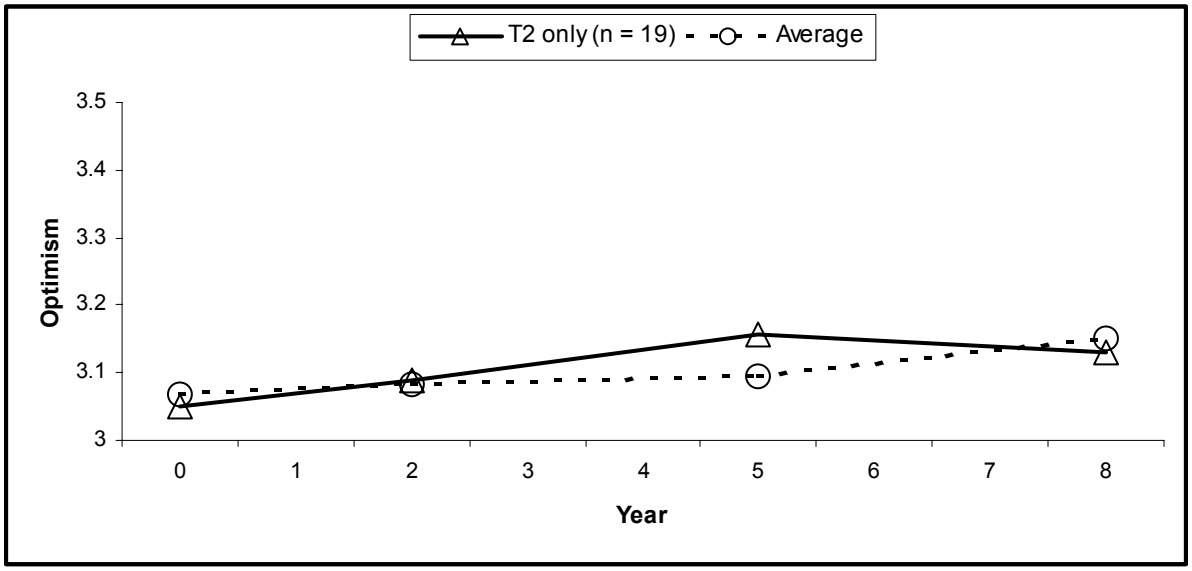


Figure 13a. Adaptive Trend in Optimism following Victimization

However, the plot in Figure 13b shows a marked influence of victimization events on reactive and adaptive changes in pessimism. Levels of pessimism increased significantly (d = 0.70) among those who experienced a victimization event in the year before the Wave 2 assessment. This increase was followed by a similar statistically significant decrease (d = -0.74) in pessimism over the next three years. Consistent with the plot for pessimism, a constraint on the intercepts for the latent differences did not significantly degrade the fit of the model [$\Delta\chi^2_{MLR}(1, N = 889) < 1.00$], indicating that the adaptive recovery in pessimism following victimization events was complete.

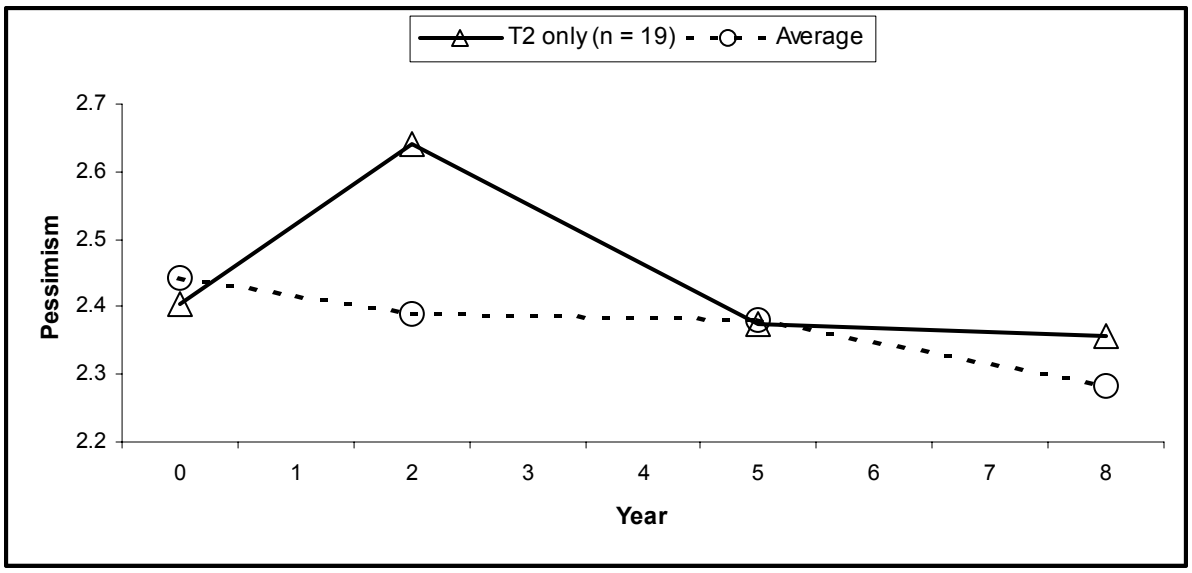


Figure 13b. Adaptive Trend in Pessimism following Victimization

DISCUSSION

Discussion of the findings from the current study is divided into three main sections. The first section evaluates the study hypotheses against the data and integrates findings from the current study with the existing literature regarding personality stability, optimism and pessimism, and adaptation theory. The next section discusses strengths and limitations of the current research. Suggested avenues for future research that further examine or extend the findings of the current study follow discussion of strengths and limitations. Finally, the discussion concludes by placing the current study findings and their potential implications in the larger context of general theory regarding personality.

Evaluation of Study Hypotheses and Integration with Existing Literature

Preliminary analyses examined whether optimism and pessimism reflect related but partially distinct constructs among African American adults. Findings from these analyses provided compelling evidence to suggest that the structural relations between optimism and pessimism among African American women and men are quite similar to previous findings from predominately white samples. For example, the CFA results convincingly demonstrated that a single underlying factor does not provide an adequate representation of the relationships among the items on the LOT. Rather, results indicated that the items tap two distinct constructs that correlate only moderately in the current sample. These findings are consistent with previous statistical evidence supporting the distinction of optimism and pessimism (e.g., Carifio & Rhodes, 2002; Chang et al., 1994; Creed et al., 2002; Lai, 1994; Lai & Yue, 2000; Marshall & Lang, 1990; Marshall et al., 1992; Mook et al., 1992; Mroczek et al., 1993; Plomin et al., 1992; Scheier & Carver, 1985; Scheier et al., 1994).

In addition to statistical evidence, findings from preliminary analyses that examined the relationships between optimism/pessimism and positive/negative affect provided validity evidence for a distinction between optimism and pessimism. Specifically, positive and negative affect both related uniquely to optimism after controlling for shared variance with pessimism; however, positive affect no longer related to pessimism after controlling for shared variance due to optimism. This finding is partially consistent with previous findings that demonstrated similar unique associations among these four constructs (Marshall et al., 1992). Results from analyses that examined whether controlling for positive/negative affect and life event experiences at Time 1 decreased the association between subsequent levels of optimism and pessimism also suggest that the two constructs are unique. Although controlling for these influences did reduce the correlation between optimism and pessimism, the negative relationship between the two constructs remained statistically significant at each assessment. In addition, the decline in the correlation between optimism and pessimism actually decreased over time such that the change was minimal (r = -.44 vs. r = -.37) nine years after initial assessments of affect and life event experiences.

The first set of study hypotheses examined the general stability of optimism and pessimism during adulthood. Consistent with *Hypothesis 1a*, the longitudinal correlations observed between optimism and pessimism in the current study indicated a reasonable degree of differential stability over time. Specifically, the average correlations between assessments of optimism (r = .53) and pessimism (r = .58) over intervals ranging between two and three years were quite consistent with previous findings over similar periods of time (e.g., Bromberger & Matthews, 1996; Kivimäki et al., 2005; Scheier et al., 1994). However, differential stability over such intervals is certainly smaller than the levels suggested by

previous studies that spanned shorter periods (e.g., Atienza et al., 2004; Eid & Diener, 2004; Park et al., 1996; Robinson-Whelen et al., 1997; Scheier et al., 1994; Schou et al., 2005). One possible interpretation of these findings is that differential stability in optimism and pessimism declines over time. However, examination of lagged longitudinal correlations suggested that differential stability over the five- or nine-year intervals in the current study did not differ appreciably from the differential stability observed between adjacent study assessments.

Findings regarding the absolute stability of optimism and pessimism were inconsistent with *Hypothesis 1b*. Specifically, average levels of optimism and pessimism changed significantly over the 9-year study period. Results from growth curve analyses indicated that levels of optimism and pessimism increased and decreased, respectively, in a reasonably linear manner over time. Unfortunately, the evaluation of these findings is limited by a shortage of existing longitudinal evidence regarding absolute stability in optimism and pessimism. Comparison of the current findings to those reported in the few available studies suggests that the mean differences observed in the present sample are partially consistent with the general literature. For example, studies that assessed changes in optimism over short intervals of less than one year (e.g., Atienza et al., 2004; Dougall et al., 2001) reported small (ds < 0.36) mean differences of similar magnitude to the changes in optimism observed in the current study. By contrast, the only available study that examined absolute stability in optimism over longer intervals (i.e., three years) reported no mean differences in optimism or pessimism over a three-year interval (Robinson-Whelen et al., 1997). The present findings are also consistent with existing research that demonstrates similar small normative changes on other personality dimensions over time (e.g., Costa et al., 2000; Helson et al., 2002;

Mroczek & Spiro, 2003; Roberts & Chapman, 2000; Roberts et al., 2002; Watson & Walker, 1996). In addition, and consistent with *Hypothesis 1c*, results from the growth curve analyses indicated that rates of change in optimism and pessimism varied significantly across individuals. This finding is consistent with previous evidence of significant intraindividual variability in changes on other personality dimensions including extraversion and neuroticism (Mroczek & Spiro, 2003), the global dimensions of the Big-5 (Small et al., 2003), and most of the personality dimensions assessed by the CPI (Helson et al., 2002).

Interestingly, findings from the current study were inconsistent with both *Hypothesis 1d* and existing studies that have provided evidence to support the notion that maturational changes occur on numerous personality dimensions across adulthood (e.g., Roberts et al., 2002; Srivastava et al., 2003; Watson & Walker, 1996). Evidence from previous studies suggests that maturational changes in personality typically reflect better adjustment and this seems consistent with the average increase in optimism and decrease in pessimism observed in the current study. However, age did not relate significantly to the rates of change for optimism or pessimism. One possible explanation for this finding is that the average trends over time actually do reflect changes as a function of age. That is, average rates of change over the 9-year study period could simply reflect average rates of change that result from aging. If the observed average changes reflected a process linked to age, one might expect that initial levels of optimism and pessimism would differ between individuals of different ages. For example, average levels of optimism among individuals over the age of 50 should be higher than average levels of optimism among individuals between the ages of 20 and 30. However, this interpretation seems unlikely given the lack of a significant association

between age and initial levels of optimism/pessimism after controlling for positive/negative affect and education in the growth curve analysis[2].

Preliminary analyses examining whether the experience of particular life events at one point in time are associated with the experience of later life events yielded findings that were generally consistent with previous research (e.g., Headey & Wearing, 1989). Specifically, the experience of positive/negative life events did associate significantly with later same-valenced event experiences. This finding is not surprising given that the experience of particular events may predispose individuals to experience later events that occur as a consequence of the initial event. For example, being diagnosed with a severe illness could lead to the loss of one's job, which in turn could lead to negative financial events such as a home foreclosure or vehicle repossession. Similarly, getting married could lead to a positive increase in financial circumstances due to the merging of two incomes. However, findings from the current study are not consistent with previously documented associations between the likelihood of event experience and individual characteristics (e.g., Headey & Wearing, 1989). Although initial levels of optimism/pessimism and positive/negative affect did relate significantly to later life event experiences in some instances, the pattern of associations was not consistent. That is, individuals with higher levels of optimism were not consistently more likely to experience positive life events. In addition, the few statistically significant associations that did emerge were small, with

[2] ANOVAs comparing optimism/pessimism composite scores at Time 1 across the five age groups defined at Time 1 (see p. 95) also indicated no significant differences in optimism, $F_{(4, 875)} < 1.00$. Average levels of pessimism did differ significantly across the groups but the effect of age group accounted for less than 2% of the variance in levels of pessimism at Time 1, $F_{(4, 874)} = 3.53$, $p < .01$, $\eta^2 = .016$. Tukey-adjusted post hoc comparisons indicated that those between the ages of 41 and 50 reported significantly lower levels of pessimism than did individuals in the youngest two groups (i.e., 20-30 and 31-40). However, none of the other pairwise comparisons among the five age groups indicated statistically significant differences in levels of pessimism.

optimism/pessimism and positive/negative affect accounting for less than 3.0% of the total variance in counts of positive or negative life event experiences. Contrary to the findings provided by Headey and Wearing, these results suggest that the dispositional characteristics of individuals do not dramatically influence life event experiences.

Initial examination of changes in optimism and pessimism indicated few consistent associations between levels of optimism/pessimism at Time 1 and changes that occurred over the 9-year study period. The notable exception to this pattern involved moderate associations between initial levels of optimism/pessimism and changes that occurred over the next two years. In the both cases, these associations were negative, indicating that individuals with high initial levels of either construct changed less on that construct over the next two years than did individuals with lower initial levels. Of particular interest was the finding that initial levels of optimism and pessimism did not relate consistently to distal changes. For example, initial levels of optimism were only weakly related to changes that occurred five (r = -.14) and eight (r = -.04) years later. Associations between initial levels of pessimism and distal changes were even less compelling over the same time periods (r = -.03 and r = -.07 for changes at Times 3 and 4, respectively). These findings, coupled with similar weak associations involving positive/negative affect, suggest that changes in optimism and pessimism occur somewhat independently of initial levels on the four constructs.

Evaluation of the study hypotheses regarding life event influences on changes in optimism and pessimism was challenging. Results indicated few statistically significant associations between the total numbers of positive and negative life event experiences and changes in optimism/pessimism. For example, total life event experiences reported at Time 2 associated negatively with levels of pessimism at Time 2 controlling for optimism,

pessimism, positive/negative affect, and the number of life event experiences reported at Time 1. This finding indicated that those who experienced greater numbers of positive events (relative to negative events) in the year before the Time 2 assessment reported significantly lower levels of pessimism than did those who experienced greater numbers of negative life events during the same period. In addition, this influence of life event experiences was unique to prior event experiences and previous levels of optimism and pessimism. Aside from only a few statistically significant associations between total life event experiences and levels of optimism/pessimism, the findings of the current study do not provide overwhelming support for *Hypotheses 2a* and *2b*. However, the fact that some significant linear associations were observed between total event counts and levels of optimism/pessimism suggests that life events do relate to optimism and pessimism and that multiple same-valenced life event experiences compound additively in a manner consistent with *Hypothesis 2c*.

Analyses examining relations between total event counts and levels of optimism/pessimism did provide consistent evidence to contradict *Hypothesis 2d*. Specifically, average levels of optimism/pessimism often differed significantly between individuals who experienced no life events and individuals who experienced an equal number of positive and negative events. These findings indicate that positive/negative event experiences do not necessarily cancel out influences due to oppositely valenced event experiences. These findings also indirectly provide some additional support for *Hypotheses 2a* and *2b* in that if life events exerted no influence, levels of optimism/pessimism would not differ between those who experienced no events and those who experienced both types of events.

When life event influences were examined individually within each life domain, results painted a much clearer picture. Life events occurring in particular domains (e.g., financial, work, and relationships) did influence changes in pessimism somewhat consistently. For example, positive changes in one's employment situation during the year before Time 2 associated with a significant decrease in pessimism during the interval between the Time 1 and Time 2 assessments. Conversely, victimization during the year before Time 1 related to significant increases in pessimism between Time 1 and Time 2. Perhaps most interesting, individuals who married between the Time 1 and Time 2 assessments experienced moderate increases in optimism *and* decreases in pessimism during the same time period. Collectively, these findings provide tentative support for *Hypotheses 2a* and *2b* but the pattern of results is certainly not definitive. Although few of the associations between life event experiences and changes in optimism were consequential, some life event experiences exerted lagged effects on changes in optimism that occurred well after the initial event. For example, the experience of a negative health-related event during the year before the Time 3 interview related to a significant decrease in optimism over the next three years, suggesting the possibility of an eventual decline in optimism following a severe illness or injury. Finally, the domain-specific reactivity analyses provided additional evidence to contradict *Hypothesis 2d* in that some of the interactions between positive and negative life event experiences did exert significant lagged effects, indicating that the influences of positive and negative event experiences are not necessarily equal. Rather, it is likely that particular negative event experiences (e.g., a divorce) outweigh particular positive events (e.g., a financial improvement), or that some negative events are less influential than other negative events (e.g., dipping into savings vs. getting evicted).

The limited existing research that has examined reactive changes in optimism and pessimism following life event experiences is mixed. Studies examining changes in optimism following negative health-related events in samples of angioplasty patients (Helgeson, 1999) and women recovering from breast cancer surgery (Schou et al., 2005) both reported no significant changes in optimism following additional health complications that occurred within one year of the initial negative health event. Results from the reactivity analyses that examined whether one's own severe illness or injury events related to changes in optimism and pessimism are consistent with these previous findings. However, the lagged effect of negative health events that occurred in the year before Time 3 on changes in optimism over the next three years suggests the possibility that the lack of findings from previous studies may stem from the short study intervals. Both previous studies limited the assessment of potential influences to less than one year making it impossible to determine whether negative health-related events produce reactive changes in optimism and pessimism that take longer to unfold. Although speculative, it is possible that health complications have little immediate impact on levels of optimism and pessimism but that further proliferation of or delayed recovery from illness may eventually erode optimism. In domains other than personal health, previous research provides suggestive evidence for reactive changes in optimism and pessimism related to increases in family/work stress (Atienza et al., 2004), caregiving stress (Robinson-Whelen et al., 1997), and the severe illness or death of a family member (Kivimäki et al., 2005). Results from the current study are partially consistent with these previous findings. For example, individuals whose only experience with illness, injury, or death of a loved one occurred in the year before Time 2 reported levels of optimism and pessimism that were lower and higher, respectively, than levels reported at Wave 1. Although

these differences were small (*d*s ≈ 0.20) and not statistically significant, they do provide suggestive evidence that is consistent with previous findings.

Although not statistically robust, study findings regarding potential adaptive processes following reactive changes in optimism and pessimism suggest a pattern consistent with *Hypotheses 3a* and *3b*. For example, levels of pessimism increased on average between Times 2 and 3 among those who experienced a severe illness or injury during the year before Time 2. Consistent with findings regarding health and changes in optimism, this increase in pessimism reflects a lagged effect, suggesting that changes in optimism and pessimism following health-related events may take longer to become manifest. Interestingly, the average increase in pessimism was followed by a moderate decrease in pessimism between Times 3 and 4 consistent with an adaptive return to levels of pessimism that were no different from the levels of pessimism reported by other individuals. Similarly, average levels of optimism increased and average levels of pessimism decreased between Times 1 and 2 for individuals whose only experience with injury, illness, or death of a close relative occurred before the Time 2 assessment. Similar to findings regarding personal health events, levels of optimism declined and levels of pessimism increased over the next three years such that levels of optimism and pessimism among these individuals were no different than the average levels for the rests of the sample. Patterns of change and effect size estimates were generally consistent with adaptive recovery in pessimism across all life event domains except for work-related events. Optimism, on the other hand, seemed somewhat more stable in that patterns of change and effect size estimates were only consistent with an adaptive recovery process following negative work-related and financial events.

One notable exception to the consistent evidence for complete adaptive recovery involved marriage. Patterns of change and effect size estimates provide some evidence that is consistent with an alternative incomplete adaptive recovery process. The initial reactive increase in optimism following marriage was not followed by an adaptive decline in optimism at any point during the 9-year study period. Rather, levels of optimism for the rest of the sample seem to have "caught up" with the elevated levels reported by those who married between Times 1 and 2. Similarly, the initial decline in pessimism following marriage was not followed by an equal adaptive increase in pessimism. In fact, although not statistically significant or large ($d = 0.13$), those who married remained less pessimistic than did the rest of the sample over the next three years. Although far from definitive, these findings appear more consistent with *Hypotheses 3c*, in that complete adaptive recovery in levels of optimism and pessimism did not occur following marriage. It is important to note that similar patterns of change in optimism and pessimism did not occur following negative event experiences, indicating no support for *Hypothesis 3d*.

Collectively, the limited findings of the present study regarding adaptive recovery in optimism and pessimism following life event experiences are most consistent with the original conceptualization of adaptation theory as applied to SWB. Specifically, small reactive changes in optimism/pessimism seem to subside over time such that individuals return to pre-event levels within a relatively short time period (i.e., 3- 5 years). Brickman and Campbell (1971) argued that cognitive processes involving temporal and social comparisons were largely responsible for the eventual return to one's set-point. Although these processes were not directly examined in the current study, they do suggest a possible mechanism that could adequately explain the patterns of change in optimism and pessimism observed here.

For example, experience of a negative financial event (e.g., a home foreclosure) could be devastating initially, leading to reactive increases in pessimism and/or reactive decreases in optimism (see Figures 8a and 8b). However, subsequent social comparisons with others who have lost both a home and a loved one might reduce the negative impact of the initial event experience. Similarly, temporal comparisons to earlier times when things were potentially worse (e.g., a bout of unemployment following a divorce) could alter perceptions of the current situation, causing optimism/pessimism to rebound and return to pre-event levels.

Aside from the suggestive findings regarding marriage, the adaptive patterns of change in optimism and pessimism observed in the current study are not consistent with proposed modifications to adaptation theory (e.g., Diener et al., 2006; Fujita & Diener, 2005; Lucas, 2007b). Recent findings from the SWB literature suggest that adaptation processes following certain life event experiences may be incomplete, in that levels of satisfaction/happiness do not necessarily return to the set-point over time. Rather, reactive changes following life events related to relationships (Lucas et al., 2003), work (Lucas et al., 1994), and physical health/disability (Lucas, 2007a; Oswald & Powdthavee, 2006) can result in relatively stable or enduring changes that alter an individual's level of SWB. However, it is important to note that existing research findings cannot rule out the possibility that seemingly permanent changes in SWB actually reflect a series of short-term reactive changes brought on by the experience of multiple related life event experiences.

Strengths and Limitations

The current study has a number of strengths that reflect promising contributions to the existing literature regarding personality development, stability and change in optimism/pessimism, and adaptation theory. This is the only known study to have rigorously

investigated stability and change in dispositional optimism/pessimism longitudinally over such a long period of time. In addition, this study is one of very few attempts to examine personality development among African Americans and the only known study to do so over the course of adulthood. This study also reflects the first known attempt to examine potential reactive changes in optimism/pessimism that may occur following event experiences within multiple life domains.

This study extends research on adaptation theory in a number of important ways. First, current adaptation research has only examined adaptive processes in the context of SWB. This research reflects a novel application of adaptation theory by extending the idea of adaptive recovery following life event experiences to the study of potential changes in optimism/pessimism that have typically been viewed as stable or static dispositional characteristics. In addition, the current study extends the examination of adaptive processes to life event experiences (e.g., victimization) that have not yet been examined in the SWB literature. Finally, this study addresses a potential limitation of existing adaptation research in that previous studies have not adequately examined the potential consequences of competing reactive influences due to the experience of oppositely valenced life events.

Although the strengths of this study suggest potential contributions to a number of research areas, potential limitations of the current study deserve attention. Perhaps the most important issue involves the assessment intervals across which reactive and adaptive changes in optimism and pessimism were hypothesized to occur. All of the life event items assessed whether particular events occurred only within the 12 months before each assessment. However, assessments were separated by intervals of two or three years. This complicates clear interpretation of the study findings and suggests a possible explanation for why robust

effects did not emerge. Event experiences that occurred within a year or two after any particular assessment went undocumented and therefore did not contribute to analyses of reactive/adaptive influences on changes in optimism and pessimism. Potential evidence to support such an argument is provided by the findings regarding marriage, which were most consistent with incomplete adaptation processes. The determination of whether individuals got married between assessments was not directly assessed, but rather inferred based on changes in reported relationship status at each assessment. This procedure effectively included in the analysis individuals who may have married soon after one assessment and a long time (i.e., two to three years) before the next wave of data collection. Although this approach maximized available information regarding the occurrence of marriage, it suffers from a similar problem in that multiple unreported marriages and at least one unreported divorce would have resulted in a determination that a particular individual only got married. Based on the pattern of changes in optimism and pessimism following marriage, this particular problem seems unlikely but findings should be considered with this possibility in mind.

A second potential limitation involves the relatively few positive life event experiences assessed in the current study. Aside from marriages, study participants indicated only whether they had experienced a positive change in employment or financial situation at each assessment. Alternatively, at each assessment participants indicated whether they had experienced any of 24 negative life events. Although the nature of some of the life event domains (e.g., health, victimization) do not suggest possible positive experiences aside from the absence of the negative life event, other positive event experiences (e.g., a child

graduating from high school, birth of a niece/nephew) could potentially influence levels of optimism and pessimism. Unfortunately, such events were not assessed in the current study.

Because the possibility of reporting a positive event was less likely in comparison to the reporting of a negative event (based on the number of respective event items), it is possible that influences due to negative events overshadowed associations between positive life event experiences and changes in optimism/pessimism. One counterargument to this possibility is provided by the frequency of positive event experiences that were actually reported at each assessment (see Table 1). After negative health events among close relatives, the most commonly reported event experiences across all assessments included a positive employment change and a positive change in financial situation (i.e., the two positive event items). In addition, a substantial proportion (ranging from 35% to 50%) of the respondents indicated experiencing at least one positive life event in the 12 months before each assessment. Results from analyses examining reactive changes in optimism and pessimism also suggest that the limited number of positive life event items may not have been problematic. Specifically, influences on levels of optimism/pessimism due to interactions and group differences reflecting the experience of equal but oppositely valenced events suggests that greater reporting of negative events did not diminish the influence of positive life event experiences.

A major limitation to the current study involves low statistical power associated with tests of adaptive recovery. The most clearly interpretable approach to examining adaptation involved selecting out respondents who experienced a particular life event only during the year before the Time 2 assessment, with no additional event experiences at later assessments. This approach resulted in very small groups (ranging from 18 to 56 observations) in which

adaptation processes could emerge most clearly. An alternative approach could have included those with event experiences at Time 1, provided analysis models appropriately controlled for influences of Time 1 events and initial levels of optimism/pessimism on later changes in optimism/pessimism. However, this approach did not result in dramatic increases in the size of the groups used to test adaptation processes. Rather, sample size limitations for the adaptation analyses were most often due to the necessary removal of individuals who reported subsequent event experiences at Times 3 and 4.

Examination of statistical power during the planning stages of this study suggests a potential reason for why many of the associations between life event experiences and changes in optimism/pessimism failed to achieve statistical significance. The *a priori* power analyses presented in Appendix 1 examined the statistical power associated with tests to detect latent mean differences as a function of event (or event sequence) experience. Using parameter estimates from the Time 1 data for the LOT items, analyses were simulated under varying conditions to determine how large effects needed to be before they could be detected reliably. Results from the simulations indicated that statistical power in the latent variable models used to examine reactivity and adaptation depended on multiple parameters, including the first-order factor loadings, the correlation (i.e., stability) between the first-order factors, the proportional split of the predictor variables, and the size of the true population effect. Under conditions in which factor loadings and stability were high (.70) and the proportional split on the predictor variable reflected rare event occurrence (i.e., 5%), the study provided adequate power to detect the effect of interest only when the true population effect was moderate (i.e., $d = 0.50$). Given that the proportional splits on the adaptation group predictor only ranged between 2% and 6.3% and that both the factor loadings and stability

were slightly lower than the simulated values, adequate levels of power required effects that were at least moderate in size.

The simulation results also indicated that none of the simulated conditions afforded adequate power to detect small ($d = 0.20$) population effects. It is important to note that many of the effects described above were of this size. One potential explanation for the lack of power to detect these small effects involves the possibility that changes in optimism over time reflect stationary processes in which means, variances, and correlations remain constant. When processes become stationary, disturbances or fluctuations in the process must become comparatively large in order to be detected reliably. However, findings in the current study argue against stationarity as the cause of low power. Although correlations between optimism/pessimism over time did not differ dramatically across assessments, means and variances clearly did. Results from both the growth curve and latent means analyses indicated that average levels of optimism/pessimism changed over time and that the changes varied significantly across individuals.

Although low statistical power decreased the likelihood of detecting significant effects, interpretation of the statistically significant results in this study is also limited because analyses did not account for nonindependence in the data due to the clustered nature of the FACHS sample. Failure to adequately account for nonindependence among observations results in estimates for standard errors that are biased downward (i.e., too small), and smaller standard errors artificially inflate test statistic values. However, it is important to note that failure to account for clustering does not influence estimates of other model parameters (i.e., effects and effect sizes). Participants in the FACHS sample were nested within 46 neighborhood clusters at the time of the first wave of data collection.

Therefore, it is possible that individuals within the same neighborhood cluster are more similar to one another than they are to individuals from other neighborhoods. This possibility was examined by computing intraclass correlation coefficients (*ICC*s) to quantify the proportion of variance in optimism and pessimism that could be accounted for by neighborhood cluster. At Time 1, *ICC*s ranged from .017 to .029 for the LOT items, indicating that neighborhoods accounted for no more than 3% of the total variability in any single item. Analyses for LOT items at Times 2 and 3 indicated decreases in the item-level *ICC*s (ranging from 0 to .019), with the exception of the pessimism items for which the *ICC*s actually increased at Time 3 (ranging from .03 to .05).

These findings indicate that clustering in the data does relate to variability in the LOT items to some degree. The decision regarding whether or not to account for this clustering involved a tradeoff between statistical accuracy and additional (perhaps unnecessary) complexity. Using neighborhood information established at Time 1 does not accurately reflect whether participants have remained in their original neighborhoods. Over the 9-year study period many participants have moved to different study neighborhoods, whereas others have moved out of the original neighborhood clusters (i.e., out of state). Because of changes in residence (i.e., moving), the original study neighborhoods currently contain considerably fewer individuals than they did at Time 1 and many participants now represent the only study participant within a particular neighborhood. In regard to analytic issues, accounting for neighborhood clustering also would have created additional problems with statistical power in that particular life event experiences may be reported by only one or two individuals from a particular neighborhood. If so, it is quite likely that estimation of effects due to life event experiences could be biased by extreme cases within any given neighborhood. Conceptually,

it is unclear whether treating neighborhood as a fixed or static effect makes sense given the residential mobility of the FACHS participants.

A final potential limitation involves the generalizability of the findings of the current study. In addition to being predominately African American, participants in FACHS were recruited for participation based on specific study criteria (i.e., being the primary caregiver for a child between the ages of 10 and 12 and living in predominantly rural areas in Iowa and Georgia). Given the nature of the sample, it is currently unclear whether the study findings would extend to different demographic (e.g., urban, impoverished, affluent) groups. In addition, FACHS participants varied in age from 24 to 81 years at Time 1. Although age did not relate to any of the study outcomes, it is unclear whether similar findings would be observed in a more homogenous sample. Finally, the majority of FACHS participants are women and the proportion of men in the sample does not allow for meaningful comparisons across gender for the research questions examined in the current study. However, there is little existing evidence to suggest that reactive and adaptive changes in optimism and pessimism following life event experiences should differ between men and women.

Directions for Future Research

The tentative findings of the current study and limitations discussed above suggest a number of interesting directions worth considering in future research. Perhaps the most important direction for future research involves the examination of reactive and adaptive changes in optimism/pessimism over more appropriate assessment intervals. The two- and three-year assessment intervals used in the current study do not allow for a fine-grained examination of potential adaptation processes. It is quite possible that adaptive recovery in optimism/pessimism following life event experiences occurs comparatively quickly in

relation to findings regarding SWB. Therefore, shorter assessment intervals (e.g., 6 months or 1 year) might allow for determination of the timing at which particularly interesting aspects of adaptive recovery occur. For example, assessments over shorter periods of time could isolate peaks in reactive changes allowing for the investigation of other factors that potentially moderate the magnitude of the initial reaction to life event experiences. Similarly, multiple assessments over shorter intervals of time could provide a better estimation of the adaptation process allowing for the examination of factors that may moderate the speed and degree of adaptive recovery. Unfortunately, these possibilities could not be examined in the current study due to the length of the assessment intervals.

A second direction for future research on adaptation theory involves further extending of the notion of competing influences following oppositely valenced life events to the adaptation process. Existing research on adaptive changes in SWB suggests that the repeated occurrence of the *same* life event (e.g., repeated bouts of unemployment; see Lucas et al., 2004) slows the adaptation process and that the prolonged experience of a particular event can lead to incomplete recovery. In addition, previous findings show that the experience of the *exact opposite* event (e.g., securing new employment) not only speeds adaptive recovery but is also more likely to lead to complete recovery over time. What remains unclear from findings regarding SWB is whether *different* oppositely valenced life events have similar implications for the speed and degree of adaptive recovery. For example, does a positive event such as entering into a new relationship moderate the adaptive process that follows the experience of a negative event such as a demotion or cut in wages at work? Unfortunately, sample size limitations linked with the experience of particular events and event sequences prohibited examination of these possibilities in the current study. The potential for competing

influences due to life event experiences in different domains seems worthy of future research attention.

Of particular interest regarding future research on optimism/pessimism is the fact that neighborhood clustering contributed to the total variance in the LOT items (see discussion of *ICC*s above). Although neighborhoods accounted for small proportions of the variability in optimism/pessimism, it is not immediately clear why. One potential explanation involves the notion that living in a particular neighborhood may reflect a chronic negative life event. For example, neighborhoods characterized by high levels of criminal activity may increase the likelihood of victimization. Similarly, neighborhoods characterized by high levels of employment instability or limited employment opportunity may increase the likelihood of negative work-related and financial life events. Although extremely limited, existing cross-sectional evidence is consistent with this notion in that the average levels of optimism differed across neighborhoods in relation to residents' perceptions of neighborhood quality (Greenberg & Schneider, 1997).

Social comparison processes provide a second potential explanation in that comparison targets may most likely include individuals living in the same neighborhood. Although the experience of a negative event may produce reactive and adaptive changes in optimism and pessimism, the nature or degree of these changes could depend on the circumstances of targets against which individuals compare themselves. For example, taking a cut in wages at work may be devastating when available comparison targets are enjoying increases in their financial situation. However, the same reduction in wages may be less influential if available comparison targets are unemployed. The prospect of examining

potential relationships between neighborhood-level characteristics and levels of optimism/pessimism suggests a potentially interesting avenue for future research.

A second direction for future research specifically related to optimism and pessimism involves the likelihood of negative life experiences in the current study sample. The proportion of participants who reported experiencing at least one negative life event exceeded 70% across the four waves of assessment. Although negative event experiences were quite common, average levels of optimism and pessimism increased and decreased, respectively, across the 9-year study period. In addition, life event experiences (positive or negative) did not account for substantial proportions of variance in these changes, suggesting that other factors could be influential. Although speculative, it is possible that the common occurrence of negative events in the lives of these particular individuals has altered their expectations regarding whether a negative event is likely to occur. That is, negative event experiences that are consistent over time may eventually erode reactive influences in a manner consistent with habituation processes. As a result, optimism and pessimism may come to reflect very distinct constructs that can occur simultaneously. Findings from the current study are partially consistent with this notion in that the negative structural relationship between optimism and pessimism remained quite stable (and comparatively small) across the first three study assessments. However, it is important to note that other potential explanations for these findings including measurement artifacts (e.g., Chang & McBride-Chang, 1996; Røysamb & Strype, 2002; Vautier et al., 2003), systematic measurement error (e.g., Green et al., 1993), and statistical artifacts (e.g., Russell & Carroll, 1999) are equally compelling. Future research that specifically addresses these issues seems not only interesting, but necessary as well.

Findings from the current study also suggest interesting directions for future research regarding general personality development. One particularly interesting finding involves that fact that age did not account for the average changes in optimism and pessimism observed over the 9-year study period. This finding suggests that the changes in optimism and pessimism did not result as a function of maturational processes that move individuals toward better levels of adjustment with age. Although previous research has demonstrated consistent associations between age and normative or average changes on other personality dimensions, age typically accounts for only a small proportion of the total variability in the trend. For example, findings from Srivastava et al.'s (2003) study indicated that age accounted for 12% and 16% of the variability in agreeableness and conscientiousness, respectively, but considerably smaller proportions of the variance in other dimensions of the Big-5. Other studies that examined personality change suggest similar small effects due to age (e.g., Costa et al., 2000; Costa & McCrae, 1994; Roberts et al., 2002; Watson & Walker, 1996).

In addition to the lack of influence due to age, the combination of life event experiences, demographic characteristics (i.e., education), and other supposedly stable individual differences (i.e., positive/negative affect) did not account for the changes in optimism and pessimism observed in the current study. This finding, coupled with the small effects linked to age in previous studies, suggests that other factors may contribute in important ways to changes in personality across adulthood. Because examination of average-level and maturational changes in personality is a relatively new area of research, it is not yet clear exactly which factors might be involved in such personality changes.

Existing research findings do suggest that a history of normal life event experiences may relate to normative personality development. For example, work histories characterized by work force participation and the absence of unemployment seem to be associated with patterns of personality development that reflect better overall adjustment (e.g., Costa et al., 2000; Ek et al., 2004; Roberts, 1997). Similarly, relationship histories characterized by the absence of marital tension and divorce relate to patterns of personality development that generally reflect better adjustment (Costa et al., 2000; Roberts & Chapman, 2000). Finally, the experience of motherhood also seems to contribute to normative changes in personality during later adulthood (Roberts et al., 2002). Based on these findings, it is possible that changes in adult personality stem largely from a history of normative life experiences (e.g., establishing a career, getting married, and becoming a parent). Although examining such possibilities would require extensive longitudinal data, research efforts to determine whether life histories characterized by typical experiences tract individuals onto a path of personality development that culminates in better adjustment could provide exceptionally interesting findings.

A final direction for future research on general personality development involves the extension of adaptation theory to personality constructs other than optimism/pessimism. Such research efforts could yield very interesting findings linking the experience of particular life events with reactive and adaptive changes on other supposedly stable individual differences. For example, experiences of social rejection/isolation may contribute to reactive decreases in extraversion that are followed by an eventual return to pre-event levels. Similarly, the experience of negative life events in work and financial domains may produce reactive and adaptive changes in trait levels of neuroticism. Limited findings from the literature suggest

that such event-related changes could be possible. For example, findings reported by Costa et al. (2000) showed that job stress led to average increases on facet-level scales that assess neuroticism. In addition, divorce resulted in average increases in extraversion among women and decreases in conscientiousness among men. Although these findings indicate the potential for reactive changes on other personality dimensions following specific life event experiences, the findings are not definitive. In addition, there is no information currently available to indicate whether these apparent changes subside over time in a manner consistent with adaptation theory. This possibility seems worthy of future consideration.

Conclusions

Genetic perspectives regarding personality argue that individual differences reflect the expression of genetic influences that differ across individuals (see Plomin & Caspi, 1999). From such a perspective, genetic information responsible for personality expression and development is viewed as the primary agent that contributes to personality stability (see Johnson et al., 2005; Roberts & Caspi, 2003). One particularly relevant finding from the current study may be consistent with this view of personality. Specifically, levels of optimism and pessimism over time did demonstrate moderate levels of stability. In addition, the degree of stability seemed largely independent of the passage of time between assessments. For example, the differential stability between levels of optimism assessed two years apart did not differ noticeably from the stability between levels of optimism assessed five years apart. Similar findings emerged regarding the stability of pessimism. Although speculative, these findings are consistent with a genetic perspective in that the stability in optimism and pessimism was itself stable, possibly reflecting genetic influences.

Findings from the current study are also consistent with a trait perspective, which argues that personality development and expression stems from interactions between genetic and environmental influences (see John & Srivastava, 1999). From a trait perspective, personality changes should be pronounced during periods of rapid development (i.e., childhood, adolescence, and young adulthood) as individuals begin to encounter numerous and varied environmental influences. However, changes in personality should slow over time eventually ceasing (see Costa & McCrae, 1994) as people enter into adulthood, at which point personality becomes relatively stable. Empirical support for this assertion exists in numerous research studies that provide overwhelming evidence regarding the consistency of personality in adulthood (e.g., Costa et al., 2000; Roberts & DelVecchio, 2000; Terracciano et al., 2006). The moderate levels of consistency in optimism and pessimism observed in the current study are consistent with a trait perspective. In addition, changes in the average levels of optimism/pessimism were not large indicating some degree of absolute stability. Finally, intraindividual variability in the changes in optimism/pessimism suggests the probability that optimism and pessimism did not change at all over the study period for some individuals.

Although not adequately explained by the factors examined in this study, average levels of optimism and pessimism did change over the study period. This finding is quite consistent with developmental perspectives on personality, which argue that personality change continues throughout the course of adulthood (see Caspi & Roberts, 1999, 2001). Research findings consistent with developmental perspectives are beginning to accumulate in which average changes in personality during adulthood consistently move individuals toward better levels of adjustment. The current study findings contribute to this accumulation in that levels of optimism increased and levels of pessimism decreased over time.

Finally, findings regarding reactive changes in optimism/pessimism following life event experiences are consistent with contextual perspectives on personality (see Lewis, 1999, 2001), which argue that personality change should occur often as individuals interact with a constantly changing environment. Although not completely consistent, findings from the current study do suggest that changes in life circumstances can influence changes in personality over relatively short periods of time. In addition, the limited but suggestive evidence regarding adaptive changes in optimism/pessimism following life event experiences is consistent with contextualist assertions that changes in personality during adulthood are not necessarily stable or enduring. Rather, a contextual perspective would argue that personality change in one direction following an environmental/situational change is equally as likely as personality change in the other direction if the environment/situation reverses in the future.

When examining the cumulative body of research findings regarding adult personality, all four of the perspectives discussed above seem applicable. Genetic and trait perspectives provide compelling explanations for high levels of personality consistency across adulthood. Alternatively, developmental perspectives provide an intuitive account for why change should continue to occur across adulthood. Finally, contextual perspectives suggest a potential process that could contribute to both stability and continual personality development. Findings from the current study indicate, at least in part, that personality psychology would benefit greatly from pursuing an integration of these competing perspectives. Each perspective acknowledges that genetic, environmental, and situational factors all play a role in personality expression and development but integrative research that examines this possibility is currently lacking. In addition to examining potential additive

influences, future studies that assess the possibility of the multiplicative influences of genetics, traits, environmental factors, and situations would undoubtedly enhance our current understanding of personality processes. The current study represents an initial step toward such integrative thinking and hopefully these findings are sufficiently compelling to encourage other researchers to do the same.

APPENDIX 1: *A PRIORI* STATISTICAL POWER ANALYSES

Examination of statistical power for tests of *Hypotheses 1a* and *1b* used the Monte Carlo features available in the Mplus software package to simulate a LCFA model for 1,000 samples of 500 respondents. Choice of sample size reflects a conservative strategy in that 606 of the original sample of FACHS participants provided data at all four waves of the study. Furthermore, the choice of sample size for the simulation allowed for a very high rate of item missingness (i.e., approximately 14%), reflecting an overestimation of the actual rate of item missingness at any single wave of the FACHS study.

The simulation was conducted by generating data based on a model that was specified to be consistent with the population. Specifically, data on 16 items (4 indicators for each of the 4 latent variables) were generated and randomly sampled from a population in which the LCFA reflected the appropriate structural model. Items were generated as standard normal variables ~N(0,1) that loaded on latent variables at certain magnitudes, depending on the simulated condition. For example, under conditions of high reliability, item loadings were fixed to population values of .70 and residual variances were fixed to .51 (i.e., $1 - .70^2$). In simulation conditions that did not involve comparisons of mean differences, latent means were fixed to zero in the population model. In all simulation conditions, latent variances were set to one in the population model so that latent variables without nonzero mean structure essentially reflected standard normal variables. Intercorrelations among the latent variables were also specified at different population values depending on the simulation condition. For example, to simulate conditions of high stability over time, factor correlations were specified at values of .70 in the population such that the shared variance between any two factors equaled 49% in the population. Finally, when latent means were of interest, the values of the

latent means in the simulation model were fixed at particular population values depending on the simulation condition. Specification of means and variances at zero and one, respectively for the population model provided a standard deviation unit metric for comparisons between latent means. For example, to simulate a moderate mean difference between any two latent variables, population values for one factor were held at zero and population values for the other factor were fixed to 0.50 (i.e., $d = 0.50$).

Each simulated model run included equality constraints on both factor loadings and the intercepts of the measured indicators to examine statistical power in the context of factorial stability. To examine power for detecting intercorrelations between the latent variables (*Hypothesis 1a*), specification of these parameters in the population model used values reflecting what Cohen (1988) termed small ($\rho = .10$), moderate ($\rho = .30$), and large ($\rho = .50$) effects. To examine statistical power for detecting deviations from absolute stability (*Hypothesis 1b*), the simulated model also included an equality constraint on the latent means under conditions where the population values for the latent means were specified to reflect small ($d = 0.20$), moderate ($d = 0.50$), and large ($d = 0.80$) effects for the difference between any two latent means. Finally, because power to detect associations and mean differences depends on both the strength of the effect and the reliability of the measure, the simulation also examined power to detect intercorrelations and mean differences between the latent variables under conditions that varied the magnitude of the factor loadings in the population between values of .40 (e.g., moderate reliability) and .70 (high reliability).

Results of the simulation to examine power for tests of *Hypotheses 1a* and *1b* indicated that when the population correlation between any two latent variables was small (i.e., .10), only 38% of the model runs identified the parameter as being significantly

different from zero when factor loadings reflected only moderate reliability (i.e., $\lambda = .40$). When factor loadings reflected higher reliability (e.g., $\lambda = .60$), only 44% of the model runs accurately identified the small population effect as being statistically significant. Increasing the magnitude of the population correlation to .20 resulted in approximately 91% of the model runs identifying the parameter as statistically significant when factor loadings equaled .40. These findings indicate adequate levels of statistical power for detecting correlations between latent variables that would reflect the expected levels (i.e. $.50 \leq \rho \geq .70$) of differential stability in optimism and pessimism. As a further test of differential stability, the power analysis also included an equality constraint on the factor correlations when population values reflected small ($\rho_{(time1,time2)} = .70$ vs. $\rho_{(time2,time3)} = .60$) to moderate ($\rho_{(time2,time3)} = .70$ vs. $\rho_{(time3,time4)} = .40$) differences over time. Results indicated minimal power (approximately .55) to detect small differences of .20 when factor loadings equaled .70. However, approximately 85% of the model runs correctly rejected the equality constraint when the population difference was moderate and factor loadings equaled .40. Finally, the power analysis revealed that approximately 90% of the model runs resulted in rejection of the equality constraint on the latent means when specification of the population difference corresponded to a small effect ($d = 0.20$) and factor loadings equaled .40, indicating adequate statistical power to detect small departures from absolute stability in optimism and pessimism (*Hypothesis 1b*).

Examination of statistical power for tests involving growth processes used the same general framework discussed above to simulate LGC models for 1,000 samples of 500 respondents under conditions that varied both factor loadings and the magnitude of the parameters of interest (i.e., latent means and variances of the second-order growth

parameters). The first simulation generated a linear growth process corresponding to a total rate of change across the four latent variables that reflected a small effect (d = 0.20) by specifying latent means for the four factors (α_1, α_2, α_3, and α_4) at population values of (0, .0667, .1334, and .2001, respectively). Results of the simulation indicated that approximately 83% of the model runs identified the mean of the linear slope as being significantly different from zero when factor loadings equaled .40, suggesting adequate power to detect a small linear growth process. A second simulation examined the power to detect a nonlinear (i.e., quadratic) growth process by specifying deviation from linear growth in the population corresponding to a small effect (d = 0.20). To do so, latent means (α_1, α_2, α_3, and α_4) were re-specified to population values of 0, 0, .20, and 0, respectively. The analysis model for the simulation then estimated only a linear growth model allowing for examination of power to reject the incorrectly specified model (i.e., a linear growth process fit to nonlinear rates of change) evidenced by a model chi-square that exceeded the expected critical chi-square value ($\chi^2_{(121)}$ = 147.64). Results from the second simulation indicated that approximately 84% of the model chi-square values exceeded 156.31 when the factor loadings equaled .40, suggesting adequate statistical power to reject the model when a small deviation from linearity existed in the population. Therefore, the FACHS sample should provide adequate statistical power to examine potential nonlinear rates of change in optimism and pessimism. Finally, a third simulation examined power to detect nonzero variation in growth components (*Hypothesis 1c*) by varying the magnitude of explained variance in the latent means accounted for by a linear process. To do so, residual variances for the first-order latent variables were specified at population values corresponding to small (σ^2 = 0.01), moderate

($\sigma^2 = 0.09$), and large ($\sigma^2 = 0.25$) effects but did not vary the magnitude of the latent means or factor loadings as changes in these parameters did not affect the simulation results. For example, if the linear growth process accounted for moderate levels of variability in the first-order latent variables, latent residuals were specified at population values of ($1 - .30^2 = .81$). Results from the simulation revealed only modest power (approximately .41) to detect small levels of variability. However, 99% of the model runs correctly identified nonzero variance in the growth parameter when the population variance accounted for by the growth parameters was moderate in size. Further examination of power to detect nonzero population variability examined an effect size between small and moderate (i.e., $\sigma^2 = 0.04$), with results indicating that approximately 87% of the model runs correctly identified the nonzero population variance. These findings indicate that the FACHS sample provides adequate power to detect significant variability in growth parameters when the magnitude of the population variance falls between a small and moderate effect.

To examine statistical power related to *Hypothesis 1d*, the LGC simulation discussed above was rerun after adding a standard normal variable ~N(0,1) as a predictor of the second-order growth components. Once again, variation in the size of the growth process and factor loadings did not affect the simulation results. Therefore, the only population parameter varied in this simulation involved the size of the association between the continuous covariate and the second-order latent growth parameters. Size of the association was varied by specifying that the covariate accounted for small ($r^2 = .01$), moderate ($r^2 = .09$), and large ($r^2 = .25$) proportions of variance in the growth parameters at the population level. For example, to simulate a large relationship between the covariate and the second-order slope parameter, the regression path between the two was specified at $\beta = .50$ in the population and the residual

variance in the slope parameter was specified to a population value of ($1 - .50^2 = .75$). Results of the simulation indicated only modest power to detect a small ($\beta = .10$) effect of the covariate on the growth parameters. However, when the population effect was moderate ($\beta = .30$), 99% of the model runs correctly identified the parameter as statistically significant. Further examination of intermediate effect sizes revealed that approximately 86% of the model runs identified the regression parameter as statistically significant when the population effect equaled .20. Therefore, the FACHS sample provides adequate statistical power to detect effects of covariates that account for approximately 4% of the variability in the latent growth components.

Life Events as Predictors of Reactive and Adaptive Change

To examine statistical power related to tests of hypotheses regarding the reactivity of optimism and pessimism to life event experience (*Hypotheses 2a-2d*) and adaptive changes in optimism/pessimism following life event experiences (*Hypotheses 3a-3d*), Monte Carlo methods were used to simulate data consistent with a LDS model for 1,000 samples that each contained 500 observations. This simulation included a first-order CFA model fit to two waves of generated data, a second-order latent difference score, and a dichotomous predictor of the difference score reflecting life event experience (0 = no, 1 = yes). The simulated model defined the latent change score as follows:

$$\Delta(T_{t-1},T_t) = \alpha_0 + 1(T_{t-1}) + B(\text{Event})$$

Under this specification, the latent difference score $\Delta(T_{t-1},T_t)$ equals the latent variable at Time (t - 1) when Event equals zero because the intercept (α_0) is set to zero for purposes of identifying the latent variable. When Event equals one, the latent difference score simply

reflects the amount of increase (+B) or decrease (-B) at Time (t) resulting from life event experience.

Unlike the simulations conducted for tests of the initial study hypotheses, a number of model parameters influence the power to detect associations between the dichotomous predictor and the latent difference score. Specifically, the magnitude of the first-order factor loadings (λ) becomes important as a determinant of the reliability of the measure (latent optimism/pessimism in this case) in that higher loadings reflect a more reliable measure. The correlation between the first-order latent variables (ρ) also influences power as a higher correlation increases the sensitivity of the difference score. That is, smaller differences become more evident when stability is high. In addition, the proportional split of the dichotomous predictor (π) influences power such that the true effect size must increase to detect an effect due to group membership as the size of one group becomes smaller. Finally, power to detect an effect due to group membership depends on the true magnitude of the effect in the population (δ). Therefore, the simulation examined power to detect the effect of group membership on the latent difference score under conditions that varied all of these parameters (i.e., λ, ρ, π, and δ). Specifically, population values for factor loadings ranged from .40 to .70 and the population value of the first-order factor correlation ranged from .50 to .70. The proportion of event occurrence in the population was varied between 5% and 25% to simulate conditions that reflect the actual rates of life event experiences at Wave 1 of FACHS (see Table 1). Finally, the effect due to group membership in the population ranged from small ($\delta = 0.20$) to moderate ($\delta = 0.50$).

Simulation results indicated adequate power (.79) to detect a moderate effect (δ = 0.50) due to group membership if event experience was rare (i.e., 5%) when factor loadings and stability were both high (i.e., .70 for both). Increasing the proportion of event experience to 10% resulted in adequate power (.87) to detect a moderate effect when loadings and stability were both low (.4 and .5, respectively). In fact, simulation results for event experience of 10% indicated adequate power (.79 - .82) to detect a slightly smaller effect (δ = 0.40) under conditions when loadings ranged between .50 and .70 once stability exceeded .60. When event experience increased to 15%, low loadings (.40) and stability (.50) still afforded adequate levels of power (.83) to detect an effect equal to 0.40, with modest power (.76) to detect an effect of 0.30 when loadings and stability were both high (i.e., .70). Additional simulation conditions that increased the proportion of event experience indicated adequate statistical power (all > .80) to detect population effects of 0.30 under all combinations of loadings and stability. However, none of the simulation conditions examined provided adequate power to detect small (δ = 0.20) population effects.

APPENDIX 2: STATEMENT OF EXEMPT STATUS FROM IRB

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office of Research Assurances
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

DATE: November 6, 2007

TO: William Todd Abraham
ISBR, 2625 N. Loop Drive, Suite 500

CC: Carolyn Cutrona
ISBR, 2625 N. Loop Drive, Suite 500

FROM: Jan Canny, IRB Administrator
Office of Research Assurances

IRB ID: 07-534 **Study Review Date:** 2 November 2007

The Institutional Review Board (IRB) Chair has reviewed the project, "Reactive and Adaptive Changes in Optimism and Pessimism as a Function of Life Event Experiences" (IRB ID 07-534) and has declared the study exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b), Exempt Category (4). A description of this exemption category can be found in the list on the next page. Please note that you must submit all research involving human participants for review by the IRB. Only the IRB may make the determination of exemption, even if you conduct a study in the future that is exactly like this study.

The IRB determination of exemption means that this project does not need to meet the requirements from the Department of Health and Human Service (DHHS) regulations for the protection of human subjects, unless required by the IRB. We do, however, urge you to protect the rights of your participants in the same ways that you would if the project was required to follow the regulations. This includes providing relevant information about the research to the participants.

Because your project is exempt, you do not need to submit an application for continuing review. However, you must carry out the research as proposed in the IRB application, including obtaining and documenting (signed) informed consent if you have stated in your application that you will do so or if required by the IRB.

Any modification of this research should be submitted to the IRB on a Continuation and/or Modification form, prior to making any changes, to determine if the project still meets the Federal criteria for exemption. If it is determined that exemption is no longer warranted, then an IRB proposal will need to be submitted and approved before proceeding with data collection.

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