Informing the structure of subjective well-being through examining changes in life satisfaction, positive affect, and negative affect

by

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To my parents, Doug and Denise, and my brother, Jonathan.
Your unconditional love, support, and encouragement has guided me throughout my academic career. Your selfless natures inspire me to help others and shed light on what makes life beautiful.

"You can be happy or you can be unhappy.
It's just according to the way you look at things." ~ Walt Disney

Abstract

Subjective well-being (SWB) refers to how individuals evaluate and experience their lives in positive ways, and encompasses global judgments of life satisfaction (LS), as well as the frequency of positive and negative affect (PA and NA, respectively) in one's life. To inform the current ambiguity concerning the structure of SWB, the aim of this Masters thesis was to evaluate the structure of SWB based on whether the three components of SWB change together or independently naturally, over time and following experimental manipulation. In **Study 1**, associations among changes in LS, PA, and NA were evaluated using a longitudinal approach tracking natural changes in the components over periods of three months and three years. Results indicated that change in one component was related to change in the other two components. In **Study 2**, an experimental design was used to manipulate each SWB component individually, and evaluate changes in all three components following each manipulation. Manipulation materials designed to target LS only were effective (i.e., led to heightened focus on LS, and not PA or NA) and created an increase in both LS and PA. Manipulation materials designed to target PA and NA only were not effective (i.e., led to heightened focus on the target component, as well as on LS). Furthermore, in both studies the strength of an individual's SWB (assessed in terms of structural consistency and structural ambivalence in Study 1 and Study 2, along with subjective ambivalence in Study 2) did not consistently moderate the degree to which changes in the components were associated with one another. Together, these findings indicate that the structure of SWB may be complex and dynamic, rather than static. Alternatively, the components of SWB may not

be easily manipulated in isolation of one another. Implications for existing structural models of SWB are discussed.

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General Introduction

The focus of the current thesis is the structure of subjective well-being. Subjective well-being consists of three components: life satisfaction (a cognitive assessment of how satisfied you are with your life), positive affect (positive feelings towards your life) and negative affect (negative feelings towards your life). The aim of the current thesis is to inform the structure of subjective well-being – defined as how the three components fit together to form subjective well-being. The structure of subjective well-being was examined with respect to whether change in one component of subjective well-being was independent of, or related to, changes in the other two components. Two studies were completed. The first study employed a naturalistic, longitudinal approach to track changes in the subjective well-being components over time (three months and three years) and examined the associations among the observed changes in life satisfaction, positive affect, and negative affect. The second study employed an experimental approach to manipulate the three subjective well-being components individually, and assess changes in all three components following the manipulations. Further, in both studies an attitudes perspective was used to further inform associations among the three components through examining the concept of attitude strength as a moderator of the degree of relatedness among the subjective well-being components.

Subjective Well-Being: Life Satisfaction, Positive Affect, and Negative Affect

One prominent approach to studying well-being was introduced by Diener (1984), who defined *subjective well-being* (SWB) in terms of three main components: *life satisfaction* (LS), *positive affect* (PA), and *negative affect* (NA).

The first component of SWB, LS, is an evaluation of how satisfied an individual is with his or her life overall. LS evaluations are thought to be primarily cognitive in

nature. That is, the focus is on what an individual *thinks* about his or her life, rather than how an individual feels towards his or her life. An individual's level of LS can be high (e.g., "I am very satisfied with my life overall"), low (e.g., "I am very dissatisfied with my life overall"), or somewhere in between (e.g., "I am somewhat satisfied with my life overall"). LS is typically assessed using Diener and colleagues' (1985) 5-item Satisfaction with Life Scale, however 1-item measures of LS are also frequently used and possess adequate reliability and validity (Schimmack, 2008). In a more recent study, Busseri and Sadava (2012) confirmed that the 5-item LS measure correlated highly with a 1-item LS measure ($r = .69$, $p < .001$) and yielded consistent results. Although LS is a global judgement about one's life, individuals often draw on satisfaction within specific life domains (e.g., career, personal relationships, or academic standing) to evaluate their overall LS (Diener, 1984; Rojas, 2007). LS can thus reflect a composite evaluation of multiple life domains that can vary across individuals. For example, a student that values education may draw purely on academic experiences, the life domain most important to them, when rating their level of LS. Meanwhile, an older adult may draw on their career and romantic relationship. As demonstrated by this example, the importance of specific life domains can change with age (Andrews & Withey, 1976; Campbell, 1976; Cutler, 1979; Schimmack & Oishi, 2005). Regardless of the domain(s) referenced, LS is still a cognitive evaluation of how satisfied or dissatisfied an individual is with his or her life overall.

The final two components of SWB, PA and NA, reflect positive and negative emotional experiences related to one's life overall (Diener, 1984). From a SWB perspective, PA and NA consist of long-term *emotional reactions* towards one's life,

rather than present mood. Although both emotions and moods can be intense and long-lasting, the key distinction is that emotional reactions (with respect to SWB) are more specific and based on one's life, whereas moods are more global and are not linked to a particular object (Frijda, 2000). SWB researchers are particularly interested in emotions (and overall emotional experiences and evaluations) that are linked to an individual's life. Nonetheless, mood is considered one potential input to evaluations of PA and NA with respect to one's life, wherein individuals may draw on their present mood when forming more global evaluations of their lives (Ashby, Isen, & Turken, 1999; Frijda, 2000; Schimmack, Diener, & Oishi, 2002; Schwarz & Strack, 1999; Schwarz & Clore, 1983).

An individual's level of PA and NA can be high, low, or somewhere in between. High PA is characterized by the experience of frequent positive emotions (e.g., happiness, contentment, joy), whereas high NA is characterized by the experience of frequent negative emotions (e.g., anger, fear, sadness). For example, "I often feel happy about my life" and "I often feel angry about my life" are sentiments that reflect high PA and high NA respectively. In comparison, low PA and low NA are characterized by the infrequent experience of these same positive and negative emotions (e.g., "I rarely feel happy about my life" or "I rarely feel angry about my life"). Since PA and NA are treated as separate components of SWB within the SWB literature, it is possible for individuals to experience congruent (e.g., high PA and low NA) or incongruent (e.g., high PA and high NA) PA and NA configurations (see Busseri & Sadava, 2012). The *intensity* (i.e., magnitude) of PA and NA are commonly measured using the 20-item Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), which includes 10 items reflecting PA and 10 reflecting NA. Although affective experiences can be

assessed with respect to intensity in this way, there is evidence that the *frequency* of PA and NA (i.e., frequent PA and infrequent NA) correlate more strongly with ratings of LS (Diener, Larsen, Levine, & Emmons, 1985; Diener, Sandvik, & Pavot, 1991). Thus, SWB is typically conceptualized in terms of the relative frequency of positive versus negative emotional experiences. Therefore, the Scale of Positive and Negative Experience (SPANE; Diener et al., 2009) has been introduced and implemented in order to measure the frequency of PA and NA with respect to SWB.

Although they are treated as separate components within the SWB literature, the relationship between PA and NA is a topic of long-standing debate within the broader affect literature. The bipolar view of emotional experiences assumes that PA and NA are opposite extremes, falling along the ends of the same continuum. The bipolar view assumes that individuals can only be at one point along the continuum, experiencing either PA or NA, but not both. In this way, pleasant emotions inhibit unpleasant emotions and vice versa at a specific moment in time (see Russell & Carroll, 1999). Therefore, at any given moment, individuals are experiencing either exclusively PA, exclusively NA, or emotional neutrality (Russell & Carroll, 1999). The argument in favor of the bipolar view is that when examining PA and NA separately, only a portion of the full continuum is being measured, since emotion words like happy and sad are naturally antonyms. Researchers tend to agree that the bipolar view of PA and NA is most appropriate when considering affect at a specific moment in time (for a review see Russell & Carroll, 1999).

When the discussion moves to multiple moments in time rather than a specific moment, there is evidence that individuals can experience a mixture of PA and NA,

which supports the independence of positive and negative emotions that is assumed within the SWB literature (Schimmack & Crites, 2005). When examining SWB, the focus is on the overall affective experience of an individual over a long period of time, usually a matter of weeks or months. So although PA and NA seem to be mutually exclusive at one moment in time (i.e., the bipolar view), they appear to be independent across multiple moments in time (Russell & Carroll, 1999).

Indeed, if PA and NA are bipolar, strong negative correlations between PA and NA would be expected; however moderate correlations ($r \sim -.40$) are often found (Russell & Carroll, 1999). Another type of evidence for the independence of the two affective components of SWB is the differing correlates of PA and NA, including specific personality characteristics (e.g., Bradburn, 1969; Cherlin & Reeder, 1975; Costa & McCrae, 1980; Diener & Emmons, 1985; Harding, 1982; Warr, 1978). More specifically, in terms of the Big Five factor model of personality (Costa & McCrae, 1992), meta-analyses of SWB and personality have shown that PA tends to correlate positively with extraversion, whereas NA tends to correlate positively with neuroticism (DeNeve & Cooper, 1998; Russell & Carroll, 1999; Steel, Schmidt, & Shultz, 2008). The moderate (rather than very strong) negative correlation between, and the differing personality correlates of, PA and NA support measuring these components of SWB independently from one another in order to provide a more comprehensive picture of an individual's affective experiences over time. Understanding an individual's affective experiences over time is one of the main goals of SWB research. Therefore, PA and NA are treated as separate components of SWB and attempts to enhance well-being focus on enhancing PA as well as decreasing NA.

Subjective Well-Being as Cause and Effect

In general, people want to live a fulfilling and satisfying life and high SWB - high LS, frequent PA, and infrequent NA - has been linked to many positive life outcomes. Within the SWB literature, SWB is framed in two ways. The first is as an outcome variable, with certain experiential, psychological, cognitive, motivational, personality, cultural, contextual, and demographic factors predicting SWB (DeNeve & Cooper, 1998; Diener, Suh, Lucas, & Smith, 1999). The second is as a predictor of future positive outcomes, such as overall health and goal pursuit. It has been proposed that SWB functions as both a sign of positive functioning and an avenue for promoting further positive functioning (Diener & Seligman, 2004; Shmotkin, 2005; Veenhoven, 2008).

SWB as outcome. Researchers have yet to find a sole predictor of high SWB (i.e., high LS, frequent PA, and infrequent NA); rather, there seems to be a combination of specific factors that must be present in order for high SWB to occur. The most commonly cited predictors of SWB are personality characteristics, genetic dispositions, strong social relationships, and circumstances such as health and socioeconomic status (Diener & Seligman, 2002). Life events and goals have an apparent, yet ephemeral, impact on SWB (Diener & Seligman, 2002). Other factors, such as biosocial indicators (e.g., sex, age, marital status) and intelligence, have also been studied and are in essence unrelated to SWB or account for very little variance in SWB (for further review see DeNeve & Cooper, 1998). Lyubomirsky, Sheldon, and Schkade (2005b) have developed a model in which three factors account for the population variance in SWB, based on past cross-sectional SWB research. Genetics and personality are thought to account for as much as 50% of the between-person variance in SWB, intentional activity (like striving

towards goals or pursuing personal relationships) accounts for 40%, and circumstances (such as demographic factors or culture) account for 10%. Further, individuals are thought to be characterized by a baseline level of SWB (i.e., a long-term, durable 'set-point') around which their momentary, daily, or weekly levels of SWB may fluctuate. According to this model, individuals' SWB set-points and circumstances are, for the most part, beyond their control. Within their control however, is the choice to engage in enjoyable activities and/or personal relationships that can lead to positive changes in their level of SWB (i.e., increases in LS and PA, as well as decreases in NA).

Personality. It is possible that personality exerts the strongest influence on an individual's SWB (DeNeve & Cooper, 1998). Top-down models of SWB stress the importance of personality traits, assuming that these traits lead people to experience life in a positive or negative way (Diener, 1984). An individual's personality determines how they interpret events, and in turn how they evaluate their lives. In terms of the Big Five factors, neuroticism predicts LS and NA, whereas extraversion and agreeableness predict PA (DeNeve & Cooper, 1998). Extraverts are warm, lively, assertive, and energetic (Lucas, 2001), characteristics that aid in forming social bonds, another important predictor of SWB. In a more recent meta-analysis, Steel and colleagues (2008) propose two reasons for the relationship between SWB and personality characteristics: genetic links and parallel elements between the two constructs. There is a genetic link between individual differences in personality and SWB, with genes accounting for a sizeable portion of the variance between individuals in long-term SWB and being expressed primarily through personality traits. Thus, genes influence personality traits, which then influence an individual's level of SWB. Parallel elements refer to the overlapping

definitions of personality traits and SWB components, more specifically extraversion and PA, as well as neuroticism and NA. The influence of genes and personality on SWB, however, does not necessarily mean that SWB cannot be changed. Personality may indirectly impact SWB by influencing our environment and experiences (Sheldon & Lyubomirsky, 2006). Therefore, the environment we subject ourselves to and the experiences we seek out have the potential to increase or decrease our well-being over and above our genetic predispositions.

Set-points. A genetic predisposition could explain why individuals tend to have SWB set-points. Set-points (i.e., stable SWB) are based on temperamental, intrapersonal, and affective personality traits (Steel et al., 2008). According to the theory of SWB set-points, individuals fluctuate around a baseline level of SWB. Overall SWB set-points can vary between individuals, with set-points being positive (reflecting high SWB), neutral, or negative (reflecting low SWB). Interestingly enough however, for most people, SWB set-points are positive (see Cummins, 2010; Diener & Diener, 1996). When an event that is considered to be pleasant increases SWB (like winning the lottery) or an event that is considered to be unpleasant decreases SWB (like suffering a serious injury), people eventually return to their baseline level of SWB, usually within a matter of months (Luhmann, Hofmann, Eid, & Lucas, 2012; Suh, Diener, & Fujita, 1996). This process is known as adaptation (Diener, Lucas, & Napa Scollon, 2006; Headey & Wearing, 1989). In other words, the novelty of any event, whether good or bad, eventually wears off and individuals return to their SWB set-point. According to the dynamic equilibrium model of SWB, each person has an equilibrium level of SWB that is determined by personality traits. For example, individuals with higher SWB tend to have higher extraversion, lower

neuroticism, and greater openness to experience. These personality traits also work to return SWB to its equilibrium level, such that higher extraversion and lower neuroticism (for example) are associated with greater stability in SWB over time (DeNeve & Cooper, 1998). Therefore, although various life events may create fluctuations in SWB, people return to their set level of SWB once the novelty of the event diminishes and equilibrium is restored.

Although SWB is composed of LS, PA, and NA, the set-points for the individual components are not necessarily the same (i.e., all positive or all negative). The rate of adaptation can vary between situations and across individuals, making it a very flexible process (Lucas, Clark, Georgellis, & Diener, 2003; Luhmann et al., 2012). Set-points can thus be thought of as a set range. Nurturing oneself and pursuing fulfilling activities may influence where an individual ends up within his or her own set range for LS, PA, and NA (Sheldon & Lyubomirsky, 2006). Set-points (and set ranges) are not necessarily static, and have been found to change throughout the lifespan (Diener et al., 2006). So far within the literature, the focus has been on adaptation to negative life events, such as serious injuries or the death of a spouse (Silver, 1982; Stroebe, Stroebe, Abakoumkin, & Schut, 1996). Little is known about adaptation to positive life events, making it an interesting area of research that requires further exploration (Diener et al., 2006).

Social relationships. Strong social relationships are a consistent commonality among individuals experiencing the most frequent PA (DeNeve & Cooper, 1998; Diener & Seligman, 2002). Engaging in close social relationships improves emotion regulation skills and helps sustain high SWB (Shmotkin, 2005). Individuals with high SWB spend more time socializing with romantic partners, friends, and family members compared to

individuals with low SWB. In this way, forming strong social bonds enhances LS, increases the frequency of PA, and helps to prevent NA (Argyle & Martin, 1991; Cohen, 1988; House, Landis, & Umberson, 1988; Myers, 1992).

Goal strivings. Striving towards goals may be an important predictor of SWB (DeNeve & Cooper, 1998). Goal pursuit is linked to personality traits, with personality dictating the types of goals an individual chooses to pursue (DeNeve & Cooper, 1998). An increase in negative emotions arises when individuals believe they cannot achieve their goals, feel ambivalent towards their goals, and/or pursue conflicting goals simultaneously (DeNeve & Cooper, 1998). Striving towards a specific goal, and failing to reach it, results in decreased LS, especially if the goal was held in high regard (DeNeve & Cooper, 1998).

According to Multiple Discrepancy Theory (Michalos, 1985), LS is influenced by the standards individuals use as a comparison, or ideal. These standards can include other people (a close friend that excels in their career), past conditions (their level of LS five years ago), an ideal level of LS (I should be more satisfied than I am), or important needs as well as goals (buying a larger house). These comparisons influence an individual's expectations as well as the interpretation of their current status. A discrepancy caused by an upward comparison (my expectation was better than reality) results in decreased LS, whereas a discrepancy caused by a downward comparison (my expectation was worse than reality) results in increased LS.

Health and SES. SWB is related to an individual's subjective health rating and socioeconomic status (i.e., adequate income necessary to meet basic needs; DeNeve & Cooper, 1998). Once basic human needs are met, individuals experience an increase in

PA, a decrease in NA, and feel more satisfied with their lives overall (LS; DeNeve & Cooper, 1998). This finding extends beyond individuals, with wealthier nations reporting higher well-being than poorer nations (Diener & Biswas-Diener, 2009).

In this way, pre-determined factors such as personality characteristics, physical health, and SES influence the frequency of PA and NA experienced by an individual, as well as how satisfied they are with their life overall (LS). Extraverted individuals who consider themselves to be in good health and can meet their basic needs financially tend to rate their SWB as high. Sociability is a key component of extraversion, and although one factor does not seem to lead to high SWB, strong social relationships tend to be a commonality among individuals with high SWB. Pursuing complimentary life goals and believing one can achieve important goals also increases SWB. Different life events cause SWB to deviate from an individual's set-point, but within a few months adaptation often occurs and SWB returns to the baseline level (often positive). SWB as an outcome is an indicator of optimal human functioning, and simply stated, announces to others that someone is doing well.

SWB as cause. In addition to the evidence reviewed above indicating that SWB is a useful indicator of optimal human functioning, in this section I review research suggesting that SWB may also be a potential cause of desirable personal, interpersonal, and societal-level outcomes. According to Lyubomirsky et al. (2005b), for example, treating SWB as an outcome of factors such as personality, genetics, social relationships, health, and SES only explains part of the story. SWB may be agentic, indicating well-being as well as providing individuals with an environment conducive to positive growth (Shmotkin, 2005). The established correlates of SWB support the relationship between

SWB and positive outcomes (Busseri & Sadava, 2011). Longitudinal research supports the notion that temporally, SWB precedes human flourishing, and therefore leads to many positive outcomes, such as fewer symptoms of mental illness, better overall health, stronger interpersonal relationships, increased pro-social functioning, a higher standard of living, and greater peace at the societal-level (Busseri & Sadava, 2011; Lyubomirsky, King & Diener, 2005a; Lyubomirsky et al. 2005b; Pressman & Cohen, 2005). With respect to how SWB may promote positive outcomes, SWB provides individuals with a positive state of mind, which influences future thoughts about the world and one's behaviour (Shmotkin, 2005). This positive psychological environment provides a buffer against actual or perceived threats and reduces feelings of vulnerability during everyday tasks. In fact, there is evidence that individuals experiencing frequent PA are more likely to approach rather than avoid new tasks (Cacioppo, Gardner, & Berntson, 1999). In essence, when SWB is high, the world is seen as less hostile and goals as well as tasks are seen as more attainable (Cacioppo, Gardner, & Berntson, 1999). Confidence in attaining one's goals ultimately leads to more goal achievement (Lyubomirsky et al., 2005a).

According to the Broaden and Build Theory of positive emotions, the experience of PA allows for more creative thinking, the pursuit of personally relevant goals, and the strengthening of relationships, which provides individuals with a surplus of personal resources (Fredrickson, 2004). These resources can be drawn on to combat negative emotions, which cause individuals to withdraw from challenges in an attempt to avoid harm and disappointment. Positive emotions broaden the mind, make individuals open to challenges, and lead to more creative thinking and active goal pursuit (Lyubomirsky et al., 2005a). Frequent PA is also linked to increased confidence and self-efficacy.

Working towards goals helps develop personal skills and resources that can be relied on for later success in various life domains. According to the undoing hypothesis, positive emotions also reverse the harmful effects of negative emotions and preserve well-being (Fredrickson, Mancuso, Branigan, & Tugade, 2000).

Frequent PA and infrequent NA also appear to lead to success – defined as accomplishing goals set out by society – within important life domains such as work, social relationships, and physical as well as mental health (Lyubomirsky et al., 2005a). Individuals with high SWB tend to flourish within the workforce. Individuals characterized by high SWB are more likely to graduate from college, receive job interviews, and secure better jobs than their low SWB counterparts. They are also more likely to perform well at work, receive positive evaluations from supervisors, show high productivity, and are less likely to experience burnout or conflicts with colleagues (Lyubomirsky et al., 2005a). Employees high in PA also tend to experience greater financial success, receiving greater increases in pay over time compared to employees with lower PA (Staw, Sutton, & Pelled, 1994). Managers with high PA tend to have employees with high PA, which leads to a warmer work environment, more satisfied customers, and increased profits.

Lyubomirsky and colleagues (2005a) argue that SWB acts as a predictor of the quality, quantity, and perception of social relationships. These authors have proposed that levels of SWB, specifically frequent PA, can determine whether or not people want to become close friends with someone. Close acquaintances are more drawn towards individuals with high PA, since positive qualities and a positive outlook are desirable features in a close companion (Salovey, Rothman, Detweiler, & Steward, 2000). When

someone experiences frequent positive emotions, others take notice and are more likely to provide that individual with assistance and emotional support (Salovey et al., 2000). Being close to someone experiencing high PA may also evoke positive feelings in oneself, increasing the likelihood that the relationship will be maintained (Berry & Willingham, 1997; Staw et al., 1994). Individuals experiencing frequent PA are also more inclined to be kind and charitable towards others, through volunteer work and service towards their community (Lyubomirsky et al., 2005a). In general, people experiencing frequent PA are more satisfied with their social activities and have a more positive view of others (Lyubomirsky et al., 2005a). Forming strong social bonds increases the frequency of PA, which in turn leads to advantageous outcomes such as enhanced social acceptance, health, and emotional adjustment (Argyle & Martin, 1991; Cohen, 1988; House et al., 1988; Myers, 1992).

With regards to mental and physical health, high PA is linked to better health and fewer symptoms of psychopathology. Substance abuse (e.g., drug use), an indicator of poor mental health, is lower in individuals experiencing frequent PA (Lyubomirsky et al., 2005a). After controlling for other risk factors, such as age and physical health, being satisfied with one's life is related to lower suicide risk 20 years later (Koivumaa-Honkanen et al., 2001), which may be due to the fact that PA leads to more effective coping of life events. Most research has focused on the negative impact negative emotions, like those associated with stress and anxiety, have on one's health. It is important to note that not only is low NA beneficial to one's health, but high PA is also linked to better self-reported physical health in longitudinal studies (Graham, Eggers, & Sukhtankar, in press; see also Koivumaa-Honkanen et al., 2004). When PA is high,

individuals experience strengthened immune systems (Stone, Cox, Valdimarsdottir, Jandorf, & Neale, 1987) and abstain from unhealthy activities, like smoking, maintaining a poor diet, or substance abuse (e.g., Graham et al., in press; Piko, Gibbons, Luszcynska, & Teko¨zel, 2002). Individuals experiencing high PA are also rated as more physically active and energetic by their family and friends (Diener & Fujita, 1995; Schimmack, Oishi, Furr, & Funder, 2004). This is not to say that individuals experiencing frequent PA never experience health issues, but those who do take less medication for symptoms, and report fewer visits to the doctor in addition to less pain (Achat, Kawachi, Spiro, DeMolles, & Sparrow, 2000; Røysamb, Tambs, Reichborn-Kjennerud, Neale, & Harris, 2003). By impacting mental and physical health, PA leads to a higher quality of life and aids in the survival of an individual (Berscheid, 2003; Myers, 1999). Therefore, there is evidence that SWB promotes positive functioning, and is not simply a static attribute (Shmotkin, 2005).

Positive emotions related to one's life seem to propel individuals towards further exploration and positive outcomes, resulting in successful and flourishing people. Past research has shed light on the factors that influence SWB (e.g., genetic disposition, social relationships) as well as the positive outcomes caused by SWB (e.g., success in life domains, improved health). Due to the cause and effect influence it has on human functioning, understanding SWB is an important aspect of improving the lives of individuals. The question now becomes, what is SWB? In order to reap the benefits of the proliferation of SWB research, we need to understand how LS, PA, and NA fit together to form SWB. In essence, although it is now clear why we should care about SWB, the *structure of SWB* remains ambiguous.

Structural Models of Subjective Well-Being

Although it is widely accepted within the SWB literature that LS, PA and NA are the primary components of SWB, there is confusion surrounding how these components fit together to form SWB. Busseri and Sadava (2011) review five prominent structural models of SWB. As I discuss below, these models describe LS, PA, and NA as three separate components, a hierarchical structure, a causal system, a composite, and a unique configuration within individuals. Note that these models assume different levels of relatedness (versus independence) among the SWB components, and each is backed by studies purportedly supporting their respective assumptions.

Model 1: Three separate components. In Model 1, LS, PA and NA are treated as three separate constructs. The associations among the components are thought to be irrelevant to understanding SWB per se, as are the associations among the changes in the components, and thus the components are treated (e.g., analyzed) as if they are functionally *independent* (Campbell, 1981; Lucas, 2008). Support for this model stems from evidence that the components load onto separate factors (e.g., Adler & Fagley, 2005; Heller, Komar, & Lee, 2007; Lucas, 2008), and that PA and NA are separate aspects of affective experience (Bradburn, 1969; Bradburn & Caplovitz, 1965). LS, PA, and NA are treated as separate constructs, each contributing distinct information about the broad topic of interest, SWB. Campbell (1981) stated that the components "do not always move together" (p.38), therefore knowing one (e.g., level of LS) does not reliably inform another (e.g., frequency of PA). According to this view therefore, all three components should be measured separately, because they each reflect different aspects of SWB. Treating the components as independent inputs to SWB influences the course of

statistical analyses. The main goal of analyses is to outline the distinct causes and correlates of LS, PA, and NA separately. One important problem with Model 1 is that it ignores the relationships that are often observed between the components of SWB.

Model 2: Hierarchical structure. In Model 2, SWB is treated as a latent higher-order factor reflected by LS, PA, and NA (three lower-order factors), and thus the components are assumed to be *related* to one another. Strong positive correlations are often reported between LS evaluations and the experience of PA, as are moderate to strong negative correlations between LS and NA, supporting this model and the premise that the components reflect a common underlying construct (i.e., SWB; Diener & Emmons, 1985; Lohmann, 1977). From this perspective, studying SWB requires positive correlations among LS and PA, and negative correlations among LS and NA, as well as between PA and NA in order to estimate a latent higher-order SWB factor. Similar to Model 1, all three components need to be measured to inform SWB. However, the analyses for Model 1 and Model 2 differ. Rather than determining causes and correlates of the separate components of SWB (as in Model 1), when Model 2 is adopted, the focus is on examining correlates of the higher-order SWB factor. One drawback to Model 2 is the variable associations among the components observed across studies (e.g., Arthaud-Day et al., 2005; Busseri, Sadava & DeCourville, 2007), making it difficult to determine the viability of examining SWB as a latent higher-order factor in every study.

Model 3: Causal system. In Model 3, LS is seen as an outcome of PA and NA, and thus LS and PA, as well as LS and NA, are assumed to be causally *related* to one another. Researchers who adopt this model of SWB treat PA and NA as predictors of LS (Bradburn, 1969; Brenner, 1975; Costa & McCrae, 1980; Kozma & Stone, 1980). The

assumption is that individuals rely on their emotions when assessing how satisfied they are with their lives overall. According to Model 3, high PA and low NA will result in the highest (most positive) life evaluations. Under Model 3, LS is treated as the main indicator of SWB. Indeed, some researchers adopting this model consider LS to be the essence of SWB (Davern, Cummins, & Stokes, 2007; Oishi & Koo, 2008); therefore, measuring only LS, and not PA or NA, would inform SWB. There is support for long-term affect accounting for approximately half of the variability in LS (Diener, 1994; Diener, Lucas, Oishi, & Suh, 2002; Diener, Napa Scollon, & Lucas, 2003; Emmons & Diener, 1985; Kim-Prieto, Diener, Tamir, Scollon, & Diener, 2005). However, this evidence is based on cross-sectional research, which cannot support the assumption that PA and NA cause LS. According to Model 3, an individual's affective experiences are used to determine how satisfied they are with their life overall; therefore PA and NA are treated as independent predictors of LS. That is, studying SWB involves assuming a causal system wherein PA and NA are treated as predictors of LS (e.g., Davern et al., 2007; Lent, 2004; Schimmack et al., 2002; Schimmack, 2008). One problem with this model is the uncertainty surrounding SWB, and whether it is reflected by a single component (LS) with PA and NA as secondary predictive factors, or a three-component model (LS, PA, and NA).

Model 4: Composite. In Model 4, SWB is considered to be the combination of LS, PA, and NA. Consequently, all three components need to be examined in order to inform SWB because LS, PA, and NA are treated as joint contributors to an individual's overall well-being. Composite SWB scores are often generated by combining LS, PA, and reverse-scored NA items (Sheldon & Hoon, 2007). Unlike Model 2, Model 4

assumes that LS, PA, and NA *produce* SWB, rather than SWB producing LS, PA, and NA. According to Model 4, the associations among the SWB components, and among changes in the components, are irrelevant to understanding SWB. From this perspective, because LS, PA, and NA are considered to be joint contributors to SWB, all three components need to be measured, and the associations among the SWB components are not a focus. Model 4 thus assumes that LS, PA, and NA are *independent* aspects of SWB, similar to Model 1. Nonetheless, within Model 4, omitting one of the components would result in an incomplete picture of SWB. Unlike Model 1, the approach in Model 4 is to treat SWB as a combination of LS, PA, and NA. This is done by creating a composite LS, PA, and NA score and then relating the resulting composite score to possible correlates and predictors (e.g., personality characteristics, overall health). This SWB composite can be analyzed regardless of the correlations among components. Yet interpreting results based on composite scores becomes confusing when the correlations among the individual components are not specified or fully understood.

Model 5: Configuration of components. Model 5 utilizes a person-centered approach, focusing on configurations of LS, PA, and NA within individuals (Shmotkin, 2005). The configuration of the components simply refers to the levels of LS, PA, and NA experienced by an individual. Two people each with high LS, high PA, and low NA share the same SWB organization, or configuration. Support for this model stems from the identification of five distinct SWB configurations that vary across individuals (Busseri, Sadava, Molnar, & DeCourville, 2009; Busseri & Sadava, 2012). Within Model 5, the components are considered to be *independent* of one another. All three components need to be measured in order to determine which configuration an individual fits into;

however, the associations among the SWB components, and changes in these components, across individuals is not directly relevant to understanding SWB. For example, two possible configurations are a high SWB configuration (high LS, frequent PA, infrequent NA) or a low SWB configuration (low LS, infrequent PA, frequent NA; Busseri & Sadava, 2012). Analyses include using cut scores based on composite SWB scores to define high versus low SWB groups (Diener & Seligman, 2002) and cluster analysis to identify distinct SWB configurations (Busseri & Sadava, 2012; Busseri et al., 2009). One drawback to Model 5 is that although it captures individual differences in SWB configurations, it is unclear whether focusing on configurations completely informs the essence of SWB, which may be dimensional in nature, rather than categorical, and if so, which configuration should receive the most attention?

Implications. Until Busseri and Sadava's (2011) review of the differing structural models of SWB, the confusion regarding the *structure* of SWB within the literature was altogether ignored. Depending on the model of SWB adopted, the components of SWB are defined as either three separate components, a hierarchical structure, a causal system, a composite, or a unique configuration within individuals. These conflicting definitions lead to different methods of measurement, where all three components need to be measured separately (Model 1, 2, 4, and 5) or only one component needs to be measured to inform SWB (Model 3). Further, differing structural models result in different analytic strategies: examining the correlates of SWB (Model 1), SWB as a higher-order factor (Model 2), PA and NA as predictors of LS (Model 3), SWB as a composite of LS, PA, and NA (Model 4), or cluster analysis to determine SWB configurations (Model 5).

Consequently, the utilization of these five distinct models of SWB has resulted in the proliferation of separate bodies of literature within the SWB field.

In order to create a meaningful synthesis of the existing SWB research, a review of the research pertaining to each model should be undertaken. Until then, researchers must assume that SWB findings using one model do not generalize to the other models (Busseri & Sadava, 2011). More broadly, SWB researchers are treating LS, PA, and NA as either *independent* or *related* to one another. For the sake of clarity and as a starting point, in the present work the structural models will be reduced to two broad categorizations based on the model assumptions discussed above: the *independence view* (Models 1, 4, and 5) and the *relatedness view* (Models 2 and 3). The corresponding structural models can be examined further once the independence or relatedness of the components is established. This will be necessary because, within the broad independence and relatedness categories, models still differ based on how they conceptualize independence and relatedness. In essence, an answer to the broad question (i.e., are the SWB components independent of or related to one another) must be established before the more specific question (i.e., which of the five models best represents the independence or relatedness of the SWB components) can be examined thoroughly.

Resolution. Busseri and Sadava (2011) have suggested various ways in which the current ambiguity surrounding the structure of SWB can be resolved. For example, *longitudinal research* could be conducted in order to track changes in LS, PA, and NA over time using repeated assessments, and evaluate the associations among changes in the three components over time. This would provide insight into naturally occurring change

within each component, allowing the researcher to examine whether change in one component is related to change in another component over time. According to the *independence view*, changes in one component of SWB observed over time will not be related to changes in the other component(s). In contrast, according to the *relatedness view*, changes in one component of SWB observed over time will be related to changes in the other component(s).

Up to this point, longitudinal studies of SWB have focused primarily on change in LS over time, disregarding the affective components of SWB. For example, Lucas and Donnellan (2007) measured only change in LS over time, and found that LS is moderately stable over long periods of time. Similarly, Luhmann and Eid (2009) focused on how life events that occur repeatedly (e.g., unemployment, divorce) influence LS levels over time. For example, individuals who experience a negative life event such as divorce tend to experience decreases in LS following the first divorce, but such decreases are largely attenuated following a second divorce.

Several longitudinal studies, however, have measured all three SWB components over time. For example, Lucas, Diener, and Suh (1996) measured LS, PA, and NA in two studies, each with two waves, and different durations between the two waves (four weeks apart and two years apart, respectively). Whereas these researchers reported moderate to high correlations within components over time, correlations among the changes in the components over time were not reported. Other researchers have done the same, measuring all three SWB components over time without commenting on correlations among changes in the components (Anusic, Yap, & Lucas, 2014; Busseri et al., 2007; Diener et al., 2006; Eid & Diener, 2004; Luhmann et al., 2012; Lyubomirsky et al.,

2005b; Molnar, Busseri, Perrier, & Sadava, 2009). Therefore, what is not known based on existing longitudinal research on SWB is how *changes* in the components of SWB are independent from, or related to, each other over time.

The complement to the naturalistic, longitudinal study of SWB components over time is *experimental research* on LS, PA, and NA. Experimental research would allow researchers to evoke change in the components, and track the effects of these changes over time with respect to associations among changes in each of the three components. According to the *independence view*, researchers should be able to manipulate one component of SWB without impacting the others, such that a manipulated change (i.e., increase) in LS, for example, would not lead to an associated change in PA (i.e., increase) and/or NA (i.e., decrease). According to the *relatedness view*, however, manipulating one component of SWB will impact the other component(s). For example, increasing one's LS will lead to increases in PA, decreases in NA, or both.

Although promising techniques for manipulating the components of SWB are beginning to emerge (see Seligman, Steen, Park, & Peterson, 2005; Sin & Lyubomirsky, 2009), the SWB manipulations that are currently available tend either to target overall well-being (i.e., LS, PA, and NA), manipulate LS through manipulating PA and/or NA or manipulate present moods within the experimental setting. Further, in experimental studies where all three components are targeted, researchers often average them together (e.g., Sheldon & Lyubomirsky, 2012) – consistent with the composite structural model of SWB (Model 4) – rather than tracking manipulated changes in LS, PA, and NA separately over time, or associations among changes in each component.

Overall well-being has been manipulated by providing individuals with information on how to improve their well-being (e.g., be productive at meaningful work, spend more time socializing, develop positive thinking, eliminate negative feelings; Fordyce, 1983). Other manipulations include having participants practice self-reflection, forgive others, express gratitude, and count one's blessings to improve overall well-being (Sheldon & Lyubomirsky, 2006). SWB researchers use these mixed manipulations that blur the components of SWB in the hopes of increasing overall well-being. With respect to manipulations purportedly targeting LS, Lyubomirsky, Sousa and Dickerhoof (2006), for example, target LS by including emotion words in the LS manipulation; consequently, the manipulation is no longer specific to LS and may cause change in all three components of SWB, rather than LS only.

With respect to studies attempting to manipulate the affective components of SWB, present moods are manipulated through various methods, such as speech preparation tasks (to induce anxiety), positive film clips (Fredrickson, Mancuso, Branigan, & Tugade, 2000), flashing positive emotion words or sentences on a computer screen (King, Hicks, Krull, & Del Gaiso, 2006), having participants read descriptions of negative emotions (like anger and anxiety), or simply leaving participants in a room for long periods of time without explanation to induce anger (Polivy, 1981). As discussed earlier, within the context of SWB, PA and NA consist of long-term emotional reactions towards one's life, rather than present mood; therefore, these manipulations of present mood do not target the essence of the affective components of SWB – that is, emotional reactions linked to one's life.

In summary, SWB manipulations that target one component at a time, and track the resulting changes in all three components separately, have yet to be established. This gap in the research literature may be due to the fact that the need to clarify the structure of SWB has not yet been widely recognized. Consequently, developing manipulations that focus on the separate cognitive or affective components of SWB may have not been deemed necessary. In order to inform the structure of SWB, a more complete understanding of the relations among naturally-occurring changes in the three components over time, as well as the relations among manipulated changes in the three components, is required.

In order to address these issues, SWB can be examined using approaches specifically designed to track associations among longitudinal changes in the three SWB components, as well as associations among manipulated changes in the individual components. In the present thesis, I will address these issues in two studies examining the structure of SWB using longitudinal and experimental approaches. Before turning to the specifics of each study, however, I discuss the social psychological research literature on attitudes. As I describe below, the attitudes literature was used to identify potential moderators of the structure of SWB, and as the foundation for developing manipulations targeting each of the three SWB components individually.

Attitudes and Subjective Well-Being

Maio and Haddock (2009) define an attitude as an "*overall evaluation of an object that is based on cognitive, affective, and behavioral information*" (p.4, italics in original; see also Breckler, 1984; Eagly & Chaiken, 1995; Fabrigar, MacDonald, Wegener, 2005). The object being evaluated is known as the attitude object, and can be

anything (Eagly & Chaiken, 2007). If, for example, someone were to ask my opinion of the ocean, the ocean becomes the attitude object.

The cognitive component of an attitude consists of the beliefs, thoughts, and attributes associated with the attitude object (e.g., the ocean is not safe). The affective component of an attitude encompasses the feelings and emotions elicited by the attitude object (e.g., I am scared of the ocean). The third component of an attitude, the behavioural component, consists of the past, present, or future behaviours and experiences regarding the attitude object. Indicating that in the past I have not swam in the ocean, nor do I have any plans to swim in the ocean in the future, are past and future behaviours associated with the attitude object.

An attitude can be a global evaluation stored in memory, or a temporary construction created in the moment when an individual is asked to make an evaluative judgment (Fabrigar et al., 2005). For example, my previous experience with the ocean means that my evaluation was stored in memory, but if the attitude object was something that I had not formed an attitude towards (e.g., a new food that I had yet to experience), I would form an attitude immediately following the question. In this way, attitudes can be stable evaluations stored in memory, or evaluations that are created 'on the spot' in a particular context (Albarracin, Johnson, & Zanna, 2005; Eagly & Chaiken, 2005; Gawronski, 2007).

Although research on SWB has not typically adopted an attitudes perspective, there are several important parallels between attitudes and SWB (Busseri, 2008). SWB and attitudes both involve an evaluation (Fazio & Petty, 2008; Zanna & Rempel, 1988) in response to a specific attitude object. That is, SWB researchers ask individuals to answer

specific questions concerning their life by drawing on *cognitive* (how satisfied are you with your life?) and *affective* (how often or to what extent do you experience positive or negative emotions related to your life?) information. When individuals answer these questions they are drawing on their attitude towards their life. *My life* becomes the attitude object, and the question becomes 'what is your opinion concerning *your life*?'

The cognitive component of the SWB attitude consists of the LS evaluation (e.g., I am very satisfied with my life overall), whereas the affective component consists of the frequency of PA and NA (e.g., I feel frequent positive emotions and infrequent negative emotions related to my life). Thus a favourable attitude towards one's life would be reflected in high SWB (that is, high LS, frequent PA, and infrequent NA) and an unfavourable attitude would be reflected in low SWB (low LS, infrequent PA, and frequent NA). Just like attitudes, these evaluations of my life are based on subjective experiences, and can vary depending on the context, and the individual (Kahneman, 1999; Schwartz & Strack, 1991); however, they are also discussed as durable, global judgments (Diener, 2008; Diener et al., 2006).

Parallels can also be drawn between the structure of SWB and the structure of attitudes. Like an attitude, SWB is composed of cognitive (LS) and affective (PA and NA) components (Diener, 1984). Further, as in the SWB literature, some approaches treat the cognitive and affective components of attitudes as indicators of a more general underlying attitude (consistent with a hierarchical model of SWB, e.g., Larsen, Diener, & Emmons, 1985; Lohmann, 1977) whereas other approaches cast the attitude components as inputs to the attitude (consistent with the composite model of SWB, e.g., Andrews & Crandall, 1976; Beiser, 1974). Unlike attitudes, however, research in SWB has yet to

incorporate the third component of attitudes, behaviour, into the definition and conceptualization of SWB.

In summary, there are several parallels between SWB and the concept of attitudes. As I review next, with respect to understanding the structure of SWB, research on attitudes provides (1) the foundation for considering *attitude strength*, as a potential moderator of the degree of correlation among the components of SWB, and (2) indications of how the individual components of SWB could be targeted separately within an experimental setting.

Attitude strength. Attitudes can vary in strength. The strength of an attitude is a broad term and attitude strength has been studied in a variety of different ways. The strength of an attitude can be determined by examining various strength-related dimensions including structural consistency, certainty, ambivalence, extremity, accessibility, importance, knowledge, elaboration, or personal relevance (Wegener, Downing, Krosnick, & Petty, 1995). Interestingly, although these various dimensions have been described as indicators of attitude strength, they do not necessarily correlate strongly with each other (Krosnick & Abelson, 1992) or reflect a single underlying dimension of attitude strength (Bassili 1996; Prislin, 1996), suggesting that attitude strength may be operationalized using different approaches. Nonetheless, there are some potential commonalities among attitude strength dimensions. For example, regardless of how attitude strength is assessed, strong attitudes are thought to be stable over time and more resistant to outside influences (Krosnick & Abelson, 1992; Maio & Haddock, 2009). Of these various aspects of attitude strength, two – structural consistency and attitudinal ambivalence – are directly related to the structure of the attitude, that is, how

the components within an attitude relate to each other and are thus of particular interest to the issues of primary concern in this thesis.

With respect to *structural consistency*, intra-attitudinal consistency is the extent to which the overall evaluation is consistent with the beliefs, affect, or behaviour associated with the attitude object, that is, the various attitudinal components (Chaiken, Pomerantz, & Giner-Sorolla, 1995). Intra-attitudinal consistency is assessed by measuring the overall attitude towards an attitude object (i.e., favourable or unfavourable) and comparing that evaluation to the cognitive, affective, and behavioural evaluations of the attitude object to determine whether they are consistent with one another (Crites, Fabrigar, & Petty, 1994). Another form of structural consistency directly relevant to present purposes pertains to how the components of an attitude are related to each other; more specifically, whether the relationship between a person's thoughts and feelings towards an attitude object are internally consistent (Maio & Haddock, 2009). An attitude is thus high in strength to the extent that it has a clear internal structure; such attitudes are more likely to influence information processing (i.e., individuals devote greater attention to information that is relevant to high-strength attitudes compared to low-strength attitudes; Houston & Fazio, 1989) and less likely to change (Chaiken et al., 1995).

With respect to present purposes, structural consistency among the components of SWB could be evaluated by measuring all three components and comparing the similarities among them. Whereas *similarity between individuals* refers to stronger (versus weaker) correlations among the SWB components, *similarity within individuals* refers to the degree to which SWB scores are more (versus less) comparable in magnitude. It is this latter type of similarity that will be assessed in the present studies in

order to gauge the degree of structural consistency among the SWB components within individuals. Thus, structural consistency is high if an individual's thoughts and feelings towards his or her life are favourable (i.e., positive) or unfavourable (i.e., negative). Structural consistency would be low if an individual's feelings towards his or her life are positive, but his or her thoughts are negative, or vice-versa.

In addition to structural consistency, a second aspect of attitude strength relevant to the structure of SWB is *attitudinal ambivalence*. Two types of ambivalence are typically studied: subjective ambivalence and structural ambivalence (Refling et al., 2012). *Subjective ambivalence* is the psychological conflict reported by an individual when asked to evaluate an attitude object. Subjective ambivalence is most commonly measured by asking individuals to rate how mixed versus one-sided their feelings are towards an object. For instance, Visser and Mirabile (2004) asked participants to rate their level of mixed feelings towards senior comprehensive exams using a 5-point scale ranging from 1 = *not at all* to 5 = *completely*. An attitude is high in strength to the extent that ambivalence towards the attitude object is low (i.e., clear one-sided thoughts and feelings towards the attitude object). With respect to SWB, the attitude would be considered high-strength (i.e., low subjective ambivalence) if people report low conflict (or infrequently feeling 'torn') between their positive and negative thoughts as well as affective experiences.

The second common approach to measuring ambivalence is *structural ambivalence*, or the observed co-existence of positive and negative evaluations towards an attitude object. Unlike subjective ambivalence, structural ambivalence does not necessarily involve an explicit awareness of conflict on the part of the participant. Rather,

individuals receive directions to provide positive and negative evaluations of an attitude object. Individuals are either directed to provide positive and negative evaluations separately from one another (partitioned dimensions technique; Refling et al., 2012) or are allowed to provide positive and negative evaluations simultaneously (non-partitioned dimensions technique; Refling et al., 2012). A formula is then employed by the researcher in order to calculate an overall structural ambivalence score (Bell, Esses, & Maio, 1996). With respect to SWB, the attitude would be considered high in strength if PA and NA are not competing with one another, so that mostly PA (i.e., frequent PA, infrequent NA) or mostly NA (i.e., infrequent PA, frequent NA) is being experienced in one's life. Similarly, the attitude would be considered high in strength if positive and negative thoughts are not competing with one another, so that evaluations of one's life are mostly positive or mostly negative.

Both structural consistency and attitudinal ambivalence may be relevant to understanding the structure of SWB. In particular, in examining the structure of SWB with respect to changes in its components, attitude strength may play an important moderating role. The strength of an attitude is linked to attitude change, in that high-strength attitudes are more persistent and resistant to change than are low-strength attitudes (Bohner & Dickel, 2011; Clark, Wegener, & Fabrigar, 2008; Wegener et al., 1995). Chaiken and colleagues (1995) have established that an attitude is high in strength to the extent that it has a clear internal structure (i.e., high structural consistency) and such an attitude is less likely to change. Similarly, consistently valenced feelings towards an attitude object (i.e., low ambivalence) result in stable attitudes that are less likely to change; whereas mixed feelings (i.e., high ambivalence) result in unstable attitudes (Bell,

Esses, & Maio, 1996; Hodson, Maio, & Esses, 2001) that are more likely to change. Consequently, I would predict that the stronger an individual's attitude (i.e., the greater the structural consistency and/or the lower the attitudinal ambivalence), the more closely related will be the changes among the attitude components. With respect to SWB, therefore, the stronger an individual's attitude towards *her life*, the more closely related will be changes among the components of SWB (LS, PA, and NA).

Typically, moderation occurs when the relationship between a predictor (x) and outcome variable (y) depends on a third variable, or moderator (z; Field, 2009). The predictor, outcome, and moderating variable are commonly separate variables. Examining attitude strength as a potential moderating variable of the structure of SWB (more specifically as a moderator of the associations among changes in LS, PA, and NA based on structural consistency and structural ambivalence as indicators of attitude strength), required that structural consistency (in Study 1 and Study 2) and structural ambivalence (for Study 1 only) be derived from scores associated with the outcome variables (i.e., LS, PA, and NA). These scores were then combined to arrive at an aggregate index of attitude strength. Deriving the moderating variable (i.e., attitude strength) from the outcome variables of interest (baseline measures of LS, PA, and NA) resulted in a potential confound between the moderator and outcome variables. In order to reduce this potential confound, baseline LS, PA, NA scores were statistically controlled for in the analyses.

Proposing that attitude strength moderates the structure of SWB is a novel idea and is thus an exploratory question that has yet be examined in the SWB literature. Further, I am not aware of other studies in the attitudes and SWB literatures that test

attitude strength as a moderator of structure (or change) while simultaneously controlling for the constituents of the attitude strength score. Statistically, this approach is consistent with testing a non-linear (e.g., quadratic) predictive effect (e.g., 'X') in a regression model, wherein a new predictor is computed by squaring a variable ('X^2') and treating this computed variable as a predictor alongside the non-squared variable (Cohen, Cohen, West, & Aiken, 2003). Turning to other literature, there is however evidence that structure can be moderated by an external variable. For example, within the trauma literature, research has shown that gender moderates the structure of post-traumatic stress disorder in war-exposed Bosnian adolescents (see Armour et al., 2011). That is, the structure of post-traumatic stress (as reflected in the degree of correlation among indicators of intrusion, effortful avoidance/emotional numbing, and arousal) differs based on whether the individual is male or female. Furthermore, in studies examining correlated changes among basic dimensions of personality, factors such as age and sex have been treated as potential moderators of the correlations among personality scores over time (e.g., Soto & John, 2012).

Similarly, within the current thesis, it is proposed that the structure of SWB (as reflected in the degree of correlated change among LS, PA, and NA indicators) will differ based on whether the individual is characterized by high or low attitude strength. Note that from an attitudes perspective, SWB can be framed as an overall evaluation of one's life based on cognitive and affective information. Thus, because the strength of such an attitude would be specific to one's life, what has been discussed above as attitude strength will be referred to as *SWB strength* throughout the remainder of this document.

With regards to investigating SWB strength as a moderator of the structure of SWB, I have defined high-strength SWB as an evaluation of one's life that is both structurally consistent and low in cognitive and emotional conflict, whereas low-strength SWB as characterized by both structural inconsistency and high in cognitive and emotional conflict. It is important to note that although ambivalent attitudes are considered an indication of low SWB strength within the current work, this is not to say that holding an ambivalent attitude is necessarily weak or maladaptive. Ambivalent attitudes can serve as a protection against external pressures, such that having positive and negative feelings towards an object allows individuals to be flexible, highlighting feelings that best fit the moment (Cavazza & Butera, 2008; Hodson et al., 2001). In this sense, ambivalent attitudes can actually be considered quite adaptive. However, in the study of SWB, ambivalent (i.e., conflicting) thoughts and feelings toward one's life appear to be less adaptive (Busseri et al., 2009; Busseri & Sadava, 2013). Furthermore, I consider greater structural and subjective ambivalence as indicators of lower strength SWB because such individuals would be characterized by greater conflict or inconsistency between positive and negative thoughts and emotions toward their life.

Manipulations of attitude components. In addition to employing an attitudes perspective to examine SWB strength as a potential moderator of the structure of SWB, attitudes research can be used as a framework for developing manipulations of the individual SWB components. As reviewed previously, existing SWB manipulations target overall well-being (i.e., LS, PA, and NA; Fordyce, 1983; Sheldon & Lyubomirsky, 2006), target LS by manipulating emotion (Lyubomirsky et al., 2006), or target present mood (Fredrickson et al., 2000; King et al., 2006; Polivy, 1981). Unlike the SWB

literature, within the attitudes literature researchers appear to have established manipulations that target the cognitive and affective components of an attitude separately.

For example, Fabrigar and Petty (1999) created an attitude manipulation directed at a fictional attitude object, an animal they called the lemphur (see also Crites et al., 1994; Haddock, Maio, Arnold, & Huskinson, 2008). Depending on the condition to which participants were randomly assigned, individuals read a cognitively-based message designed to highlight the positive attributes of the lemphur, or an affectively-based message designed to elicit positive emotions towards the lemphur. The cognition based reading passage included sentences such as "A remarkably adaptive animal, lemphurs can be found in ocean waters as far north as Alaska and as far south as Antarctica", and appeared as though it were an excerpt from an encyclopedia. In contrast, the affect based reading passage included sentences designed to elicit positive emotions towards the lemphur, such as "It then made a beautiful sound that reminded me of a kitten's purr" and "It was a truly amazing experience with the most wonderful animal". The cognitively-based reading passage described thoughts towards the lemphur that were not based on personal experience, whereas the affectively-based reading passage appeared as though it were an individual's personal, emotional experience with the animal. Despite this subtle difference in the cognitive and affective manipulation materials, manipulations of the cognitive and affective bases of attitudes were successful, that is, the researchers were able to *create* cognitive and affective attitudes towards an unfamiliar attitude object (the lemphur) that matched the reading passage. This was evidenced by participants in the cognitive condition consistently judging the lemphur as favourable post-manipulation,

and participants in the affective condition consistently reporting positive emotions towards the lemphur post-manipulation.

Unlike attitudes research examining the creation of attitudes towards a new attitude object (e.g., a fictional animal), manipulating SWB involves creating change in what is assumed to be a pre-existing attitude towards a familiar attitude object, that is, an individuals' life. Further, my particular interest is in manipulations that directly target individual components of the attitude, that is, cognitive evaluations and affective reactions to one's life. An example of this approach in the attitudes research comes from Smith and Nosek (2011) who manipulated cognitions towards a familiar attitude object (gay people) through a reading passage and sentence completion task consisting of previously established cognitive words (Crites et al., 1994). In a separate condition, feelings towards gay people were manipulated through a reading and sentence completion task consisting of affective words. Participants in the cognitive condition formed explicit positive evaluations in line with the positive cognitive information presented in the reading passage and sentence completion task, whereas participants in the affect condition formed explicit positive evaluations in line with the positive valence of the affect information presented in the reading passage and sentence completion task. Note, however, that whether participants in the cognitive condition experienced change in affective evaluations towards gay people, or participants in the affect condition experienced change in cognitive evaluations towards gay people was not a focus of the study, and therefore was not reported.

Therefore, there is evidence that the cognitive and affective components of attitudes can be manipulated. Because these manipulations were intended to target the

cognitive and affective components of attitudes individually, such manipulations can be used to create focused SWB manipulations that target LS, PA, and NA separately. In the present thesis, I will use a manipulation based on research by Smith and Nosek (2011) to experimentally induce changes in LS, PA, and NA. My goal is to create changes in the SWB components so that the relationships among changes in the components can be evaluated in order to inform the structure of SWB. Because my primary purpose is to create changes in the components of SWB in order to inform SWB structure, rather than focusing on creating long-lasting SWB interventions, any change (even short-term change) will inform the independence or relatedness of LS, PA, and NA regardless of whether the change is short-term or long-lasting.

The Current Thesis

The aim of the current thesis is to inform the confusion surrounding the structure of SWB by determining whether change in one component of SWB is independent of, or related to, changes in the other two components. A naturalistic, longitudinal approach (**Study 1**, tracking changes in the three SWB components over time) and an experimental approach (**Study 2**, manipulating the three SWB components separately and assessing changes in all three components) were used to inform the structure of SWB. Further, in both studies, SWB strength (i.e., structural consistency, attitudinal ambivalence) was examined as a moderating factor with respect to the degree of relatedness (versus independence) among changes in the SWB components.

Study 1 – Examining the Associations Among Changes in the Three Components of Subjective Well-Being Over Time using a Naturalistic Approach

Introduction

The goal of Study 1 was to assess naturally occurring changes in the components of SWB over time. The longitudinal studies reviewed previously have reported correlations among the SWB components, but have not reported the correlations among *changes* in the components over time. Previous studies within the personality literature have, however, reported correlations among changes in personality traits (e.g., extraversion, neuroticism) over time and referred to the correlations among change scores as *correlated change* (Allemand, Zimprich, & Hertzog, 2007; Soto & John, 2012). Study 1 provided insight into naturally occurring change within each SWB component in order to examine whether change in one component was related to changes in the other two components over time. This study thus informed the various structural models of SWB, particularly with respect to models that assume independence among components versus models that assume relatedness (Busseri & Sadava, 2011).

The first research question I addressed was: *Do the components of SWB change together or independently from one another over time?* Within the SWB literature it is unclear whether the components are more likely to change together or independently from one another because this issue has not been well examined in previous research. Therefore, hypothesizing independence or relatedness would be unjustified, since there is no strong evidence to support either prediction. Rather, two competing hypotheses were delineated. First, according to structural models emphasizing the independence of the SWB components (e.g., Diener & Biswas-Diener, 2002; Pavot, Diener, Colvin, &

Sandvik, 1991; Pavot & Diener, 1993, 2004, 2008), it was hypothesized that the components of SWB should change independently from one another over time (i.e., changes in each component will not be related across components). Evidence for this hypothesis would provide support for the *independence view* (Hypothesis 1A) of the structure of SWB. Alternatively, according to structural models emphasizing the associations among SWB components (e.g., Bradburn, 1969; Costa & McCrae, 1980; Larsen et al., 1985; Lohmann, 1977), it was hypothesized that the components of SWB should change together over time (i.e., changes in each component would be related across components). Evidence for this alternative hypothesis would provide support for the *relatedness view* (Hypothesis 1B) of the structure of SWB.

Support for the *independence view* could occur in one of two ways (1) complete independence, where change in one component is independent from change in *both* of the other components (e.g., change in LS is not related to change in PA or NA) or (2) partial independence, where change in one component is independent from change in *one* of the other components (e.g., change in LS is not related to change in PA, but is related to change in NA). Support for the *relatedness view* could also occur in one of two ways (1) complete relatedness, where change in one component is related to change in *both* of the other components (e.g., change in LS is related to change in PA and NA) or (2) partial relatedness, where change in one component is related to change in *one* of the other components (e.g., change in LS is related to change in PA, and is not related to change in NA).

Correlations among change scores have yet to be examined within the SWB literature. For this reason, the magnitude of the relationship among change in the

components (i.e., correlated change) necessary to determine whether the *independence* or *relatedness view* was supported does not exist. Therefore, in the present work, the degree of initial correlations among LS, PA, and NA were used as a guide to determine *how much* correlation among change scores was sufficient to determine independence and relatedness thresholds. For the present purposes, *how much* refers to the magnitude of the correlation between change scores. Preacher's (2002) calculation for the test of the difference between two independent correlation coefficients was used to compare the magnitude of the observed initial correlations to the magnitude of the observed change score correlations among the SWB components. The Preacher (2002) method tests the hypothesis that two correlation coefficients are equal, taking into account the sample size employed to obtain each coefficient. I used the degree of observed initial correlations among LS, PA, and NA as a benchmark for interpreting whether the corresponding correlations among the LS, PA, and NA change scores were large enough in magnitude to be meaningfully interpreted as supportive of the *relatedness view* (Hypothesis 1B). In order for a correlation between change scores to be considered as meaningful evidence in support of Hypothesis 1B, I would expect the correlation to be comparable in magnitude to the initial correlation between the corresponding SWB components. For example, for the correlation between change in LS and change in PA to be considered meaningful evidence in support of the *relatedness view*, the correlation should be comparable in magnitude to the initial correlation between LS and PA. If, however, a change score correlation was significantly smaller in magnitude than the corresponding initial correlation, this would provide support for the *independence view* (Hypothesis 1A).

The second research question I addressed was: *Does SWB strength, specifically structural consistency and/or affective structural ambivalence, moderate the associations among changes in LS, PA, or NA?* With respect to the individual strength dimensions, high-strength SWB refers to high structural consistency or low affective structural ambivalence. Low-strength SWB refers to low structural consistency or high affective structural ambivalence. With respect to overall SWB strength (an index combining structural consistency and reverse-scored structural ambivalence), high-strength SWB refers to a combination of high structural consistency and low affective structural ambivalence, whereas low-strength SWB refers to a combination of low structural consistency and high affective structural ambivalence. Based on relevant attitudes research (e.g., Wegener et al., 1995), I predicted that among individuals with high-strength SWB, changes in LS, PA, and NA should be more strongly associated with each other, whereas among individuals with low-strength SWB, changes in LS, PA, and NA should be less strongly associated with each other (Hypothesis 2).

Method

Participants. The sample consisted of 452 first-year undergraduate students recruited through the Psychology Participant Pool at Brock University to participate in a three year, longitudinal study of health and well-being. Participants were 17 to 27 years old (M = 18.54, SD = .90) and 76.5% were female.

Procedure. The sample described above was a subset of longitudinal data collected by Sadava and Decourville (2003), which has not been used to examine the structure of SWB with respect to changes over time in LS, PA, and NA over time, or SWB strength as a moderator of the associations among such changes. Participants came

into a lab setting where they completed a paper and pencil survey regarding several aspects of their psychosocial health and well-being, including SWB (i.e., LS, PA, NA). Of interest for the current work was SWB and participants who completed all three SWB measures over three time points (n = 452). The baseline survey was administered in a small group setting during September of respondents' first year of university (Wave 1, N = 780). Participants were paid $10 upon completion of the baseline survey. Participants completed the same survey on-line at three subsequent time points: December of their first year of university (Wave 2, n = 621), at the end of their first year of university (Wave 3), and at the end of their third year of university (Wave 4, n = 547). As compensation, participants received a gift certificate valued at $10 at each time point following the completion of the survey. The SWB measures were not included at Wave 3, therefore in the present study, only data from Wave 1, Wave 2, and Wave 4 were examined. All subsequent analyses are limited to the 452 individuals who completed the SWB measures at all three relevant assessments (i.e., Wave 1, Wave 2, and Wave 4).

Measures.

Subjective well-being.

Life satisfaction. Based on the self-anchoring scale developed by Kilpatrick and Cantril (1960), participants were asked to evaluate their overall satisfaction with their life, using an 11-point Likert-type scale (0 = *worst life possible*, 11 = *best life possible*) at Wave 1, Wave 2, and Wave 4; see Appendix A. Higher ratings reflect higher satisfaction with one's life overall (e .g., Lucas & Donnellan, 2007; McIntosh, 2001).

Positive and negative affect. Participants completed the *Positive and Negative Affect Schedule* (PANAS; Watson et al., 1988; Watson, & Clark, 1994) to measure the

PA and NA components of SWB; see Appendix B. The PANAS consists of 20 items, including 10 items that measure positive emotions (e.g., interested, determined, inspired) and 10 items that measure negative emotions (e.g., distressed, ashamed, irritable). Participants were instructed to rate how much they experience each emotion on average using a 5-point Likert-type scale (1 = *not at all*, 5 = *extremely*). At each wave, average scores were computed for PA and NA, respectively. NA scores were reverse-scored such that a higher NA score indicated lower NA, and therefore greater well-being. Thus, high composite scores reflect higher SWB (i.e., greater PA and lower NA). The validity and reliability of the PANAS has been supported in numerous studies (e.g., Crawford, & Henry, 2004; Watson et al., 1988).

SWB strength. Self-report measures of SWB strength were not included in the longitudinal study conducted by Sadava and Decourville (2003). It was, however, possible to derive two measures of SWB strength (i.e., structural consistency and affective structural ambivalence) from the existing longitudinal dataset.

Structural consistency. Structural consistency was defined as the degree of consistency among the SWB components at Wave 1. The Wave 1 LS, PA, and (reversed) NA scores were first converted to z-scores and the Euclidean distance among these three components was computed for each individual. The Euclidean distance was computed by determining the differences between each pair of variables, squaring each difference, summing the squared difference values, and then taking the square root of this summed value. These scores ranged from zero to a large positive value, such that higher values indicate greater mean distance between data points in multidimensional space. The Euclidean distance score was thus multiplied by -1, so that higher scores (i.e., less

negative or closer to zero) indicated greater structural consistency, whereas lower scores (i.e., more negative) indicated less structural consistency**.**

Affective structural ambivalence. Derived structural ambivalence is referred to as *affective* structural ambivalence in Study 1 because it was derived from the affective components of SWB. Note that because the LS measure was only 1-item, it was not possible to derive a cognitive structural ambivalence score for participants, which would have required separate ratings of positive and negative thoughts or evaluations of one's life. Affective structural ambivalence was estimated using the individual PA and NA scores, following the formula provided by Bell and colleagues (1996) for use with open-ended measures of ambivalence. The original formula (i.e., (P+N) – 2 |P-N|+36) is used to calculate structural ambivalence by considering the conflict between the positive and negative dimensions of an attitude based on participants' ratings of the valences of their responses to multiple open-ended questions. An open-ended measure of structural ambivalence was not available in the current study. Therefore the original formula was revised (i.e., (P+N) – 2 |P-N|+2), in order to calculate affective structural ambivalence by considering the conflict between the average PA and average NA scores derived from the *Positive and Negative Affect Schedule* (PANAS; Watson et al., 1988; Watson, & Clark, 1994). The resulting affective structural ambivalence score indicated the extent to which individuals had mixed (versus non-mixed) emotional experiences in their lives, such that higher scores indicated greater affective structural ambivalence and lower scores indicated less affective structural ambivalence. Note that the +2 is a constant included in the formula to ensure that the resulting affective structural ambivalence score is not negative, therefore making the lowest possible score an individual can receive a zero.

SWB strength index. The structural consistency and affective structural ambivalence scores were significantly and negatively associated (r = -.17, p <.001), such that higher structural consistency was related to lower affective structural ambivalence. Consistent with an approach used by other researchers in the attitude strength literature (Krosnick & Abelson, 1992; Maio & Haddock, 2009), an overall SWB strength index score was computed by averaging the structural consistency and affective structural ambivalence scores (after standardizing each, and reverse-scoring the affective structural ambivalence score), such that higher SWB strength index scores indicated greater overall SWB strength (i.e., high structural consistency and low affective structural ambivalence) whereas lower SWB strength index scores indicated lower SWB strength (i.e., low structural consistency and high affective structural ambivalence). Note that given the low correlation between the structural consistency and affective structural ambivalence scores, however, the individual strength dimensions (structural consistency and affective structural ambivalence) were examined separately as potential moderating factors.

Results

Preliminary data analysis.

Distributions and outliers. Descriptive statistics for each of the Wave 1, Wave 2, and Wave 4 study variables are shown in Table 1. Skewness and kurtosis were examined for each SWB component at Wave 1, Wave 2, and Wave 4. Some of the skewness and kurtosis values exceeded |1.00|[1]; therefore the variables of interest were not all normally distributed. More specifically, LS evaluations and PA evaluations were clustered to the right of the mean, with most individuals reporting high levels of LS and PA; NA

[1] Regardless of whether a cut-off value of |2.00| or a more conservative cut-off value of |1.00| was used, the outcome of the assessment was the same.

Table 1

Study 1: Descriptive Statistics for Wave 1, Wave 2, and Wave 4 Study Variables

Variable	Mean	SD	Alpha	Scale min.	Scale max.	Observed min.	Observed max.	Skewness	Kurtosis	Outliers
W1 LS	7.20	1.33	--	1.00	9.00	2.00	9.00	-1.12	1.85	7
W1 PA	3.70	0.59	0.84	1.00	5.00	1.60	5.00	-0.35	0.23	3
W1 NA	2.28	0.62	0.84	1.00	5.00	1.00	4.50	0.73	0.54	5
W2 LS	6.94	1.32	--	1.00	9.00	2.00	9.00	-1.18	2.22	6
W2 PA	3.64	0.59	0.86	1.00	5.00	1.50	5.00	-0.30	0.11	2
W2 NA	2.20	0.59	0.84	1.00	5.00	1.00	5.00	0.99	1.60	4
W4 LS	7.03	1.40	--	1.00	9.00	1.00	9.00	-1.29	2.55	6
W4 PA	3.66	0.59	0.88	1.00	5.00	1.20	5.00	-0.51	0.88	2
W4 NA	2.24	0.64	0.87	1.00	5.00	1.00	4.60	0.57	0.21	3
Δ W1W2 LS	-0.26	1.37	--	-9.00	9.00	-6.00	6.00	0.10	2.34	6
Δ W1W2 PA	-0.02	0.46	--	-5.00	5.00	-1.40	2.30	0.24	2.04	6
Δ W1W2 NA	-0.07	0.50	--	-5.00	5.00	-2.90	2.40	-0.10	3.72	4
Δ W1W4 LS	-0.17	1.56	--	-9.00	9.00	-7.00	7.00	-0.31	2.79	7
Δ W1W4 PA	0.01	0.55	--	-5.00	5.00	-2.00	2.51	0.07	2.34	7
Δ W1W4 NA	-0.04	0.66	--	-5.00	5.00	-2.30	2.30	0.10	1.10	5
W1 Structural consistency	-1.70	1.04	--	--	--	-6.86	-0.08	-1.28	2.86	8
W1 Structural ambivalence	4.92	1.67	--	--	--	0.30	9.70	0.16	-0.39	0
W1 SWB strength index	<.01	0.80	0.29	--	--	-3.43	1.77	-0.76	1.13	4

Note. N = 452. W1 = Wave 1; W2 = Wave 2; W4 = Wave 4; LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. *p < .05.

evaluations were clustered to the left of the mean, with most individuals reporting low levels of NA.

To further examine outliers, z-scores were calculated for the Wave 1 SWB components, Wave 2 SWB components, Wave 4 SWB components, Wave 1 SWB strength index, Wave 1 structural consistency scores, and Wave 1 affective structural ambivalence scores. Z-scores greater than |3.00| were flagged as outliers. As shown in Table 1, several outliers for each variable of interest were identified using this criterion. Outliers represent meaningful variability within study variables, rather than invalid scores, and for this reason were included in the analyses[2].

Participant attrition. The number of participants who completed the survey decreased across waves: $N = 780$ at Wave 1, $N = 621$ at Wave 2, and $N = 547$ at Wave 4. Independent sample t-tests were examined to determine whether participants with SWB measures at all three time points (referred to as 'complete' participants; $n = 452$) and participants that did not complete SWB measures at all three time points (referred to as 'incomplete' participants; $n = 328$) differed significantly based on age, gender, Wave 1 SWB component scores, and Wave 1 SWB strength scores. As shown in Table 2, on average incomplete and complete participants did not significantly differ in age, Wave 1 LS or Wave 1 NA. However, a significant group difference was found regarding gender and Wave 1 PA. Incomplete participants were more likely to be male and experienced

[2] Presented results reflect Pearson correlation coefficients, which assume variables are normally distributed. Given that several outliers were identified for each variable of interest, Spearman correlation coefficients, which do not assume normality, were also examined. The primary results (i.e., significant change correlations) were consistent at both time periods. SWB strength results were also consistent, with the exception of the Wave 1 to Wave 4 results. Based on the Spearman correlation coefficients, structural consistency rather than affective structural ambivalence significantly and negatively correlated with change in NA. Also, the partial change correlations between LS and PA did not significantly differ between the low and high structural consistency groups. Overall, the results remained fairly consistent, allowing the conclusion that examining Pearson correlation coefficients did not lead to spurious results due to the non-normality of study variables.

significantly greater PA at Wave 1 than complete participants. Furthermore, on average incomplete and complete participants did not significantly differ in SWB strength index, structural consistency, or affective structural ambivalence scores. In all of the analyses described below, only participants that responded to all three SWB measures at Wave 1, Wave 2, and Wave 4 (N = 452) were examined.

Table 2

Study 1: Results from Comparisons Between Complete and Incomplete Participants on Demographic and Wave 1 SWB Variables

	Means		*p*-values
	Complete	Incomplete	
Age	18.54	18.73	.11
Gender	0.23	0.31	.02
W1 LS	7.20	7.29	.31
W1 PA	3.66	3.77	.01
W1 NA	2.28	2.26	.69
SWB strength index	<-.01	<.01	.86
Structural consistency	-1.76	-1.78	.84
Structural ambivalence	4.93	4.88	.71

Note. N = 780. W1 = Wave 1; LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being. For W1 LS complete participants n = 452, incomplete participants n = 322. For W1 PA complete participants n = 452, incomplete participants n = 328. For W1 NA complete participants n = 452, incomplete participants n = 327. For SWB strength index complete participants n = 452, incomplete participants n = 327. For structural consistency complete participants n = 452, incomplete participants n = 319. For structural ambivalence complete participants n = 452, incomplete participants n = 327.

Research question 1: Do the components of SWB change together or independently from one another over time?

Two competing hypotheses were tested. According to Hypothesis 1A, the components of SWB should change independently from one another over time (i.e., correlations among SWB change scores should be non-significant). Evidence for

Hypothesis 1A would provide support for the *independence view* of the structure of SWB. According to Hypothesis 1B, in contrast, the components of SWB should change together over time (i.e., correlations among two or more SWB change scores should be significant). Evidence for Hypothesis 1B would provide support for the *relatedness view* of the structure of SWB.

Wave 1 to Wave 2 results. Descriptives for each of the Wave 1 and Wave 2 study measures are shown in Table 1. Correlations among the LS, PA, and NA scores within and across waves are shown in Table 3. Within each wave, the correlations among the three SWB components are statistically significant and each is in the expected direction (i.e., LS and PA are positively correlated; LS and NA are negatively correlated; PA and NA are negatively correlated). Further, each of the correlations is moderate in magnitude. Across waves, the same patterns of associations were observed, in addition to moderate to high correlations between corresponding SWB components (e.g., Wave 1 PA with Wave 2 PA).

To test Hypothesis 1A and 1B, correlations and partial correlations among the Wave 1 to Wave 2 SWB component change scores were examined. Pairwise as well as partial correlations among SWB change scores are shown in Table 3. Statistically significant partial correlations were observed among all three of the SWB change scores (controlling for the Wave 1 LS, PA, and NA scores). The partial correlation between LS and PA change scores was positive, indicating that an increase in LS was associated with an increase in PA. The partial correlation between LS and NA was negative, indicating that an increase in LS was associated with a decrease in NA. The partial correlation

Table 3

Study 1: Bivariate and Partial Correlations among Wave 1 and Wave 2 Study Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1.W1 LS	--	.40*	-.36*	.46*	.38*	-.28*	-.52*	-.01	.12*	.26*	-.28*	.35*
2.W1 PA		--	-.24*	.26*	.69*	-.23*	-.13*	-.37*	.02	.11*	-.31*	.28*
3.W1 NA			--	-.26*	-.27*	.66*	.10*	-.05	-.46*	-.20*	.88*	-.71*
4.W2 LS				--	.49*	-.42*	.52*	.30*	-.17*	.10*	-.20*	.20*
5.W2 PA					--	-.35*	.10*	.42*	-.08	.06	-.36*	.28*
6.W2 NA						--	-.14*	-.16*	.37*	-.16*	.57*	-.48*
7. Δ W1W2 LS							--	.30*	-.28*	-.15*	.08	-.15*
8. Δ W1W2 PA							.41*	--	-.12*	-.06	-.07	.00
9. Δ W1W2 NA							-.34*	-.22*	--	.06	-.41*	.31*
10. W1 Structural consistency							-.04	-.08	-.02	--	-.17*	.77*
11. W1 Structural ambivalence							.06	-.18*	-.03		--	-.77*
12. W1 SWB strength index							-.06	.01	-.01			--

Note. N = 452. W1 = Wave 1; W2 = Wave 2; LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. Bivariate correlations are presented above the diagonal, partial correlations (controlling for Wave 1 LS, Wave 1 PA, and Wave 1 NA) are presented below the diagonal. *p < .05.

between PA and NA was negative, indicating that an increase in PA was associated with a decrease in NA. Each of these partial correlations was moderate in magnitude – and similar in magnitude to the bivariate correlations among SWB components at each wave (refer to Figure 1). The initial correlations among SWB components and the partial change correlations among SWB components were compared statistically (Preacher, 2002; see Table 4). The initial and change correlations did not significantly differ from one another. Thus, the degree of correlated change among the SWB components is as robust as the initial correlations among the same SWB components. This means that the observed correlated change among components is not only significant, but also large enough in magnitude to provide authentic support for the *relatedness view*. Together, these findings provide complete support for Hypothesis 1B (the *relatedness view* of the structure of SWB), and no support for Hypothesis 1A (the *independence view* of the structure of SWB) over a three month time period.

Wave 1 to Wave 4 results. Descriptives for each of the Wave 1 and Wave 4 study measures are shown in Table 1. Correlations among the LS, PA, and NA scores within and across waves are shown in Table 5. Within each wave, the correlations among the three SWB components are statistically significant and each is in the expected direction (i.e., LS and PA are positively correlated; LS and NA are negatively correlated; PA and NA are negatively correlated). Further, each of the correlations is moderate in magnitude. Across waves, the same patterns of associations were observed, in addition to moderate to high correlations between corresponding SWB components (e.g., Wave 1 PA with Wave 4 PA).

Figure 1. Display of Comparison of Wave 1 Correlations among SWB Components and Corresponding Change Score Correlations

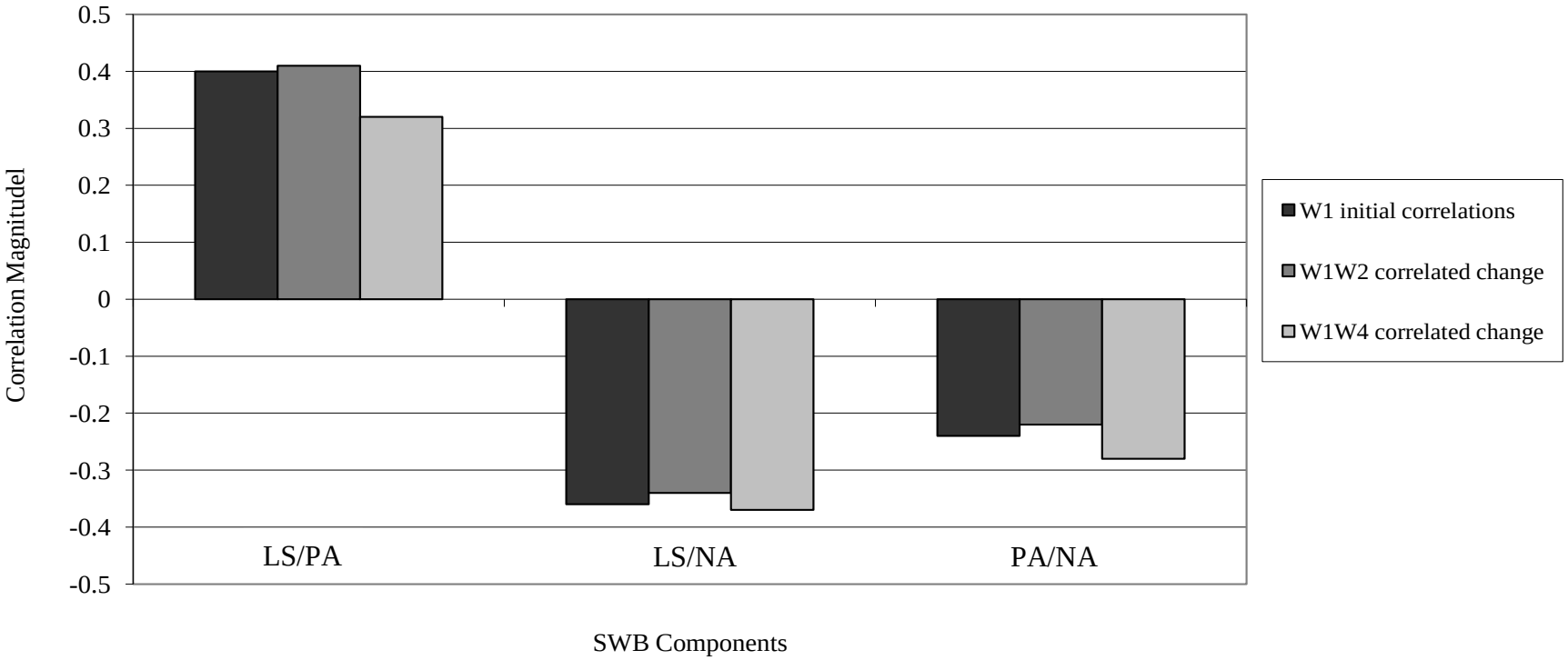

Figure 1. Display of comparison of Wave 1 correlations among SWB components and corresponding change score correlations. *N* = 452. LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; W1W2 = Wave 1 to Wave 2; W1W4 = Wave 1 to Wave 4. Initial correlations are bivariate correlations among the Wave 1 SWB components. Correlated change is the partial correlation between Wave 1 to Wave 2 change scores and Wave 1 to Wave 4 change scores, controlling for Wave 1 LS, PA, and NA scores.

Table 4

Study 1: Comparing Magnitudes of Initial Correlations versus Partial Correlations among SWB Change Scores at Two Time Periods

	Initial Correlations		Change Scores		Comparison *p*-values	
	PA	NA	PA	NA	PA	NA
W1W2						
LS	.40*	-.36*	.41*	-.34*	.86	.73
PA		-.24*		-.22*		.75
W1W4						
LS	.40*	-.36*	.32*	-.37*	.17	.86
PA		-.24*		-.28*		.52

Note. *N* = 452. LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being. W1W2 = Wave 1 to Wave 2 results. W1W4 = Wave 1 to Wave 4 results. Initial correlations are bivariate correlations among the Wave 1 SWB components. Change scores are partial correlations among W1W2 or W1W4 change scores. Results from statistical comparison between corresponding initial and change correlations (W1W2 or W1W4) are presented in the "comparison p-values" column. *p < .05.

To test Hypothesis 1A and 1B, correlations and partial correlations among the Wave 1 to Wave 4 SWB component change scores were examined. Pairwise as well as partial correlations among SWB change scores are shown in Table 5. Statistically significant partial correlations were observed among all three of the SWB change scores (controlling for the Wave 1 LS, PA, and NA scores). The partial correlation between LS and PA change scores was positive, indicating that an increase in LS was associated with an increase in PA. The partial correlation between LS and NA was negative, indicating that an increase in LS was associated with a decrease in NA. The partial correlation between PA and NA was negative, indicating that an increase in PA was associated with a decrease in NA. Each of these partial correlations was moderate in magnitude – and similar in magnitude to the bivariate correlations among SWB components at each wave (refer to Figure 1). The initial correlations among SWB components and the partial change correlations among SWB components were compared statistically (Preacher, 2002; see Table 4). The initial and change correlations did not significantly differ from one another. Thus, the degree of correlated change among the SWB components is as robust as the initial correlations among the same SWB components. This means that the observed correlated change among components is not only significant, but also large enough in magnitude to provide authentic support for the *relatedness view*. Together, these findings provide complete support for Hypothesis 1B (the *relatedness view* of the structure of SWB), and no support for Hypothesis 1A (the *independence view* of the structure of SWB) over a three year time period.

Table 5

Study 1: Bivariate and Partial Correlations among Wave 1 and Wave 4 Study Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1.W1 LS	--	.40*	-.36*	.35*	.33*	-.15*	-.54*	-.07	.19*	.26*	-.28*	.35*
2.W1 PA		--	-.24*	.29*	.55*	-.23*	-.08*	-.45*	-.01	.11*	-.31*	.28*
3.W1 NA			--	-.19*	-.22*	.45*	.13*	.01	-.50*	-.20*	.88*	-.71*
4.W4 LS				--	.43*	-.41*	.60*	.16*	-.21*	.04	-.17*	.14*
5.W4 PA					--	-.37*	.11*	.50*	-.15*	.07	-.22*	.19*
6.W4 NA						--	-.24*	-.15*	.55*	-.14*	.37*	-.34*
7. Δ W1W4 LS							--	.20*	-.36*	-.18*	.09*	-.18*
8. Δ W1W4 PA							.32*	--	-.15*	-.05	.09*	-.09
9. Δ W1W4 NA							-.37*	-.28*	--	.05	-.46*	.33*
10.W1 Structural consistency							-.07	-.04	-.06	--	-.17*	.77*
11.W1 Structural ambivalence							.04	.07	-.11*		--	-.77*
12. W1 SWB strength index							-.07	-.06	-.01	.		--

Note. $N = 452$. W1 = Wave 1; W4 = Wave 4; LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being: Δ = change. Bivariate correlations are presented above the diagonal, partial correlations (controlling for Wave 1 LS, Wave 1 PA, and Wave 1 NA) are presented below the diagonal. *$p < .05$.

Research Question 2: Does SWB strength moderate the associations among changes in LS, PA, or NA? According to Hypothesis 2, among individuals with high-strength SWB, changes in LS, PA, and NA should be more strongly associated with each other whereas the opposite should be true among individuals with low-strength SWB.

Wave 1 to Wave 2 results. To test Hypothesis 2, participants were divided into three groups: a high SWB strength index group (i.e., high structural consistency and low affective structural ambivalence; i.e., top 25% of the distribution), a moderate SWB strength index group (i.e., moderate structural consistency and moderate affective structural ambivalence, i.e., middle 50% of the distribution), and a low SWB strength index group (i.e., low structural consistency and high affective structural ambivalence; i.e., bottom 25% of the distribution). Within each group, the partial correlations among the SWB change scores were evaluated (controlling for the Wave 1 LS, PA, and NA scores); see Table 6. Preacher's (2002) calculation for the test of the difference between two independent correlation coefficients was used to compare the magnitude of the correlation between SWB change scores in the high strength index group to the corresponding correlations in the low strength index group.[3] Using the Preacher (2002) method provides an indication of whether the correlations between SWB change scores differ depending on level of SWB strength, as hypothesized (Hypothesis 2), or whether the correlations do not differ between SWB strength groups.

[3] Note that Research Question 2 was also examined using a multiple regression approach (in which the individual SWB change scores were examined as predictors of one another). The choice of which SWB change score (change in LS, change in PA, or change in NA) was the predictor and which was the outcome was arbitrary. In addition, the results differed between regression models (involving the same two change scores) depending on which SWB change score was used as the predictor and which was used as the outcome. The inconsistency in the results can be attributed to the fact that the regression models were not statistically identical (i.e., the statistical effects, and the statistical control of each effect afforded by the other effects in the model, differed depending on which SWB component served as the predictor versus outcome in a given model). Thus, in the present work, I treated the moderating variable using the categorical approach, which provided a direct test of the main question of interest, that is, the extent to which the correlations among the SWB change scores differed between groups of individuals characterized by low versus high SWB strength.

Table 6

Study 1: Partial Correlations among Wave 1 to Wave 2 SWB Change Scores in the Low, Moderate, and High SWB Strength Groups

	Low strength		Moderate strength		High strength		Comparison *p*-values	
Moderator	Δ PA	Δ NA	Δ PA	Δ NA	Δ PA	Δ NA	Δ PA	Δ NA
SWB strength index								
Δ LS	.43*	-.33*	.45*	-.37*	.29*	-.32*	.24	.93
Δ PA		-.26*		-.22*		-.19*		.59
Structural consistency								
Δ LS	.42*	-.20*	.47*	-.42*	.25*	-.42*	.15	.07
Δ PA		-.19*		-.25*		-.25*		.64
Structural ambivalence								
Δ LS	.27*	-.44*	.51*	-.28*	.37*	-.36*	.41	.48
Δ PA		-.29*		-.14*		-.32*		.81

Note. N = 452. LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. For the SWB strength index, low strength index group n = 111, moderate strength index group n = 231, high strength index group n = 110. For structural consistency, low structural consistency group n = 113, moderate structural consistency group n = 220, high structural consistency group n = 119. For structural ambivalence, low structural ambivalence group n = 114, moderate structural consistency group n = 225, high structural ambivalence group n = 113. Results from statistical comparison of high and low group correlations are presented in the comparison p-values column. *p < .05.

As shown in Table 6, the partial correlations between changes in LS and PA, changes in LS and NA, and changes in PA and NA did not differ significantly between the high-strength index and low-strength index groups. Note that the results were consistent when the structural consistency and affective structural ambivalence variables were examined as separate moderators (i.e., by splitting the sample into low, moderate, and high-strength groups based on the separate structural consistency and affective structural ambivalence scores; see Table 6). Together, these findings indicate that Hypothesis 2 was not supported over a three month period.

Wave 1 to Wave 4 results. Next, the partial correlations among the SWB change scores (controlling for the Wave 1 LS, PA, and NA scores) were evaluated within, and compared statistically (Preacher, 2002) between, the low and high SWB strength index groups; see Table 7. Based on the SWB strength index, the partial correlations between changes in LS and PA, changes in LS and NA, and changes in PA and NA did not differ significantly between the high and low SWB strength index groups. As shown in Table 7, however, when structural consistency was examined as a moderator, low versus high structural consistency groups differed significantly with respect to all three associations among changes in the SWB components. Specifically, associations among the SWB change scores were more strongly linked among individuals in the high structural consistency group compared to individuals in the low structural consistency group. With respect to low versus high affective structural ambivalence, groups did not differ significantly with respect to any of the associations between the three SWB components. Thus, support for Hypothesis 2 was found with respect to the structural consistency

Table 7

Study 1: Partial Correlations among Wave 1 to Wave 4 SWB Change Scores in the Low, Moderate, and High SWB Strength Groups

	Low strength		Moderate strength		High strength		Comparison *p*-values	
Moderator	Δ PA	Δ NA	Δ PA	Δ NA	Δ PA	Δ NA	Δ PA	Δ NA
SWB strength index								
Δ LS	.23*	-.28*	.34*	-.41*	.37*	-.44*	.26	.17
Δ PA		-.21*		-.29*		-.42*		.08
Structural consistency								
Δ LS	.06	-.17	.43*	-.43*	.34*	-.53*	.03	<.01
Δ PA		-.13		-.34*		-.43*		.01
Structural ambivalence								
Δ LS	.30*	-.28*	.34*	-.39*	.27*	-.44*	.81	.17
Δ PA		-.19*		-.30*		-.37*		.14

Note. $N = 452$. LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. For the SWB strength index, low strength index group $n = 111$, moderate strength index group $n = 231$, high strength index group $n = 110$. For structural consistency, low structural consistency group $n = 113$, moderate structural consistency group $n = 220$, high structural consistency group $n = 119$. For structural ambivalence, low structural ambivalence group $n = 114$, moderate structural consistency group $n = 225$, high structural ambivalence group $n = 113$. Results from statistical comparison of high and low group correlations are presented in the comparison p-values column. *$p < .05$.

dimension of SWB strength, but was not found with respect to the composite SWB strength index or affective structural ambivalence over a three year period.

Discussion

The purpose of the present study was to inform the structure of SWB by determining whether over time, naturally occurring change in one component of SWB is related to or independent from naturally occurring change in another component of SWB. Initial correlations among SWB components and correlations among SWB change scores were examined over a three month (Wave 1 to Wave 2) and a three year (Wave 1 to Wave 4) period. In addition, SWB strength was explored as a moderator of the degree of correlated change observed among SWB components over time.

Research question 1: Do the components of SWB change together or independently from one another over time? As a starting point, the five most prominent structural models of SWB identified by Busseri and Sadava (2011) were reduced to the *independence view* (Models 1, 4, and 5) and the *relatedness view* (Models 2 and 3). Based on this broad categorization of the existing structural models of SWB, two competing hypotheses were tested. Hypothesis 1A stated that the components of SWB should change independently from one another over time, whereas according to Hypothesis 1B, the components of SWB should change together over time. To determine whether the components of SWB change together or independently from one another over time, correlated changes among the SWB components, after controlling for Wave 1 LS, PA, and NA scores, were examined.

Controlling for Wave 1 LS, PA, and NA scores ensured that the observed partial correlations reflected correlated change independent of the initial SWB correlations. This

approach was valuable because moderate correlations were observed between Wave 1 and Wave 2 SWB scores, between the Wave 1 and Wave 4 SWB scores, as well as between Wave 1 SWB scores and SWB change scores at each wave. Therefore, observing significant change correlations after partialing out variance associated with the initial correlations resulted in correlated change that was not confounded by initial correlations between components.

The observed change correlations ranged from |.22| to |.41|. Cohen's (1988) guidelines are often used to evaluate the magnitude of Pearson correlation coefficients. According to Cohen (1988), r = .10 constitutes a small relationship, r = .30 a moderate relationship and r = .50 a large relationship between variables. Thus, the degree of relatedness among the change scores observed in the present study would be considered moderate according to Cohen's guidelines.

The comparison of initial and change correlations is also valuable because there are no guidelines concerning how much relatedness among change is enough to support the *relatedness view*. When compared statistically in the present work, corresponding initial correlations and change correlations did not significantly differ from one another in magnitude. Also, correlations among the SWB components in the range of those observed at Wave 1 are typical of studies on SWB, and have been used to test a hierarchical conceptualization of SWB comprising a higher-order factor structure (e. g., Busseri et al., 2007; Diener & Emmons, 1985). Together, these results indicate that the observed change correlations are not only significant, but large enough in magnitude to support the conclusion that the degree of relatedness among changes in the SWB components over time is substantive and meaningful.

The finding of moderate correlations among changes in all three SWB components over time suggests a broad underlying mechanism that is driving change in LS, PA, *and* NA over time. Such mechanisms could include life events that have a lasting influence on individuals' thoughts as well as emotions (e.g., romantic relationships), genetic dispositions (such as SWB set-points), or participants' referencing congruent life domains when evaluating thoughts and feelings towards their lives. Whereas the purpose of the current study was to determine whether change in the SWB components occurs in an independent or related way, determining *why* change co-occurs among SWB components is a question that needs to be directly examined.

Yet although correlated changes were observed at three-month and three-year intervals, the degree of correlated change was moderate, rather than very strong. One reason the observed correlated change was not larger within this study is correlations greater than |.50| rarely occur within psychological research, as suggested by reviews of meta-analyses (Hemphill, 2003). Second, near perfect change correlations would be expected if the components of SWB were conceptually the same. However, larger change correlations are not expected because the SWB components are not redundant, and capture three unique aspects of well-being – thoughts towards one's life, positive emotional experiences, and negative emotional experiences (Lucas, Diener & Suh, 1996). In this regard, moderate correlations among SWB components – as observed in the present study with respect to the initial correlations and the change score correlations – support the notion that SWB components are both unique and related (Busseri et al., 2007).

The shared and unique variance between changes in LS, PA, and NA observed at three-month and three-year intervals may be meaningful, rather than random. For example, Busseri and colleagues (2007) proposed a hybrid model of SWB in which the variance associated with all three components (i.e., common variance) and variance associated with each component (i.e., specific variance) is examined. In the past, SWB researchers have looked at the common and specific variance among SWB components separately. The observed moderate change correlations indicate that the unique and shared variance among components is substantive and therefore can both tell us something important about the conceptualization of SWB. For example, common variance may indicate a stable tendency towards positive evaluations of one's life and positive emotional reactions. Common variance may also indicate similar antecedents among components. However, even if the components share similar influences, factors that cause change in one component may, in some cases, be unique to that component – resulting in moderate change correlations. For this reason, specific variance may indicate factors that influence one component and not the others. The experience of unemployment, for example, appears to impact LS but not PA and NA (Luhmann et al., 2012). Therefore, the moderate degree of correlated change observed among LS, PA, and NA suggests meaningful overlap in addition to separateness among how the components change over time.

The strength of the associations among change scores may also differ based on the information an individual references when evaluating LS, PA, and NA. For example, associations among change scores may be stronger when assessing emotionally stimulating life domains, such as a romantic relationship, compared to a less emotionally

stimulating life domain, such as economic stability. Future research is required to explore each of these possibilities concerning potential common and unique predictive factors of the changes in SWB components over time by adopting a hybrid model of SWB.

Research question 2: Does SWB strength moderate the associations among changes in LS, PA, or NA? Examining SWB by drawing on the attitudes literature is novel, yet fitting due to the theoretical and structural parallels between the two concepts. Within the attitudes literature, attitude strength influences whether an attitude (i.e., an evaluation of an attitude object) will be susceptible to change. More specifically, strong attitudes are thought to be stable over time, and therefore more resistant to change than weak attitudes (Krosnick & Abelson, 1992; Maio & Haddock, 2009). Though attitude strength has been studied in various ways (Wegener et al., 1995), two dimensions of attitude strength in particular - structural consistency and structural ambivalence - provide insight into SWB strength by examining the relationship *between* the components of an attitude. Adopting an attitudes perspective in regards to change in the components of SWB, it was assumed that SWB strength (i.e., reflecting cohesiveness among the three components) would influence whether or not SWB would be susceptible to change. High-strength SWB, characterized by high structural consistency and/or low affective structural ambivalence, should be stable over time, and therefore more resistant to change than low-strength SWB, characterized by low structural consistency and/or high affective structural ambivalence. According to Hypothesis 2, among individuals with high-strength SWB, changes in LS, PA, and NA should be more strongly associated with each other whereas the opposite should be true among individuals with low-strength SWB.

To explore SWB strength as a moderator of the degree of correlated change observed among SWB change scores, participants were split into high, moderate, and low SWB strength index groups, and partial correlations among the SWB change scores were evaluated within each group. Partial correlations among change scores were compared statistically between the high and low strength index groups.

Over a three month period, among individuals within the high SWB strength index group, changes in the SWB components were not more strongly associated with each other when compared to the low SWB strength index group. Examining structural consistency and affective structural ambivalence separately similarly indicated that changes in the SWB components were not more strongly associated with each other in the high compared to low structural consistency and affective structural ambivalence groups. Thus, support for Hypothesis 2 was not found over this three month interval.

Over a three year period, among individuals within the high SWB strength index group, changes in the SWB components were not more strongly associated with each other than the corresponding values of the associations among individuals in the low SWB strength index group. Examining affective structural ambivalence similarly indicated that changes in the SWB components were not more strongly associated with each other in the high compared to low structural ambivalence groups. However, the associations among SWB change scores were significantly stronger among individuals in the high structural consistency group compared to the low structural consistency group. Thus, Hypothesis 2 (over the three year period) was supported when examining structural consistency, but was not supported in regards to affective structural ambivalence or the SWB strength index.

For high structural consistency individuals, it is unclear whether components changed together because these individuals were extremely confident in how they think and feel about their lives, or because they were more concerned with reducing cognitive/affective dissonance than low structural consistency individuals. High structural consistency individuals may be aware of dissonant thoughts and emotions, feel discomfort due to these inconsistencies, and therefore make an effort to reduce them. In contrast, low structural consistency individuals may have been aware of such inconsistencies, and rather than feeling discomfort, accepted that thoughts and emotions towards one's life are not always congruent. High structural consistency individuals with consistently favourable evaluations may also have been more influenced by social norms regarding SWB, including the belief that people should experience many positive thoughts, positive emotions, and few negative emotions towards their life (Diener & Lucas, 2000). Future research is needed to determine the mechanisms underlying high versus low structural consistency as a moderator of the degree of correlated change among SWB components. For example, the experience of high versus low structural consistency may lead individuals to differ in their degree of perceived conflict among SWB components, information processing, and/or the degree to which they strive for consistency in the SWB components, which in turn would impact the structure of their SWB (i.e., the degree of correlated change among the components).

One possibility as to why structural consistency, and not affective structural ambivalence, moderated the associations between SWB change scores over three years is that structural consistency accounts for all three SWB components, whereas structural ambivalence accounts for PA and NA, but not LS. That is, structural ambivalence as

assessed in the present work, was based on a formula that considers affective ambivalence (i.e., mixed positive and negative emotions towards one's life), but does not consider cognitive ambivalence (i.e., mixed positive and negative thoughts towards one's life) because separate positive and negative cognitions were not assessed. Perhaps strength dimensions need to encompass all three SWB components in order to moderate associations among change in these components. Such a result would support the tripartite definition of SWB (Diener, 1984), according to which all three components need to be considered simultaneously. Alternatively, thoughts towards one's life may influence the associations among change in the components and emotions towards one's life may not. Such a conclusion would provide indirect support for Model 3, in which LS is treated as the most important indicator of SWB. Further research is needed to inform these issues.

Structural consistency was a moderator of the associations among change over a three year period, but did not moderate the same change associations over a three month period. This difference in structural consistency as a moderator based on time frames could be explained by the theory of SWB set-points (Luhmann et al., 2012; Steel et al., 2008; Suh et al., 1996). An individual's set-point reflects an enduring level of LS, PA, and NA (i.e., baseline SWB). Life events and daily experiences are thought to create short-term fluctuations around this set-point, with an individual eventually returning to their baseline level of SWB (Luhmann et al., 2012; Suh et al., 1996). Therefore, it may be that the SWB change scores based on a three year period reveal changes in baseline levels of SWB, whereas change scores based on a three month period may reveal brief fluctuations in SWB. Such short-term changes may be less predictable when based on an

individual's baseline or initial level of SWB (from which the structural consistency measure was derived). It is possible, therefore, that structural consistency is most relevant to long-term changes in SWB set-points, rather than short-term changes in SWB. Future research is needed in order to replicate the observed differentiation between results based on short-term versus long-term correlated changes in LS, PA, and NA.

Limitations. Results were based on an undergraduate student sample. The sample was primarily female and consisted of young adults. The homogeneity of the sample may not allow for generalizability of results to a male population or beyond the current age group. SWB can vary with age, and evidence has been found to suggest that LS increases with age, specifically between the age of 40 and 65, whereas PA and NA decrease slightly (Diener & Ryan, 2009). Therefore, the relationships among changes in the SWB components may differ in an older sample.

Further, as summarized in Table 2, some participants that began the study did not complete the SWB measures at all three time points: Wave 1 (September of their first year of university), Wave 2 (December of their first year of university), and Wave 4 (end of their third year of university). Participants that completed all three SWB measures at all three time points were more likely to be female and reported lower PA at Wave 1 than participants that did not complete all measures at all time points. Thus, results based on participants with higher PA at Wave 1 and males were underrepresented due to participant attrition. Therefore, participant attrition negatively influenced the generalizability of the Study 1 results. Further, the magnitude of the results may have also been influenced, such that observed change score correlations may have been stronger or weaker if all participants had completed the study. However because the completers and

non-completers did not significantly differ in all three SWB components, the inclusion of non-completers would most likely lead to consistent overall conclusions.

Another caveat is that evaluations of LS, PA, and NA were subjective, and are therefore based on the perceptions of the individual. Although subjective evaluations are at the core of SWB (Diener, 1984), subjective evaluations may also be influenced by transient factors such as present mood. For instance, an individual experiencing an unpleasant mood may be unable to recall positive life events and perceive their LS and PA as quite low and their NA as quite high (Frijda, 2000). The same individual may assess their LS and PA as much higher, and their NA as lower, if they are in a pleasant mood. Controlling for present mood would therefore have provided a clearer assessment of SWB. Further, when completing the self-report SWB measures, participants may have misunderstood instructions, failed to focus consistently on their own life, or felt the need to answer questions in a socially desirable manner to provide evidence of high SWB. Each of these possibilities may have influenced the present findings by failing to truly measure SWB (which requires participants to complete survey items in an attentive and truthful manner while focusing on their own life experiences), thereby increasing measuring error, which would lead to weaker associations observed among SWB components and possibly, weaker associations between change in the components over time. The use of self-report measures means the current study focuses on an individual's explicit attitude towards his or her life. Exploring measures that tap into an individual's implicit attitude towards his or her life is an interesting avenue for future research, and may provide an interesting alternative or supplementary assessment of SWB (e.g.,Walker & Schimmack, 2008).

With respect to SWB measurement, LS was assessed using a 1-item measure. Although there is support for the reliability of the 1-item measure (Schimmack, 2008), a multi-item measure may be more sensitive to change in LS over time. Further, although the *Positive and Negative Affect Schedule* (PANAS; Watson et al., 1988) assesses the intensity of PA and NA, it does not measure the frequency of PA and NA, which is more relevant to assessing SWB than is emotion intensity (Diener et al., 1985; Diener et al., 1991). The instructions provided to participants also did not specify that they should focus on their long-term emotional experiences. In the absence of clear instructions, it is possible that participants focused on their current mood or short-term emotions when completing the PANAS. Each of these measurement issues could be addressed in future studies by measuring LS using a multi-item scale, and assessing the *frequency* of individuals' longer-term PA and NA experiences.

In addition, SWB strength was not a focus of the larger study from which the current data was obtained. For this reason, measures of SWB strength were not included. Rather, for the present study strength dimensions were derived from the LS, PA, and NA scores. Although this approach provided a derived index of structural consistency based on all three SWB components, the measure of structural ambivalence encompasses only PA and NA instead of all three SWB components. Finally, the correlational design can be considered a limitation of the present study because causality cannot be inferred from these results. That is, whether change in one component *causes* change in another component remains unknown. It would thus be valuable to experimentally manipulate the components of SWB and examine whether correlated change among all three components occurs when each of the components is manipulated separately. This would

provide evidence for change in a given component causing changes in the other components of SWB.

To address several of these issues, a second study examining the structure of SWB with respect to changes among its components was conducted. **Study 2** included a multi-item measure of LS and a measure of the frequency of emotional experiences. Present mood was also measured, along with SWB structural ambivalence (i.e., affective and cognitive structural ambivalence) based on all three SWB components, and subjective ambivalence assessed independently of the SWB components. Finally, Study 2 was an experimental study evaluating whether change in a given SWB component (LS, PA, NA) *causes* changes in the other two components.

Study 2 - Examining the Associations Among Changes in the Three Components of Subjective Well-Being Over Time using an Experimental Approach

Introduction

Naturally occurring changes in the components of SWB were measured over time in Study 1. Given the correlational design, however, Study 1 does not inform whether a manipulated change in one component of SWB also resulted in a change in the other components. To more fully inform the structure of SWB, therefore, the next step was to *manipulate*, rather than only measure, changes in the SWB components. The goal of Study 2 was to create changes in the components of SWB within an experimental setting in order to determine whether manipulated change in one component was independent from, or related to, changes in the other two components. Study 2 thus further informs the various structural models of SWB, particularly with respect to models that assume independence among components versus models that assume relatedness (Busseri & Sadava, 2011).

Thus far, experimental research concerning SWB is limited, particularly with respect to manipulations targeting LS, PA, and NA in isolation. As reviewed above, however, effective manipulations targeting the cognitive and affective components of attitudes separately have been developed within the attitudes literature (e.g., Smith & Nosek, 2011) and served as a template for designing effective manipulations of the SWB components. Further, expanding on Study 1, in the present study SWB strength as a moderating factor was examined based on examination of three indicators of SWB strength: structural consistency, SWB structural ambivalence, and subjective ambivalence.

Study 2 addressed the same research questions proposed in Study 1, but from an experimental rather than naturalistic perspective. The first research question that was addressed was: *Do the components of SWB change together or independently from one another?* Two competing hypotheses were delineated. According to Hypothesis 1A, the components of SWB should change independently from one another such that a manipulated change in one component will not result in, or be related to, changes in the other components. Evidence for Hypothesis 1A would provide support for the *independence view* of the structure of SWB. According to Hypothesis 1B, in contrast, the components of SWB should change together wherein a manipulated change in one component results in, and is related to, changes in the other component(s). Evidence for Hypothesis 1B would provide support for the *relatedness view* of the structure of SWB.

The second research question that was addressed was: *Does SWB strength moderate the associations among changes in LS, PA, or NA?* With respect to the individual strength dimensions, high-strength SWB refers to high structural consistency, low SWB structural ambivalence, or low subjective ambivalence. Low-strength SWB refers to low structural consistency, high SWB structural ambivalence, or high subjective ambivalence. With respect to the SWB strength index, high-strength SWB refers to a combination of high structural consistency, low SWB structural ambivalence, and low subjective ambivalence; low-strength SWB refers to a combination of low structural consistency, high SWB structural ambivalence, and high subjective ambivalence. As in Study 1, based on relevant attitudes research (e.g., Wegener et al., 1995), it was predicted that among individuals with high-strength SWB, changes in LS, PA, and NA should be more strongly associated with each other whereas among individuals with low-strength

SWB, changes in LS, PA, and NA should be less strongly associated with each other (Hypothesis 2).

Method

Participants. The full sample consisted of 218 undergraduate students recruited through the Psychology Participant Pool at Brock University to participate in a two-session experimental study of SWB. Of these participants, 196 completed both sessions, and 195 had data for all relevant measures (as described below). These 195 participants were 18 to 54 years old (M = 20.42, SD = 5.36) and 87.6% were female. The ethnic background of the participants was primarily Caucasian (81.5%, n = 159).

Procedure. Individuals participated in two measurement periods. Session 1 was a pre-test session comprising an on-line survey requiring approximately 30 minutes to complete (range = 5 to 433 minutes, M = 19.84, SD = 34.38; N = 218 participants). Session 2 was an experimental session in which participants completed a paper and pencil survey lasting no more than 60 minutes (n = 196 participants). Participants received 1.5 credits towards a course of their choice following complete participation in Session 1 and Session 2.

After signing up online for Session 2, through the Psychology Participant Pool, participants were emailed a link to the online Session 1 survey by the principal researcher. This survey consisted of an informed consent form, a personalized alphanumeric code, demographic questions, SWB measures, and SWB strength measures. The Session 1 survey was completed by participants an average of 9 days prior to Session 2 in order to minimize priming and carry-over effects (range = 1 to 42 days between sessions, M = 8.74 days, SD = 4.19).

After completing the online pre-test survey (Session 1), participants came into a lab setting where they completed the experimental session (Session 2) in a small group setting. Participants were randomly assigned to one of four conditions: either one of three experimental conditions (LS condition, PA condition, NA condition) or a control condition, as described below. The Session 2 survey consisted of a personalized alphanumeric code, a SWB component manipulation (or control materials), SWB measures, self-reported focus questions, a present mood measure, and a suspicion check. The paper and pencil Session 2 survey was administered by either the principal researcher or a graduate research assistant, with participants completing the tasks independently by following the detailed instructions provided. The principal researcher and the graduate research assistant were available to clarify survey instructions during the experimental session when necessary. Written debriefing was provided to each participant after they submitted their completed Session 2 survey. Note that all subsequent analyses were based on the 195 respondents who completed all of the relevant measures (described below) from both the Session 1 and Session 2 surveys.

Participants assigned to an experimental condition completed a manipulation specific to one component of SWB (LS, PA, or NA), whereas participants assigned to the control condition completed a neutral task unrelated to LS, PA, or NA; details are provided below. All participants, regardless of condition, then completed measures of LS, PA, NA, self-reported focus, present mood, and a suspicion check. The three SWB measures were counterbalanced, as were the three individual self-reported focus questions, resulting in six versions of the survey within each condition. The manipulation materials preceded the SWB measures, self-reported focus questions, present mood

measure, and suspicion check questions in all versions. This procedure was granted clearance by the Brock University Research Ethics Board (Appendix C).

Manipulations and materials. The intended purpose of the experimental conditions was to create *improvements* in SWB. Therefore, references to the LS and PA conditions refer to *increasing* LS and PA, whereas references to the NA condition refer to *decreasing* NA. Participants randomly assigned to the LS condition completed a manipulation in which LS was the target component. The LS manipulation was designed to *create an increase in satisfying thoughts towards one's life* (LS), without specifically targeting PA or NA (the non-target components). The LS manipulation consisted of five tasks: a reading passage, a comprehension task, a reading passage summary, an autobiographical thoughts task, and a persuasive story writing task (Appendix D). Adapted from Smith and Nosek (2011), participants began by reading a short paragraph designed to increase their level of LS. In accordance with The Yale Model of Persuasion (Hovland, Lumsdaine, & Sheffield, 1949), the reading passage provided incentives for change in LS (the attitude object being *my life*) by outlining the benefits of being satisfied with one's life, the personal relevance of the information, and using experts in LS as the source of persuasion (i.e., leading researchers in the field, recent research). Following the reading passage were questions adapted from Smith and Nosek (2011) in which participants rated seven LS-specific statements as true or false based on the reading passage. These questions are referred to as the comprehension task, and confirmed that the participant read, understood, and gave further thought to the reading passage. Next, participants summarized the LS reading passage (instructions adapted from Hong, Chiu, Dweck, Lin, & Wan, 1999) to once again ensure that they read the passage, and to

facilitate thoughtful elaboration of the reading passage content (Cacioppo & Petty, 1989; Wegener et al., 1995). In order to relate the reading passage to their own life, participants answered questions regarding their past, future, and present LS through an autobiographical thoughts task (Lench, Flores, & Bench, 2011). Finally, participants completed a persuasive writing task in which they were asked to convince someone else that they lead a satisfying life (adapted from Layous, Nelson, & Lyubomirsky, 2013).

Participants randomly assigned to the PA condition completed a manipulation in which PA was the target component. The PA manipulation was designed to *create an increase in the perceived frequency of positive emotions towards one's life* (PA), without targeting LS or NA (the non-target components). The PA manipulation consisted of the same five tasks as the LS condition; however the tasks were tailored to specifically increase the perceived frequency of PA related to one's life (Appendix E).

Participants randomly assigned to the NA condition completed a manipulation in which NA was the target component. The NA manipulation was designed to *create a decrease in the perceived frequency of negative emotions towards one's life* (NA), without targeting LS or PA (the non-target components). The NA manipulation consisted of the same five tasks as the LS and PA conditions; however the tasks were tailored to specifically decrease the perceived frequency of NA related to one's life (Appendix F).

Participants randomly assigned to the control condition completed neutral tasks unrelated to LS, PA, or NA. The control condition was designed to exert the same amount of cognitive effort as the experimental conditions, without targeting LS, PA, or NA. Individuals in the control condition completed the same five tasks as the LS, PA, and NA conditions; however the tasks consisted of reading a passage about a natural

phenomenon known as a gamma-ray burst (Guerrieri, Nederkoorn, & Jansen, 2012), a summary of the passage, and rating their level of agreement with seven statements based on facts presented in the reading passage. Next, control participants completed a neutral listing exercise (e.g., "list five different sports") as well as a persuasive writing task convincing someone else that gamma-ray bursts are an important area of study. In this way, participants completed the same tasks and expended similar cognitive resources as the participants in the experimental conditions (Appendix G).

Manipulation check. Before interpreting the impact of the experimental manipulations, it is important to establish that (1) *between* experimental conditions (i.e., LS condition, PA condition, NA condition), participants in a given condition (e.g., LS condition) focused on the target component (e.g., LS) more so than did participants in the other conditions (e.g., PA condition, NA condition, and control condition); and (2) *within* each experimental condition (i.e., LS condition, PA condition, NA condition), the manipulation (e.g., in the LS condition) effectively focused participants on the corresponding target component (e.g., LS) to a greater degree than on the non-target components (e.g., PA and NA).

Participant self-reported focus. After completing the manipulation materials and the SWB measures, participants were asked to answer questions pertaining to what extent they focused on (1) thoughts about how satisfying their life is (i.e., LS) (2) how frequently they experience positive emotions related to their life (i.e., PA) and (3) how infrequently they experience negative emotions related to their life (i.e., NA) while completing the manipulation materials (1 = *not at all*, 5 = *a lot*; see Appendix H). The three questions represented a subjective measure of the degree to which participants were

focused on each SWB component when completing the manipulation materials. The order of the three focus questions were counterbalanced between participants within each condition.

Blind rater focus scores. Two blind raters read the persuasive paragraph text provided by participants and rated to what extent the participant focused on (1) thoughts about how satisfying their life is (i.e., LS), (2) how frequently they experience positive emotions related to their life (i.e., PA), and (3) how infrequently they experience negative emotions related to their life (i.e., NA) while writing a persuasive paragraph about his or her LS, PA, or NA (1 = *not at all*, 5 = *a lot*; see Appendix I) . Writing the persuasive paragraph was the last component of the manipulation and control materials, and thus reflects what component(s) of SWB, if any, participants were focused on while completing the manipulation (or control) materials. Scores from the two blind raters were combined prior to analysis, as supported by the high inter-rater reliability on each of the three focus scores (*r*s = .86, .78, and .81, respectively, for focus on LS, PA, and NA; *p*s < .001).

Measures

Demographics. Participants were asked questions concerning their age, sex, ethnicity, year of study, and program of study during Session 1; see Appendix J.

SWB measures.

***Life satisfaction*.** At Session 1 and Session 2, participants completed *The Satisfaction with Life Scale* (SWLS) developed by Diener and colleagues (1985); see Appendix K. The SWLS consists of five statements (e.g., "the conditions of my life are excellent") in which participants can either agree or disagree using a 7-point Likert-type

scale (1 = *strongly disagree*, 7 = *strongly agree*). Ratings provided for the five statements were averaged such that higher scores indicated higher life satisfaction.

Positive and negative affect. At Session 1 and Session 2, participants completed *The Scale of Positive and Negative Experience* (SPANE; Diener et al., 2009), which asks participants how often they experienced specific feelings (e.g., positive, negative, joyful, sad) during the past four weeks using a 5-point Likert-type scale (1 = *very rarely or never*, 5 = *very often or always*); see Appendix L. Average scores were computed for PA and NA, respectively.

Unlike Study 1, in which I employed the single-item LS rating and the PA and NA scores derived from the PANAS measure, in Study 2 the multi-item LS score derived from the SWLS was employed, along with the PA and NA scores from the SPANE measure. This approach was undertaken because the multi-item LS measure provides a more reliable estimate of LS than the single-item measure, and the SPANE provides a direct assessment of frequency of positive and negative emotional experiences (rather than a measure of extent, as in the PANAS) – consistent with the conceptual definition of SWB. Note that the 1-item LS measure and the PANAS were included in the Session 2 survey and the 1-item LS measure appeared on the same page as the SWLS. To clarify, the three SWB measures (SWLS and 1 –item LS measure, PANAS, SPANE) and the three self-reported focus questions were counterbalanced, which resulted in six versions of the survey for each condition.

SWB strength.

Structural consistency. As in Study 1, structural consistency was defined as the degree of consistency among the SWB components at Session 1. To index structural

consistency, the Session 1 LS, PA, and (reversed) NA scores were converted to z-scores and the Euclidean distance was computed (and multiplied by -1), as in Study 1, so that higher scores (i.e., less negative or closer to zero) indicated greater structural consistency, whereas lower scores (i.e., more negative) indicated less structural consistency or greater structural inconsistency.

SWB structural ambivalence. To measure SWB structural ambivalence, participants completed a modified version of Bell and colleagues' (1996) open-ended procedure; see Appendix M. Note that in Study 2, structural ambivalence is referred to as SWB structural ambivalence because it is based on *cognitive and affective* information provided by participants. Participants listed a maximum of 12 adjectives and short phrases that described their cognitive reactions towards their life and separately, listed an additional 12 adjectives and short phrases that described their emotional reactions towards their life. The ordering of these lists was randomized across participants. After listing their cognitive (or emotional) reactions, participants were asked to assign a positive or negative valence to each reaction they listed; this process was repeated separately for the other list (i.e., emotional or cognitive reactions). The original formula (i.e., (P+N) – 2 |P-N|+36) provided by Bell and colleagues (1996) was used to calculate two structural ambivalence scores for each individual, based on the valences assigned to (1) the cognitive thought listings, and (2) the affective thought listings. These two structural ambivalence scores were then averaged (r = .57) to form an overall index of SWB structural ambivalence.

Subjective ambivalence. Subjective ambivalence was assessed using a 4-item measure based on Visser and Mirabile (2004), in which participants were asked (using

two items) how conflicted their thoughts and feelings about their life are, as well as the degree of mixed thoughts and feelings (using two items) they have towards their life using a 5-point Likert-type scale (1 = *not at all*, 5 = *completely*); see Appendix N. Ratings for the 4 items were averaged to form an overall subjective ambivalence score, with higher scores indicating greater subjective ambivalence with respect to thoughts and feelings toward one's life.

***SWB strength index*.** An overall SWB strength index score was computed by averaging the structural consistency, SWB structural ambivalence, and subjective ambivalence scores (after standardizing each, and reverse-scoring the SWB structural ambivalence and subjective ambivalence scores), such that higher SWB strength index scores indicate greater overall SWB strength (i.e., high structural consistency, low SWB structural ambivalence, low subjective ambivalence) whereas lower SWB strength index scores indicate lower SWB strength (i.e., low structural consistency, high SWB structural ambivalence, high subjective ambivalence). Note that given the modest correlations among the structural consistency scores, SWB structural ambivalence scores, and the composite subjective ambivalence scores (see Table 11), each of these indices of SWB strength were also examined separately as moderating factors.

Additional measures.

***Present mood*.** At Session 2, participants completed the *Brief Mood Introspection Scale* (BMIS; Mayer & Gaschke, 1988), which asked participants to rate their present mood based on eight adjectives related to positive mood (e.g., happy, content) and eight adjectives related to negative mood (e.g., sad, tired) using a 4-point Likert-type scale (1 = *definitely do not feel*, 4 = *definitely feel*); see Appendix O. A composite score for positive

mood was created by averaging scores for the eight positive adjectives. A composite score for negative mood was created by averaging scores for the eight negative adjectives. Higher scores reflect higher levels of positive and negative mood, respectively. Given the moderate correlation between the two mood scores (r = -.31), positive and negative mood were treated as separate scores.

***Suspicion check*.** Upon completing the Session 2 survey, participants were asked the following open-ended questions (1) what do you think was the purpose or goal of the current study and (2) what do you think the researchers hoped or expected to find?

Main Results

Preliminary data analysis.

Distributions and outliers. Descriptive statistics for the Session 1 and Session 2 study variables are shown in Table 8. Skewness and kurtosis were examined for each SWB component at Session 1 and Session 2, each SWB strength dimension at Session 1, and present mood scores at Session 2. Some of the skewness and kurtosis values exceeded |1.00|; therefore the variables of interest were not all normally distributed. More specifically, structural consistency scores were clustered to the right of the mean, with most individuals having greater structural consistency.

To further examine outliers, z-scores were calculated for the Session 1 SWB components, Session 2 SWB components, Session 1 SWB strength index, Session 1 structural consistency scores, Session 1 SWB structural ambivalence scores, and Session 1 subjective ambivalence scores. Z-scores greater than |3.00| were flagged as outliers. As shown in Table 8, outliers for several variable of interest were identified using this

Table 8

Study 2: Descriptive Statistics for Session 1 and Session 2 Study Variables

Variable	Mean	SD	Alpha	Scale min.	Scale max.	Observed min.	Observed max.	Skewness	Kurtosis	Outliers
S1 LS (SWLS)	4.96	1.21	0.88	1.00	7.00	1.60	7.00	-0.96	0.42	0
S1 PA (SPANE)	3.67	0.60	0.83	1.00	5.00	2.00	4.83	-0.29	-0.38	0
S1 NA (SPANE)	2.48	0.70	0.82	1.00	5.00	1.17	4.83	0.51	-0.01	1
S2 LS (SWLS)	5.07	1.14	0.88	1.00	7.00	1.20	7.00	-0.99	0.69	1
S2 PA (SPANE)	3.69	0.67	0.87	1.00	5.00	1.67	4.83	-0.63	0.09	1
S2 NA (SPANE)	2.39	0.67	0.81	1.00	5.00	1.00	4.50	0.49	0.12	1
Δ S1S2 LS (SWLS)	0.11	0.67	--	-7.00	7.00	-2.40	2.20	0.03	2.40	5
Δ S1S2 PA (SPANE)	0.02	0.41	--	-5.00	5.00	-1.17	1.00	-0.24	0.25	0
Δ S1S2 NA (SPANE)	-.09	0.52	--	-5.00	5.00	-1.67	1.50	0.20	0.31	2
S1 Structural consistency	-1.25	0.74	--	--	--	-4.28	-0.13	-1.21	2.04	3
S1 Structural ambivalence	31.06	9.97	--	--	--	2.50	58.50	-0.33	0.32	0
S1 Subjective ambivalence	2.89	0.97	0.93	1.00	5.00	1.00	5.00	0.16	-0.49	0
S1 SWB strength index	-0.01	0.70	0.45	--	--	-2.28	1.88	-0.03	0.05	1
S2 Positive mood	2.87	0.51	0.79	1.00	4.00	1.38	4.00	-0.22	-0.32	0
S2 Negative mood	2.10	0.57	0.80	1.00	4.00	1.00	4.00	0.47	0.11	1

Note. N = 195. S1 = Session 1; S2 = Session 2; LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. *p < .05.

criterion. Outliers represent meaningful variability within study variables, rather than invalid scores, and for this reason were included in the analyses.

Participant attrition and missing data. The number of participants who completed the survey decreased across sessions: N = 218 at Session 1, n = 196 at Session 2. Independent sample *t*-tests were examined to determine whether participants who completed all study measures at Session 1 and Session 2 (referred to as 'complete' participants; n = 195) and participants that only completed Session 1 (referred to as 'incomplete' participants; n = 28) differed significantly based on age, gender, ethnicity, Session 1 survey duration, Session 1 SWB component scores, and Session 1 SWB strength scores. As shown in Table 9, incomplete and complete participants did not significantly differ in any of the variables of interest. Note that 196 individuals participated at both Session 1 and Session 2, however one of these individual had incomplete data on the Session 1 SPANE measure and for that reason was not included in subsequent analyses. Therefore, in all of the analyses described below, only participants that responded to all of the relevant study measures (i.e., all three SWB measures at both time points, Session 1 SWB strength measures, Session 2 present mood measure) were examined (n = 195).

Table 9

Study 2: Results for Comparisons between Complete and Incomplete Participants on Session 1 Study Variables

	Means		*p*-values
	Complete	Incomplete	
Age	20.42	19.71	.55
Gender	1.88	1.95	.16
Ethnicity	.82	.64	.08
S1 Survey Duration	20.50	13.11	.37
S1 LS (SWLS)	4.96	4.73	.43
S1 PA (SPANE)	3.67	3.56	.50
S1 NA (SPANE)	2.48	2.44	.79
S1 Structural consistency	-1.25	-1.18	.66
S1 SWB Structural ambivalence	31.06	30.79	.89
S1 Subjective ambivalence	2.89	2.76	.59
S1 SWB strength index	-.01	.15	.34

Note. N = 195. S1 = Session 1; LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being. For Age complete participants n = 195, incomplete participants n = 21. For Gender complete participants n = 194, incomplete participants n = 21. For Ethnicity complete participants n = 195, incomplete participants n = 28. For S1 Survey Duration complete participants n = 195, incomplete participants n = 19. For S1 LS complete participants n = 195, incomplete participants n = 21. For S1 PA complete participants n = 195, incomplete participants n = 18. For S1 NA complete participants n = 195, incomplete participants n = 18. For S1 structural consistency complete participants n = 195, incomplete participants n = 18. For S1 structural ambivalence complete participants n = 195, incomplete participants n = 28. For S1 subjective ambivalence complete participants n = 195, incomplete participants n = 19. For the S1 SWB strength index complete participants n = 195, incomplete participants n = 20. *p < .05. Gender was coded 1 = Male, 2 = Female; ethnicity was coded 0 = Other, 1 = Caucasian.

Manipulation check.

Participant self-reported focus. The self-reported focus questions were included in the Session 2 survey to serve as a manipulation check. Using the self-reported focus scores as the manipulation check, between condition comparisons revealed that only individuals in the NA condition were focused on their NA to a greater degree than

individuals in the other conditions. Individuals in the LS condition and PA condition were however more focused on their LS and PA than individuals in the control condition. Within condition comparisons revealed that only individuals in the LS condition were focused on the target component (LS) to a greater degree than the non-target components (PA and NA). However, issues arose when attempting to use the self-reported focus scores as an indicator of the degree to which participants focused on each component of SWB while completing the manipulation materials. The self-reported focus questions appeared after the SWB measures (SWLS and SPANE) for all participants. Thus, although participants were instructed to indicate to what extent they focused on their LS, PA, and NA while completing the manipulation materials, participants may have (1) had difficulty following the instructions and/or (2) been inclined to report focusing on all three components, given that they had recently been instructed to focus on LS, PA, and NA in order to complete the SWB measures. Due to these issues, the blind rater focus scores assigned to the persuasive paragraph texts were used as the main source of information regarding the effectiveness of the manipulation materials. The persuasive paragraph text was completed at the end of the manipulation or control materials (and before the SWB measures), and therefore is a more accurate representation of the extent to which individuals focused on their LS, PA, and NA while completing the manipulation or control materials - and before completing the assessments of all three SWB components.

Blind rater focus scores. Mean blind rater focus scores on LS, PA, and NA are presented by experimental condition in Table 10. Assuming the manipulation materials were effective, it was expected that (1) *between* conditions, individuals in a given

condition (e.g., LS condition) would be more focused on the corresponding target component (e.g., LS) than would individuals in the other conditions (i.e., PA condition, NA condition, or control condition); and (2) *within* each experimental condition (e.g., LS condition), individuals would be focused on the target component (e.g., LS) to a greater degree than the non-target components (e.g., PA and NA). More specifically, it was expected that: individuals in the LS condition would be more focused on their satisfying thoughts towards their life (i.e., LS) than would individuals in the control, PA, and NA conditions and would be more focused on their LS than on their PA and NA; individuals in the PA condition would be more focused on their frequent positive emotions towards their life (i.e., PA) than would individuals in the LS, NA, and control conditions and would be more focused on their PA than on their LS or NA; individuals in the NA condition would be more focused on their infrequent negative emotions towards their life (i.e., NA) than would individuals in the LS, PA, and control conditions and would be more focused on their NA than on their LS or PA, and; individuals in the control condition would be less focused on their LS, PA, and NA compared to each of the other conditions and would not be more focused on one component than on the other two components.

Table 10

Study 2: Blind Rater Focus Scores by SWB Component by Experimental Condition

Condition	*M* (SD) Focus on LS	*M* (SD) Focus on PA	*M* (SD) Focus on NA
LS condition	$4.82\ (0.57)_a^x$	$1.68\ (1.08)_b^y$	$1.03\ (0.12)_b^z$
PA condition	$4.13\ (1.29)_b^x$	$3.27\ (1.46)_a^y$	$1.16\ (0.55)_b^z$
NA condition	$3.03\ (1.63)_b^x$	$1.67\ (1.05)_b^y$	$3.32\ (1.59)_a^x$
control condition	$1.00\ (0.00)_c$	$1.00\ (0.00)_c$	$1.00\ (0.00)_b$

Note. $N = 195$. For the control condition, $n = 48$. For the Life Satisfaction (LS) condition, $n = 50$. For the Positive Affect (PA) condition, $n = 49$. For the Negative Affect (NA) condition, $n = 48$. Within a given column, coefficients with different subscripts (a, b, c) indicate means that differed significantly ($p < .05$) between conditions. Within a given row, coefficients with different superscripts (x, y, z) indicate means that differed significantly ($p < .05$) between SWB components. Note that a row without superscripts indicates that none of the coefficients significantly differed.

To evaluate these issues, a mixed-model ANOVA was conducted in which experimental condition (LS condition, PA condition, NA condition, control condition) was a between-subjects variable and SWB component (LS, PA, NA) was a within-subjects (repeated-measures) variable. The main effects of condition ($F(3,191) = 104.81$, $p < .001$, $\eta^2 = .69$) and SWB component ($F(2,382) = 145.98$, $p < .001$, $\eta^2 = .41$), and the component by condition interaction ($F(6,382) = 62.22$, $p < .001$, $\eta^2 = .49$) were each statistically significant.

Comparisons between conditions within SWB components. Follow-up simple-effects analyses were then computed to determine if there were significant differences between the four conditions in the degree to which participants were focused on their LS, PA, and NA. Three one-way ANOVAs were conducted (one per SWB component) in

which condition was the independent variable and the blind rater focus score for each SWB component (LS, PA, or NA) was the dependent variable. A significant effect of condition on focus on LS was found; $F(3,191) = 117.70$, $p < .001$, $\eta^2 = .65$. As shown in Table 10, pairwise comparisons revealed that mean focus on LS was significantly higher in the LS condition compared to the three other conditions, and mean focus on LS in the PA and NA conditions was significantly greater than in the control condition. A significant effect of condition on PA focus was found; $F(3,191) = 40.79$, $p < .001$, $\eta^2 = .39$. Pairwise comparisons revealed that mean focus on PA was significantly higher in the PA condition compared to the three other conditions, and mean focus on PA in the LS and NA conditions was significantly greater than in the control condition. A significant effect of condition on NA focus was found, $F(3,191) = 88.26$, $p < .001$, $\eta^2 = .58$. Pairwise comparisons revealed that mean focus on NA was significantly higher in the NA condition compared to the three other conditions, and mean focus on NA in the LS and PA conditions did not significantly differ from mean focus on NA in the control condition. These findings indicate that, between experimental conditions, participants' focus on LS was highest in the LS condition, focus on PA was highest in the PA condition, and focus on NA was highest in the NA condition. As expected, therefore, for each SWB component, individuals were focused on the target component corresponding to the experimental condition to a greater degree than were individuals in the other conditions.

Comparisons between SWB components within conditions. Follow-up simple-effects analyses were also computed to determine if there were significant differences between focus on LS, PA, and NA within each condition. Four repeated-measures

ANOVA were conducted (one per condition) in which the blind rater focus score for each SWB component (LS, PA, and NA) was the within-subjects (repeated-measures) variable. In the LS condition, mean focus differed significantly among SWB components ($F(2,190) = 166.02$, $p < .001$, $\eta^2 = .64$), such that focus on LS was significantly greater than focus on PA and NA, and focus on PA was significantly greater than focus on NA (see Table 10 for results from pairwise comparisons). In the PA condition, mean focus scores differed significantly among SWB components ($F(2,190) = 95.11$, $p < .001$, $\eta^2 = .50$), such that focus on PA (and LS) was significantly greater than focus on NA, but focus on PA was significantly *less* than focus on LS. In the NA condition, mean focus scores differed significantly among SWB components ($F(2,190) = 38.64$, $p < .001$, $\eta^2 = .29$), such that focus on NA (and LS) was significantly greater than focus on PA, but focus on NA was *not* significantly greater than focus on LS. In the control condition, mean focus scores did not differ significantly among SWB components ($F(2,190) < 0.01$, $p > .99$, $\eta^2 < .01$). These findings indicate that, as expected, individuals in the LS condition were focused on the target component (i.e., LS) to a greater degree than the non-target components (i.e., PA and NA), and participants in the control condition did not differ in their degree of focus on the SWB components. Contrary to expectations, however, in the PA and NA conditions, participants were at least as focused on LS (non-target component) as they were on the target component (PA and NA, respectively).

Taken together, these findings based on participants' focus scores reveal the following: (1) The LS condition was effective in that it focused participants on LS more so than did the PA, NA, and control conditions; and it focused participants on their LS more than on their PA or NA; (2) The PA condition was ineffective in that, although it

focused participants on PA more so than did the LS, NA, and control conditions, and it focused participants on their PA more than on their NA, it did not focus participants on their PA more than on their LS; (3) The NA condition was ineffective in that, although it focused participants on NA more so than did the LS, PA, and control conditions, and it focused participants on their NA more than on their PA, it did not focus participants on their NA more than on their LS; (4) The control condition was effective in that it focused participants on all three SWB components less than did the LS, PA, and NA conditions, and it did not differentially focus participants on the SWB components.

Session 1 to Session 2 descriptives. Descriptives for each of the Session 1 and Session 2 study measures are shown in Table 8. Correlations among the LS, PA, and NA scores within and across sessions are shown in Table 11. Within each session, the correlations among the three SWB components are statistically significant and each is in the expected direction (i.e., LS and PA are positively correlated; LS and NA are negatively correlated; PA and NA are negatively correlated). Further, each of the correlations is moderate to strong in magnitude. Across sessions, the same patterns of associations were observed. In addition, correlations between corresponding SWB components (e.g., Session 1 PA with Session 2 PA) were positive and moderate to high in magnitude. Change scores were computed across sessions for each SWB component (i.e., Session 1 scores were subtracted from the corresponding Session 2 scores). Descriptives for each of the SWB change scores are shown in Table 8, and correlations (and partial correlations) among the change scores are shown in Table 11.

Research question 1: Do the components of SWB change together or independently from one another? The first research question pertained to whether or not manipulated change in one SWB component created corresponding changes in the other components. Two competing hypotheses were tested. According to Hypothesis 1A, the components of SWB should change independently from one another over time (i.e., in each experimental condition, manipulated change in the target component should not be accompanied by change in the non-target components). Evidence for Hypothesis 1A would provide support for the *independence view* of the structure of SWB. According to Hypothesis 1B, in contrast, the components of SWB should change together over time (i.e., in each experimental condition, manipulated change in the target component should be accompanied by change in one or both of the non-target components). In particular, increases in LS would be accompanied by increases in PA and decreases in NA; and increases in PA would be accompanied by decreases in NA. Evidence for Hypothesis 1B would provide support for the *relatedness view* of the structure of SWB.

Table 11

Study 2: Bivariate and Partial Correlations (Controlling for Session 1 LS, PA, and NA) among SWB Change Scores Based on the Entire Sample

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1.S1 LS	--	.67*	-.60*	.84*	.66*	-.56*	-.38*	.08	.09	.19*	-.22*	-.59*	.48*	.41*	-.39*
2.S1 PA		--	-.65*	.59*	.80*	-.57*	-.20*	-.17*	.13	.24*	-.29*	-.59*	.54*	.48*	-.29*
3.S1 NA			--	-.53*	-.59*	.71*	.18*	-.00	-.43*	-.20*	.26*	.57*	-.49*	-.34*	.42*
4.S2 LS				--	.67*	-.55*	.19*	.22*	.01	.09	-.22*	-.57*	.42*	.46*	.44*
5.S2 PA					--	-.63*	-.05	.46*	-.02	.24*	-.31*	-.56*	.54*	.60*	-.40*
6.S2 NA						--	.08	-.18*	.33*	-.23*	.25*	.53*	-.48*	.39*	.52*
7. Δ S1S2 LS							--	.21*	-.14	-.19*	.01	.10	-.15*	.04	.05
8. Δ S1S2 PA							.30*	--	-.23*	.05	-.08	-.05	.08	.28*	-.23*
9. Δ S1S2 NA							-.16*	-.30*	--	-.03	-.03	-.08	.04	-.04	.10
10. S1 Structural consistency							-.15*	.08	-.10	--	-.12	-.21*	.65*	.04	.03
11. S1 Structural ambivalence							-.06	-.12	.06		--	.32*	-.69*	-.36*	.11
12. S1 Subjective ambivalence							-.15*	-.09	.12			--	-.73*	-.41*	.37*
13. S1 SWB strength index							.01	.16*	.14				--	.39*	-.22*
14. S2 Positive mood							.22*	.40*	-.14					--	-.31*
15. S2 Negative mood							-.22*	-.23*	.33*						

Note. N = 195. S1 = Session 1; S2 = Session 2; LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. Bivariate correlations are presented above the diagonal, partial correlations (controlling for Session 1 LS, Session 1 PA, and Session 1 NA) are presented below the diagonal. *p < .05.

Differences between conditions within SWB components. For descriptive purposes, mean changes in LS, PA, and NA by experimental condition are presented in Table 12. To evaluate the first research question with respect to differences between conditions, three one-way ANCOVAs were conducted in which condition (LS condition, PA condition, NA condition, control condition) was the independent variable, one of the SWB change scores (i.e., change in LS, change in PA, or change in NA) was the dependent variable, and Session 1 LS, PA, and NA were treated as covariates. Results are shown in Table 13.

Table 12

Study 2: Mean Change in SWB Components by Experimental Condition

Condition	SWB component change score		
	M (SD) change in LS	*M* (SD) change in PA	*M* (SD) change in NA
LS condition	0.31 (0.74)	0.08 (0.39)	-0.05 (0.55)
PA condition	0.19 (0.63)	0.15 (0.39)	-0.06 (0.59)
NA condition	-0.02 (0.54)	-0.01 (0.39)	-0.13 (0.50)
control condition	-0.06 (0.70)	-0.14 (0.42)	-0.11 (0.46)

Note. $N = 195$. For the control condition, $n = 48$. For the Life Satisfaction (LS) condition, $n = 50$. For the Positive Affect (PA) condition, $n = 49$. For the Negative Affect (NA) condition, $n = 48$.

Table 13

Study 2: Summary of Results from Comparisons of Change in SWB Components by Experimental Condition (Controlling for Session 1 LS, PA, and NA)

Condition	SWB component estimated marginal means		
	M (SE) change in LS	*M* (SE) change in PA	*M* (SE) change in NA
control condition	$-0.06\ (0.09)_b$	$-0.11\ (0.06)_b$	-0.11 (0.07)
LS condition	$0.27\ (0.09)_a$	$0.08\ (0.06)_a$	-0.10 (0.07)
PA condition	$0.23\ (0.09)_a$	$0.12\ (0.06)_a$	-0.02 (0.07)
NA condition	$-0.03\ (0.09)_b$	$-0.002\ (0.06)_{a,b}$	-0.12 (0.07)

Note. $N = 195$. For the control condition, $n = 48$. For the Life Satisfaction (LS) condition, $n = 50$. For the Positive Affect (PA) condition, $n = 49$. For the Negative Affect (NA) condition, $n = 48$. Estimated marginal means (*M*) and standard errors (*SE*) are shown. Within a given column, coefficients with different subscripts (a, b) indicate means that differed significantly ($p < .05$) between conditions. Note that a column without subscripts indicates that none of the coefficients significantly differed.

There was a significant main effect of condition on change in LS, $F(3,188) = 3.63$, $p < .05$, *partial* $\eta^2 = .06$. As shown in Table 13, pairwise comparisons revealed that mean change in LS was significantly higher in the LS and PA conditions compared to the control and NA conditions, and mean change in LS did not significantly differ between the LS and PA conditions. There was also a significant main effect of condition on change in PA, $F(3,188) = 3.16$, $p < .05$, *partial* $\eta^2 = .05$. Pairwise comparisons revealed that mean change in PA was significantly higher in the PA and LS conditions compared to the control condition, and mean change in PA did not significantly differ between the PA and LS conditions. In addition, mean change in PA did not significantly differ between the NA condition and the other conditions (i.e., control, LS, or PA conditions).

The main effect of condition on change in NA was non-significant, $F(3,188) = .43$, $p = .73$, *partial* $\eta^2 = .01$.

Together these findings indicate that, controlling for Session 1 LS, PA, and NA: The LS condition created an increase in LS that was significantly greater than in the NA and control conditions, an increase in PA that was significantly greater than in the control condition, but no significant change in NA (compared to the control condition); the PA condition created an increase in LS that was significantly greater than in the NA and control conditions, an increase in PA that was significantly greater than in the control condition, but no significant change in NA (compared to the control condition); the NA condition did not result in significant changes in any of the SWB components. These findings provide some support for Hypothesis 1B (*relatedness view*) in that, in the LS condition a manipulated change in LS also resulted in a change in PA; further, in the PA condition a manipulated change in PA also resulted in change in LS. Yet the results also provide some support for Hypothesis 1A (*independence view*) in that, in the LS condition, a manipulated change in LS did not result in a change in NA; further, in the PA condition, a manipulated change in PA did not result in a change in NA. Note, however, that only the results concerning the LS condition are informative with respect to these hypotheses because only the LS manipulation (and not the PA or NA manipulation) was effective in focusing individuals on the target component and not on the non-target components, as reviewed above.

Differences among individuals within conditions. Correlations and partial correlations among the SWB change scores were also examined within each of the four conditions; see Tables 14, 15, 16, and 17 for results in the control, LS, PA, and NA

conditions, respectively. In the control condition, the partial correlation between change in LS and PA was non-significant, whereas the partial correlations between changes in LS and NA, and between changes in PA and NA were negative and significant. Individuals characterized by greater increases in LS also tended to report greater decreases in NA, as did individuals with greater increases in PA. In the LS condition, the partial correlation between change in LS and PA as well as the partial correlation

Table 14

Study 2: Bivariate and Partial Correlations (Controlling for Session 1 LS, PA, and NA) among SWB Change Scores in the Control Condition

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1.S1 LS	--	.60*	-.64*	.83*	.66*	-.70*	-.32*	.20	-.10	.24	-.18	-.64*	.52*	.36*	-.55*
2.S1 PA		--	-.66*	.56*	.79*	-.64*	-.08	-.18	.02	.29*	-.26	-.65*	.59*	.50*	-.36*
3.S1 NA			--	-.51*	-.62*	.76*	.24	-.04	-.33*	-.31*	.23	.62*	-.57*	-.45*	.51*
4.S2 LS				--	.61*	-.74*	.27	.16	-.34*	.15	-.27	-.62*	.51*	.37*	-.59*
5.S2 PA					--	-.71*	-.12	.50	-.14	.33*	-.27	-.64*	.61*	.61*	-.47*
6.S2 NA						--	-.04	-.22	.36*	-.26	.30*	.63*	-.58*	-.60*	.60*
7. Δ S1S2 LS							--	-.07	-.41*	-.15	-.14	.06	-.03	.01	-.06
8. Δ S1S2 PA							.06	--	-.26	.11	-.06	-.10	.13	.27	-.23
9. Δ S1S2 NA							-.50*	-.31*	--	.06	.11	.02	-.03	-.23	.14
10. S1 Structural consistency							-.10	.14	-.01	--	-.27	-.27	.72*	.36*	-.07
11. S1 Structural ambivalence							-.20	-.09	.18		--	.16	-.67*	-.38*	.08
12. S1 Subjective ambivalence							-.19	-.14	-.12			--	-.71*	-.42*	.51*
13. S1 SWB strength index							.15	.20	-.16				--	.56*	-.33*
14. S2 Positive mood							.12	.41*	-.42*					--	-.29*
15. S2 Negative mood							-.34*	-.17	.30*						--

Note. N = 48. S1 = Session 1; S2 = Session 2; LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. Bivariate correlations are presented above the diagonal, partial correlations (controlling for Session 1 LS, Session 1 PA, and Session 1 NA) are presented below the diagonal. *p < .05.

Table 15

Study 2: Bivariate and Partial Correlations (Controlling for Session 1 LS, PA, and NA) among SWB Change Scores in the LS Condition

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1.S1 LS	--	.79*	-.62*	.83*	.72*	-.54*	-.52*	-.08	.23	.32*	-.27	-.57*	.57*	.29*	-.27
2.S1 PA		--	-.65*	.69*	.79*	-.47*	-.35*	-.29*	.35*	.24	-.24	-.51*	.48*	.46*	-.22
3.S1 NA			--	-.52*	-.57*	.72*	.32*	.09	-.54*	-.09	.15	.54*	-.37*	-.17	.46*
4.S2 LS				--	.69*	-.47*	.04	.03	.16	.22	-.32*	-.54*	.52*	.32*	-.29*
5.S2 PA					--	-.60*	-.23	.37*	.08	.25	-.41*	-.47*	.55*	.51*	.34*
6.S2 NA						--	.23	-.23	.20	-.17	.21	.56*	-.45*	-.24	.56*
7. Δ S1S2 LS							--	.18	-.17	-.23	-.01	.20	-.22	-.02	.05
8. Δ S1S2 PA							.23	--	-.41*	.03	-.28*	.03	.12	.09	-.19
9. Δ S1S2 NA							-.09	-.42*	--	-.08	.05	-.09	-.03	-.06	.03
10. S1 Structural consistency							-.09	.07	-.12	--	.04	-.31*	.69	.00	.00
11. S1 Structural ambivalence							-.17	-.36*	.13		--	.31*	-.56	-.37*	.27
12. S1 Subjective ambivalence							-.15	-.04	.25			--	-.78*	-.24	.40*
13. S1 SWB strength index							.10	.24	-.26				--	.28*	-.31*
14. S2 Positive mood							.12	.33*	-.23					--	-.12
15. S2 Negative mood							-.14	-.23	.37*						--

Note. $N = 50$. S1 = Session 1; S2 = Session 2; LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. Bivariate correlations are presented above the diagonal, partial correlations (controlling for Session 1 LS, Session 1 PA, and Session 1 NA) are presented below the diagonal. *$p < .05$.

Table 16

Study 2: Bivariate and Partial Correlations (Controlling for Session 1 LS, PA, and NA) among SWB Change Scores in the PA Condition

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1.S1 LS	--	.62*	-.55*	.84*	.58*	-.52*	-.47*	-.02	.02	-.01	-.39*	-.52*	.41*	.57*	-.23
2.S1 PA		--	-.77*	.56*	.84*	-.63*	-.22	-.20	.14	.29*	-.44*	-.65*	.63*	.56*	-.22
3.S1 NA			--	-.53	-.65*	.64*	.14	.14	-.40*	-.24	.59*	.61*	-.66*	-.45*	.26
4.S2 LS				--	.67*	-.55*	.09	.25	-.04	-.09	-.40*	-.49*	.37*	.73*	-.40*
5.S2 PA					--	-.68*	.04	.37*	-.06	.25	-.46*	-.60*	.60*	.68*	-.35*
6.S2 NA						--	.06	-.14	.46*	-.26	.47*	.51*	-.57*	-.34*	.37*
7. Δ S1S2 LS							--	.44*	-.09	-.12	.07	.16	-.16	.14	-.22
8. Δ S1S2 PA							.53*	--	-.33*	-.05	-.08	.03	.01	.26	-.25
9. Δ S1S2 NA							-.19	-.35*	--	-.04	-.13	-.10	.09	.12	.14
10. S1 Structural consistency							-.21	.05	-.15	--	-.12	-.14	.58*	-.14	.28*
11. S1 Structural Ambivalence							-.07	-.19	.15		--	.62*	-.81*	-.43*	.09
12. S1 Subjective ambivalence							-.05	-.12	.08			--	-.80*	-.50*	.24
13. S1 SWB strength index							-.06	.18	-.20				--	.34*	-.02
14. S2 Positive mood							.56*	.45*	.10					--	-.39*
15. S2 Negative mood							-.37*	-.30*	.26						

Note. $N = 49$. S1 = Session 1; S2 = Session 2; LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. Bivariate correlations are presented above the diagonal, partial correlations (controlling for Session 1 LS, Session 1 PA, and Session 1 NA) are presented below the diagonal. *$p < .05$.

Table 17

Study 2: Bivariate and Partial Correlations (Controlling for Session 1 LS, PA, and NA) among SWB Change Scores in the NA Condition

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1.S1 LS	--	.71*	-.63*	.90*	.70*	-.53*	-.13	.32*	.17	.22	-.04	-.63*	.46*	.52*	-.48*
2.S1 PA		--	-.53*	.68*	.84*	-.55*	.01	.19	.01	.13	-.13	-.60*	.44*	.56*	-.43*
3.S1 NA			--	.61*	-.54*	.74*	-.02	-.27	-.41*	-.20	.01	.54*	-.37*	-.39*	.49*
4.S2 LS				--	.72*	-.50*	.32*	.39*	.19	.07	.04	-.61*	.33*	.46*	-.43*
5.S2 PA					--	-.55*	.12	.70*	.02	.15	-.09	-.51*	.38*	.63*	-.45*
6.S2 NA						--	.03	-.27	.31*	-.23	-.05	.45*	-.32*	-.45*	.61*
7. Δ S1S2 LS							--	.19	.06	-.31*	.17	-.02	-.23	-.07	.06
8. Δ S1S2 PA							.25	--	.02	.10	.01	-.13	.11	.40*	-.24
9. Δ S1S2 NA							.07	-.11	--	-.04	-.08	-.15	.10	-.06	.13
10. S1 Structural consistency							-.31*	.02	-.13	--	-.18	-.12	.64*	-.05	-.08
11. S1 Structural ambivalence							.18	.01	-.13		--	.15	-.68*	-.33*	.09
12. S1 Subjective ambivalence							-.08	.11	-.02			--	-.65*	-.49*	.29*
13. S1 SWB strength index							-.24	-.04	.01				--	.40*	-.23
14. S2 Positive mood							-.06	.33*	-.17					--	-.41*
15. S2 Negative mood							.04	-.09	.39*						

Note. $N = 48$. S1 = Session 1; S2 = Session 2; LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. Bivariate correlations are presented above the diagonal, partial correlations (controlling for Session 1 LS, Session 1 PA, and Session 1 NA) are presented below the diagonal. *$p < .05$.

between change in LS and NA was non-significant. Changes in PA and changes in NA were significantly negatively correlated, such that individuals characterized by greater increases in PA also tended to report greater decreases in NA. In the PA condition, the partial correlation between changes in LS and PA was significant and positive, meaning individuals characterized by greater increases in LS also tended to report greater increases in PA. The partial correlation between change in LS and NA was non-significant. The partial correlation between changes in PA and NA was significant and negative, such that individuals who reported greater increases in PA also tended to report greater decreases in NA. In the NA condition, partial correlations between the three SWB change scores were non-significant.

The partial correlations between SWB change scores were compared statistically (Preacher, 2002; see Table 18) in order to determine whether the patterns of within-condition associations between the SWB change scores differed across conditions. The magnitude of the partial correlation between change in LS and change in PA significantly differed between the control condition and PA condition. More specifically, change in LS and change in PA were more strongly associated in the PA condition compared to the control condition. The magnitude of the partial correlation between change in LS and change in PA did not significantly differ between the remaining conditions. The magnitude of the partial correlation between change in LS and change in NA significantly differed between the control condition and the LS and NA conditions, such that change in LS and change in NA was more strongly associated in the control condition. The magnitude of the partial correlation between change in LS and change in NA did not significantly differ between the remaining conditions. The magnitude of the

partial correlation between change in PA and change in NA did not significantly differ across conditions.

Note, however, that only the results concerning the LS condition are informative with respect to Hypothesis 1A and Hypothesis 1B because only the LS manipulation (and not the PA or NA manipulation) was effective in focusing individuals on the target component and not on the non-target components, as reviewed above. The within-condition findings specific to the LS condition provide limited support for Hypothesis 1B (*relatedness view*), in that, of the three pairs of SWB components, changes in PA and NA were correlated; in contrast, associations between changes in LS and changes in PA, as well as changes in LS and changes in NA, were non-significant within the LS condition – providing somewhat greater support for Hypothesis 1A (*independence view*).

Table 18

Study 2: Partial Correlations among SWB Change Scores (Controlling for Session 1 LS, PA, and NA) by Experimental Condition

	Partial correlations among SWB change scores		
Condition	ΔLS and ΔPA	ΔLS and ΔNA	ΔPA and ΔNA
control condition	$.06_{a}$	$-.50_{a}$*	-.31*
LS condition	$.23_{a,b}$	$-.09_{b}$	-.42*
PA condition	$.53_{b}$*	$-.19_{a,b}$	-.35*
NA condition	$.25_{a,b}$	$.07_{b}$	-.11

Note. *n*s = 48, 50, 49, and 48, respectively, for control, LS, PA, and NA conditions. * $p < .05$ for testing the significance of the partial correlation coefficient. Within a given column, coefficients with different subscripts differed significantly ($p < .05$). Note that a column without subscripts indicates that none of the coefficients significantly differed.

Research question 2: Does SWB strength moderate the associations among changes in LS, PA, or NA? Further, according to Hypothesis 2, among individuals with high-strength SWB, changes in LS, PA, and NA should be more strongly associated with each other, whereas among individuals with low-strength SWB, changes in LS, PA, and NA should be less strongly associated with each other.

To test Hypothesis 2 in the entire sample, participants were divided into three groups: a high SWB strength index group (top 25% of the distribution), a moderate SWB strength index group (i.e., middle 50% of the distribution), and a low SWB strength index group (i.e., bottom 25% of the distribution)[4]. Within each group, the partial correlations among the SWB change scores were evaluated for the entire sample (controlling for the Session 1 LS, PA, and NA scores); see Table 19. The corresponding correlations were compared statistically between the high-strength and low-strength groups. The partial correlations between changes in LS and PA, changes in LS and NA, and changes in PA and NA did not differ significantly between the high and low SWB strength index groups. Results were consistent when participants were divided into high, moderate, and low strength groups based on each of the individual strength variables (structural consistency, SWB structural ambivalence, subjective ambivalence), and corresponding partial correlations were compared between the high and low strength groups. These findings provide no support for Hypothesis 2, according to which correlations among the SWB change scores should have been stronger among individuals in the high-strength

[4] Using a 25%, 50%, 25% split better reflects the distributions of the raw SWB strength scores compared to using a tertile split. This approach also provided a more accurate classification of 'high' versus 'low' strength. Conclusions were consistent when a tertile split was used instead (i.e., comparing the top and bottom third of participants).

groups compared to individuals in the low-strength groups. Instead, no evidence was found that the

Table 19

Study 2: Partial Correlations (controlling for S1 LS, PA, and NA) among SWB Change Scores in the Low, Moderate, and High SWB Strength Groups for the Entire Sample

	Low strength		Moderate strength		High strength		Comparison *p*-values	
Moderator	Δ PA	Δ NA	Δ PA	Δ NA	Δ PA	Δ NA	Δ PA	Δ NA
SWB strength index								
Δ LS	.34*	-.22	.14	-.14	.55*	-.08	.21	.49
Δ PA		-.37*		-.34*		.02		.05
Structural consistency								
Δ LS	.08	-.03	.43*	-.22*	.25^	-.15	.40	.56
Δ PA		-.30*		-.40*		-.02		.16
Structural ambivalence								
Δ LS	.33*	-.29*	.16	-.10	.47*	-.02	.42	.18
Δ PA		-.45*		-.26*		-.13		.09
Subjective ambivalence								
Δ LS	.39*	-.16	.22^	-.19	.41*	-.04	.90	.53
Δ PA		-.36*		-.30*		-.14		.22

Note. $N = 195$. LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. For the SWB strength index, low strength index group $n = 47$, moderate strength index group $n = 98$, high strength index group $n = 50$. For structural consistency, low structural consistency group $n = 49$, moderate structural consistency group $n = 97$, high structural consistency group $n = 49$. For structural ambivalence, low structural ambivalence group $n = 52$, moderate structural ambivalence group $n = 95$, high structural ambivalence group $n = 48$. For subjective ambivalence, low subjective ambivalence group $n = 64$, moderate subjective ambivalence group $n = 79$, high subjective ambivalence group $n = 52$. Results from statistical comparison of high and low group correlations are presented in the comparison p-values column. *$p < .05$.

associations among the SWB change scores differed between the high and low strength groups.[5]

Supplementary Analyses. In supplementary analyses, I re-ran the analyses for each research question, controlling for participants' mood (positive and negative) at Session 2 in addition to baseline SWB (i.e., Session 1 LS, PA, and NA). Results from these supplementary analyses are provided in Appendix P. Compared to the results from the main analyses presented above, findings from the supplementary analyses indicated that (1) with regards to between-condition comparisons, the manipulations were not strong enough to create changes in the SWB components independent of participants' positive and negative mood at Session 2; (2) with regards to within-condition comparisons, consistent with the main results, changes in LS and PA as well as changes in LS and NA were not correlated, while changes in PA and NA were correlated within the LS condition; and finally (3) SWB structural ambivalence and the overall SWB strength index moderated the strength of the association between change in PA and change in NA in the opposite manner predicted in Hypothesis 2.

With respect to the first research question and hypotheses, between condition comparisons provided no support for the *independence view* (Hypothesis 1A) or the *relatedness view* (Hypothesis 1B) of the structure of SWB, but instead suggested that the manipulations were not strong enough to create changes in the SWB components

[5] Condition (LS condition, PA condition, NA condition, control condition) by moderator (structural consistency, SWB structural ambivalence, subjective ambivalence, SWB strength index) interactions were examined using a multiple regression approach in which each SWB change score was regressed onto the three Session 1 SWB scores, three dummy codes (each contrasting the control condition, coded as 0, with one of the experimental conditions, coded as 1), a continuous SWB strength score (structural consistency, SWB structural ambivalence, subjective ambivalence, or SWB strength index), and three interaction terms (representing the interactions of the SWB strength scores and each of the dummy codes). None of the interaction terms were significant (controlling for Session 1 LS, PA, and NA); therefore, these results are not discussed further.

independent of participants' mood at Session 2. In addition, within condition comparisons provided limited support for Hypothesis 1B (*relatedness view*), in that, of the three pairs of SWB components, changes in PA and NA were correlated in the LS condition; in contrast, associations between changes in LS and changes in PA, as well as changes in LS and changes in NA, were non-significant within the LS condition – providing somewhat greater support for Hypothesis 1A (*independence view*).

With respect to the second research question and hypothesis, the supplementary findings provided no support for Hypothesis 2, according to which partial correlations among the SWB change scores should have been stronger among individuals in the high-strength groups compared to the low-strength groups. Instead, findings suggest that in regards to SWB structural ambivalence and the overall SWB strength index, change in PA and change in NA was more strongly related among individuals in the low-strength group compared to the high-strength group.

Results from these supplementary analyses controlling for whether an individual was in a positive or negative mood following the experimental manipulation indicated that the experimental manipulations did not differ in the amount of change in the SWB components. Compared to the main results, therefore, in which a manipulated change in LS was accompanied by a change in PA, controlling for mood severed the manipulated link between these two positive components of SWB. Due to the potential overlap between present mood and PA, in particular the potential for each to influence the other (Frijda, 2000), it is not surprising that the main effect of the manipulation did not remain significant when controlling for mood. Additionally, emotion words (e.g., happy, sad) that appear in the mood measure used in the present student (i.e., BMIS; Mayer &

Gaschke, 1988) also appeared in the measure I employed to assess PA and NA (i.e., SPANE; Diener et al., 2009). Further, although the SPANE instructions prompted individuals to rate their emotional experiences *over the past four weeks* and the BMIS prompted individuals to rate the emotion words based on how they feel *at that particular moment*, individuals may not have noticed the subtle differences between these two sets of instructions. Together, therefore, these notions suggest that controlling for present mood may also have controlled for the effects of PA and NA that are of interest in the current study.

With regards to SWB strength as a moderator of the associations among change scores, the role of SWB strength also appears to be contingent on the variables that are included as covariates within the analyses. Treating the Session 1 SWB scores as the covariate, the SWB strength index and the individual strength dimensions did not moderate the structure of SWB. In contrast, treating the Session 1 SWB scores and the Session 2 present mood scores as the covariates, the SWB strength index as well as SWB structural ambivalence moderated the association between changes in PA and changes in NA – but among individuals with low-strength SWB, rather than high-strength SWB as predicted. Compared to the main results, therefore, in which no evidence of moderation was found, controlling for mood produced some evidence in favour of moderation – albeit in the opposite direction than anticipated. Therefore, when the variance associated with present mood is held constant, for individuals characterized by low SWB strength based on the SWB strength index (i.e., low structural consistency, high structural and subjective ambivalence) changes in PA and NA are more strongly linked than for

individuals characterized by high SWB strength (i.e., high structural consistency, low structural and subjective ambivalence).

This effect may be explained entirely by the effect found for the individual strength dimension, SWB structural ambivalence, or it may be a result of the combination of strength dimensions that may not be strong enough to moderate the associations among changes in PA and NA standing alone (specifically structural consistency and subjective ambivalence). When the variance associated with present mood is held constant, for individuals characterized by high SWB structural ambivalence (i.e., low SWB strength) changes in PA and NA are more strongly linked than for individuals characterized low ambivalence (i.e., high SWB strength). There is evidence that individuals with mixed thoughts and feelings towards an attitude object are able to change their attitude in order to conform to social norms (Hodson, Maio, & Esses, 2001). In the present study, individuals who were highly ambivalent may have conformed to the ideas presented in the manipulation materials (high PA and low NA are ideal), which created a stronger link between changes in the two affective components of SWB. The reason why this pattern was found only when controlling for present mood, however, is unclear.

Thus, across levels of analysis, it appears that controlling for Session 2 present mood creates somewhat different patterns of results – rather than a single consistent outcome. On the one hand, such findings may call into question the effectiveness of the experimental manipulations (in particular the LS manipulation), particularly if present mood is seen as a nuisance variable that needs to be controlled in order to arrive at clearer or more robust conclusion concerning the main outcomes of interest (i.e., changes in LS,

PA, and NA). On the other hand, it may be problematic to try to separate out the impact of the manipulations on present mood versus SWB. Including present mood as a covariate is arguably the strictest test of whether or not the experimental manipulations had an impact on an individual's thoughts or feelings towards his or her life, because the inclusion of multiple covariates in statistical analyses can reduce statistical power – particularly if those covariates are closely related to the other predictors and the outcomes of interest. More specifically, controlling for Session 2 present mood removes a portion of variance in PA and NA (and perhaps LS, given the associations among all three SWB components found in previous research, including Study 1 in the present thesis) due to the overlap between these measures. Taking these issues into consideration, in my view the main results (controlling for Session 1 LS, PA, and NA only) are a more realistic indicator of the effects of the manipulations on changes in SWB (and thus the structure of SWB) and the role of SWB strength as a potential moderator.

As stated previously, however, the role of mood in evaluations and beliefs is relevant to understanding SWB. Papousek and Schulter (2008) provide evidence that an intervention which effectively creates a cheerful (i.e., positive) mood in participants led to increases in their subjective health. Therefore, the same may be true in the current study, with the experimental manipulations creating a positive mood in participants and leading to increases in subjective well-being. Indeed, experimental manipulations of SWB tend to blur affect and mood, attempting to induce positive moods in order to enhance SWB (King et al., 2006; Lench et al., 2011; Polivy, 1981). Accordingly, in the present study the experimental manipulation could have impacted participants' mood, which then led to changes in their LS, PA, or NA. Thus, further research is needed to

better understand the role of moods in experimental manipulations of SWB, in particular studies attempting to influence the individual components of SWB.

Discussion

The purpose of the present study was to inform the structure of SWB by determining whether manipulated change in one component of SWB was related to or independent from changes in the other two components of SWB. In addition, SWB strength was explored as a moderator of the degree of correlated change observed among SWB components over time.

Effectiveness of the experimental SWB manipulations. Within the SWB literature, manipulations that target one component at a time, in order to track the resulting changes in all three components separately, have yet to be established. In the hopes of informing the structure of SWB, the present study employed separate manipulations of LS, PA, and NA, created by drawing on manipulations that have been used in the attitudes research literature to impact separately the cognitive and affective components of an existing attitude (e.g., Smith & Nosek, 2011). The goal of the experimental manipulations was to focus individuals on one target component of SWB, and by focusing an individual on the target component, create changes in that component of SWB in order to then determine whether change in the target SWB component resulted in changes in the non-target SWB components. The LS manipulation effectively focused individuals on the target component (i.e., LS) and not on the non-target components (i.e., PA and NA) and led to improvements (i.e., increases) in LS and PA (but not NA). In contrast, the PA and NA manipulations failed to focus individuals on only the target

component (i.e., PA and NA respectively) and not on the non-target components (specifically LS), and thus were deemed ineffective.

With regards to focusing individuals on the target component, the LS condition may have been more effective than the PA and NA conditions simply because individuals understood the instructions in the LS condition (i.e., focus on your satisfying thoughts towards your life) better than the instructions for the PA and NA conditions. Examining within-condition focus led to further insights on the apparent dominance of LS, such that regardless of whether individuals were instructed to focus on LS, PA, or NA, LS appeared to be the component of SWB individuals were most focused on while writing their persuasive paragraphs. This finding may be interpreted as support for Model 3, in which SWB is seen as a causal system and LS is considered the essence of SWB (Davern, Cummins, & Stokes, 2007; Oishi & Koo, 2008). From this perspective, focusing individuals on the positive or negative emotional aspects of their life may automatically activate thoughts about one's life and the conditions of one's life that brought forth the emotional experiences. Such an interpretation, however, assumes that the instructions for the PA and NA conditions were clear and the manipulation materials isolated PA and NA respectively – evidence of which was not found in the present work

In future research, clearer examples of LS, PA, and NA could be provided within each condition in order to ensure that participants focus *only* on the target component. Individuals may not understand the difference between positive thoughts (LS) and positive emotions (PA) towards one's life, so telling participants to focus on one and not the other may be ineffective. Instead, participants in a condition designed to target PA could be told to focus on positive emotions towards their life (PA; such as "I am happy",

"I always experience joy in my life", or "my life makes me feel grateful") and not on positive thoughts (LS) towards their life (such as "I have understanding friends", "I have been successful in school" or "I live in a beautiful neighbourhood"). Therefore, clarifying the difference between thoughts and emotions, paired with explicit examples, may be beneficial before having individuals complete manipulation materials designed to target the components separately.

With regards to creating change in the target component, both the LS and PA conditions were successful whereas the NA condition was not. The LS and PA conditions may have been more effective than the NA condition because the LS and PA conditions focused on *increasing* the target component, whereas the NA condition focused on *decreasing* the target component. Asking individuals to recall their positive thoughts (LS condition) and positive emotions (PA condition) and then write about how they occur frequently may bolster LS and PA because it is easy for individuals to convince themselves that positive thoughts and emotions occur more often than they can recall. In contrast, asking individuals to recall their negative thoughts (NA condition) and then write about how infrequently they occur may have been confusing, because an individual's recollection of negative emotions would be inconsistent with what they are being asked to write about. Therefore, although participants in the NA condition were willing to follow instructions and write about their infrequent negative emotions towards their life, they may have been reluctant to believe that these negative emotions occur less frequently than they are able to recall. Thus, perhaps individuals in the NA condition were not convinced by the reading passage or the other manipulation materials, and thus change in NA was not observed within the NA condition. If so, in future research, a more

effective method for manipulating the NA component of SWB could require more extensive and repeated intervention, consistent with research on attitudes in which it has been shown that resisting an initial persuasion attempt can weaken the attitude, such that an additional persuasive attempt would be more likely to create attitude change than the initial attempt (Cooke & Sheeran, 2004). Further research is needed in order to identify manipulations that effectively target PA and NA, separate from LS. Indeed, in order to clarify the structure of SWB, whether or not the components can be manipulated separately from one another is an important question that must be pursued further.

In addition, the degree to which an individual is motivated to process a persuasive message also has important implications for the effectiveness of the message in creating attitude change. Motivated individuals are more likely to systematically analyze and elaborate on the persuasive message, whereas unmotivated individuals use less effortful processing by drawing on peripheral cues (such as an expert source), which may result in a superficial change in one's attitude (Crano & Prislin, 2006). Therefore, individuals who welcome SWB interventions may experience more improvements in SWB compared to individuals who are disinterested in SWB interventions. In addition, whether an attitude is cognitively or affectively based can influence the effectiveness of manipulation materials (Fabrigar & Petty, 1999). Evaluating participants' motivation to change their SWB, as well as determining the basis of an individual's attitude towards his or her life may provide further insights into the effectiveness of the SWB manipulations.

Lastly, it is important to keep in mind that an effective intervention is not always effective for everyone. According to Sheldon and Lyubomirsky (2006), when choosing an intervention it is important to consider the person-activity fit. There is evidence that an

individual's strengths, weaknesses, interests, and personal values impact the effectiveness of interventions designed to increase well-being. In order to maximize person-activity fit, future research should provide participants with a choice of multiple manipulations that target one component of SWB and instruct participants to complete the manipulation that appears most intriguing based on their personal preferences. This would ensure that individuals have the opportunity to complete manipulation materials that align with their personal values or interests, which may increase motivation to attend to the manipulation materials, resulting in greater focus and greater change in the intended component of SWB.

Research question 1: Do the components of SWB change together or independently from one another? The first research question pertained to whether or not manipulated change in one SWB component created corresponding changes in the other two SWB components. According to Hypothesis 1A (*independence view*), it was expected that the components of SWB should change independently from one another such that a manipulated change in one component would not result in, or be related to, changes in the other component(s); whereas according to Hypothesis 1B (*relatedness view*), it was expected that the components of SWB should change together, wherein a manipulated change in one component of SWB would result in changes in the other component(s) of SWB.

Differences between conditions. Results from the main analyses revealed that two experimental conditions, LS and PA, impacted two SWB change scores, changes in LS and PA. Individuals focusing on their satisfying thoughts toward their lives (LS condition) or on their frequent experiences of PA (PA condition) were characterized by

greater increases in LS and PA compared to individuals in the control condition. In contrast, the third experimental condition (NA) did not impact any of the SWB change scores. Results from the manipulation check indicated that only the LS condition effectively focused individuals on the target component (LS) more so than on the non-target components. Therefore, results regarding the impact of the PA and NA conditions on changes in SWB cannot be interpreted in order to clarify the structure of SWB, since it is unclear whether the results are a product of the structure of SWB or the product of a manipulation that did not effectively focus individuals on one component of SWB.

Findings regarding the LS condition, and the observed link between changes in LS and changes in PA, provide support for the *relatedness view* (Hypothesis 1B) with respect to the LS and PA components of SWB, and support for the *independence view* (Hypothesis 1A) with respect to the NA component of SWB. In regards to informing the structure of SWB, it appears as though an individual's level of LS and PA are linked, such that a situation resulting in increases in LS also results in increases in PA. In contrast, a situation resulting in an increase in LS does not appear to also impact an individuals' level of NA. These findings indicate that the LS and PA (but not NA) components of SWB change together when LS is targeted individually.

With respect to the various competing structural models of SWB, together these patterns based on the comparisons among experimental conditions provide support for Model 1 (which ignores the associations among SWB components) with respect to the associations among SWB components involving NA. Results also support Model 2 (which requires associations among all three SWB components) for LS and PA, but not NA. Further, with respect to Model 3 (which presumes that PA and NA influence LS),

my findings indicate that manipulation of PA (but not NA) may lead to changes in both PA and LS, consistent with the assumptions of Model 3, but that manipulation of LS leads to changes in both PA and LS, contrary to the assumptions of Model 3. Together, the findings thus provide partial support for Model 3.

The link between change in LS and change in PA observed in the LS condition may be explained by the positive valence shared by these two components of SWB. Possessing many satisfying thoughts about your life and frequently experiencing positive emotions related to your life can both be thought of as ideals to strive towards. In this respect, changes in LS and PA may have been observed in the LS condition because they consist of positive life experiences and emotions. Change in these two components of SWB may occur in tandem because having an individual recall *positive* thoughts automatically leads to the recall of *positive* emotions; whereas change in NA may occur independently of the other two components because it consists of *negative* emotional experiences. Positive emotions have been linked to cognitive functioning, such that PA improves creative problem solving, and more importantly, facilitates the recall of neutral and *positive* material (Ashby et al., 1999). Therefore, recalling negative emotions towards one's life may be isolated from positive thoughts and positive emotions, such that recalling negative emotional experiences does not connect an individual with the positive aspects of their SWB. According to the model of evaluative space (Cacioppo & Gardner, 1999), positivity and negativity are independent evaluative channels that are often activated separately from one another. A stimulus, in this case specific life events or thoughts about one's life more generally, have the potential to activate both positive and negative evaluations, but can also activate only one of these channels. This model

provides support for the independence of PA and NA, as well as the notion that NA may also be separate from LS. Thinking of positive and negative evaluations as a complex system, with the ability to co-exist as well as occur independently explains the variable relationship between positive and negative components of SWB. Thus, with respect to the structure of SWB and how the three components fit together, what can be thought of as the positive aspects of SWB (i.e., LS and PA), that we strive to increase, may be isolated from the negative aspect of SWB (i.e., NA), which we strive to decrease depending on the life event or thought an individual is referencing when evaluating his or her SWB. However, over longer periods of time (Study 1), it appears as though change in NA is linked to changes in LS and PA; I discuss this issue further in the General Discussion.

Differences among individuals within conditions. Results from the main analyses within each condition revealed statistically significant partial correlations among several of the SWB change scores (controlling for Session 1 LS, PA, and NA scores) as well as several non-significant partial correlations. In order to provide full support for the *relatedness view,* all pairs of SWB change scores would need to be significantly correlated with one another within each condition. Alternatively, to provide full support for the *independence view,* all pairs of SWB change scores would need to be non-significantly correlated with one another across conditions. The control condition consisted of neutral tasks unrelated to the components of SWB and was intended to represent naturally occurring change in the SWB components. In this condition, two of out of the three pairs of SWB change scores were significantly related in the anticipated directions: Increases in LS were associated with decreases in NA, increases in PA were associated with decreases in NA, and change in LS was not associated with change in

PA. In the LS condition, which was intended to boost individuals' LS, only one out of the three pairs of change scores were significantly associated: Increases in PA were associated with decreases in NA, but change in LS was not associated with change in PA or NA. In the PA condition, which was intended to boost individuals' PA, two out of the three pairs of change scores were significantly associated in the anticipated directions: Increases in LS were associated with increases in PA, increases in PA were associated with decreases in NA, but change in LS was not associated with change in NA. In the NA condition, which was intended to decrease individuals' NA, none of the three pairs of change scores were significantly associated. Together, results within the control, LS, and PA conditions provide partial support for the *relatedness view* (Hypothesis 1B), and results in each condition also provide partial (control, LS, PA conditions) or complete (NA condition) support for the *independence view* (Hypothesis 1A). It is important to note that the significant correlation between change in LS and change in PA in the PA condition may be explained by the fact that the PA condition did not effectively focus individuals on PA more than LS.

In regards to informing the structure of SWB, results appear to differ across conditions. Results from the control condition indicate that having participants focus on a neutral topic led to partial independence among SWB components, providing some support for Model 1; and partial relatedness, providing some support for Model 2 and Model 3. Results from the LS condition indicated that having participants focus on satisfying thoughts about their lives led to partial independence among SWB components, providing some support for Model 1; and partial relatedness, providing some support for Model 2, but no support for Model 3. Results from the PA and NA

conditions could not be interpreted, however, because blind rater focus scores indicated that the PA and NA conditions did not effectively focus individuals on only the target SWB components (PA and NA respectively) more than the other components (specifically LS).

In regards to informing the structure of SWB, therefore, results appear to differ drastically across the LS and control conditions; however, the partial correlation between change scores only significantly differed in three cases. In the control condition, where individuals were not prompted to focus on a specific component of SWB, the link between LS and PA may not have been solidified because the participant was not required to focus internally, or more generally, on his or her life in the control condition. And yet results from the control condition also indicate that allowing focus on the SWB components to vary freely amongst participants by providing neutral tasks led to a stronger link between change in LS and change in NA compared to the LS condition. Lacking a specific focus, participants seemed to experience changes in LS that were associated with changes in NA. It is possible that life events, such as approaching academic exams, drove change in these two components together. Although individuals were asked to focus on a neutral topic in the control condition (i.e., gamma-ray bursts), pre-occupation with life events that influence LS and NA simultaneously may explain the strong link between these two components within the control condition. In contrast, when an individual is asked to focus on LS, the link between change in LS and change in NA is weaker, indicating that these two components seem to change independently when participants are focused LS. Overall, however, findings suggest that the differences

between conditions in the partial correlations among SWB change scores were not extensive, and observed with respect to very few of the statistical comparisons.

Reconciling results across analyses. The aim of the current study was to inform how the components of SWB fit together following an experimental manipulation of one of the SWB components. The conclusions regarding the structure of SWB, as consisting of independent or related components, were similar in some respects based on the level at which changes in SWB were examined (i.e. experimental condition group means, correlations within conditions), but also differed to some degree. As I discuss next, these patterns suggest that the structure of SWB may be influenced by whether an individual is focused on his or her LS, PA, NA, or on a neutral topic unrelated to SWB.

One theme to emerge from the various analyses was that conclusions concerning the structure of SWB may differ depending on whether results were considered between or within conditions. In results based on the between condition analyses and the within condition analyses, there were clear indications of independence among the SWB components. In particular, the independence of change in NA from changes in LS was a common theme. Between condition analyses indicated that changes in NA were not observed in conditions that resulted in changes in LS. As discussed above, this pattern of independence may reflect the different valences of the LS and NA concepts, as well as the different evaluative channels underlying the LS and NA systems that become highlighted or differentially activated depending on which SWB component an individual is focused on. Within condition analyses also indicated that changes in NA were not associated with changes in LS; however, this pattern was not consistent within each conditions. In some conditions, changes in NA were associated with changes in LS

and/or PA (i.e., the control, LS, and PA conditions), whereas in other conditions, changes in NA were not associated with changes in LS and/or PA (i.e., the LS, PA, and NA conditions). These differences may be explained by the effectiveness of the manipulations in focusing individuals on the target component only (and not on the non-target components), with the LS condition being effective and the PA and NA conditions being ineffective. Overall, the within-condition findings provided partial support for the *independence view* as well as partial support for the *relatedness view*. The patterns of independence and relatedness among SWB components were unclear across conditions. As discussed above, these patterns of partial independence may reflect the different valences of SWB components or different evaluative channels. Patterns of partial relatedness may reflect similar antecedents among some SWB components, a stable tendency towards positive evaluations of one's life and positive emotional reactions, or the recollection of life events that are both emotionally and cognitively stimulating.

The structure of SWB may rely on the component of SWB the individual is focused on at the time. Therefore, advocating full support for the *relatedness view* based on the individual difference findings would be misguided, since the corresponding associations within each condition tell a different story, and only the LS condition effectively focused individuals on the target component (LS). With respect to Research Question 1, therefore, the structure of SWB may not be a simple question of whether changes in the components of SWB are independent or related over time, since support for both the *relatedness* and *independence view* of SWB has been found. Instead, the structure of SWB may be more complex and what we should be asking as SWB researchers is *under what conditions* do the components of SWB change together and

independently from one another over time. Note, however, that of the various levels of analysis reported in this study, findings concerning the between condition differences – in which changes in LS were observed in conditions that also created changes in PA – are most informative with respect to the main research question concerning whether the SWB components change together or independently following targeted manipulation of the individual components.

Research question 2: Does SWB strength moderate the associations among changes in LS, PA, or NA? The second research question pertained to whether or not the strength of an individual's attitude towards his or her life (i.e., SWB strength) moderated the observed relationships between the LS, PA, and NA change scores. The hypothesis was that for individuals characterized by high-strength SWB, changes in LS, PA, and NA should be more strongly associated with each other, whereas among individuals characterized by low-strength SWB, changes in LS, PA, and NA should be less strongly associated with each other (i.e., Hypothesis 2). Below is a discussion of the findings and conclusions concerning Hypothesis 2.

Results from the main analyses revealed that changes in the SWB components were not more strongly associated within the high SWB strength index group compared to the low SWB strength index group. One potential explanation is that the SWB strength index may not have provided a reliable summary of individuals' SWB strength, with respect to the three dimensions examined in the present work (structural consistency, SWB structural ambivalence, subjective ambivalence). Among these three dimensions, the observed correlations ranged from low to moderate (see Table 11), suggesting that these aspects of strength were not well-explained by a single underlying 'strength' factor.

One of the differences among strength indicators was that structural consistency and SWB structural ambivalence are potentially less biased measures of SWB strength than subjective ambivalence, because they gauge SWB strength without the awareness of the participant. Further, structural consistency and SWB structural ambivalence both are based on computations reflecting what researchers and theorists regard as consistence (i.e., favourable or unfavourable thoughts and emotions) or ambivalence (several positive and negative thoughts about one's life), not necessarily what individuals experience as consistent or ambivalent in their own lives. Simply stated, for some individuals the experience of low LS, high PA and high NA may not be experienced as inconsistent or ambivalent. Thus, although there is support for strength dimensions correlating with one another (Cooke & Sheeran, 2004) and for combining attitude strength dimensions into an aggregate score (e.g., Bassili, 1996), similar to present findings previous research has shown that derived ambivalence and subjective ambivalence scores can be quite distinct (Conner & Sparks, 2002; Priester & Petty, 2001). As a result, the overall strength index employed in the present study may have been characterized by limited reliability or validity.

Yet examining structural consistency, SWB structural ambivalence, and subjective ambivalence separately similarly indicated that changes in the SWB components were not more strongly associated with each other in the high compared to low strength groups. Thus, support for Hypothesis 2 was not found. One explanation for why the associations among changes in LS, PA, and NA did not differ at varying levels of SWB strength is that all three SWB components were highly stable over the one-week period of the study. This stability may have been a more powerful influence on

individuals' SWB scores than the strength components examined as potential moderators. Therefore, a potential reason why SWB strength did not moderate the associations among SWB change scores is because of the short-term nature of Study 2 (i.e., over the course of approximately one week on average). If Session 2 had taken place months, or years, after Session 1, evidence for SWB strength as a moderator of change in SWB may have been found. Further, the experimental conditions did not have large effects on the SWB components. It is possible, consequently, that SWB strength (or its components) may have been found to moderate associations among the SWB change scores had there been larger changes in SWB over time, resulting from stronger effects of the manipulations.

Finally, beyond considering additional aspects of SWB strength, there may be other potential moderating factors of the structure of SWB. Perhaps when examining an individual's attitude towards his or her life, the memory of certain life events would impact the links among SWB change scores. For example, examining whether drawing on life events that are cognitively or affectively-based (e.g., Luhmann et al., 2012) results in stronger or weaker associations among SWB change scores than drawing on life events that are both cognitively and affectively-based is an interesting avenue for future research. In addition, based on research examining lay theories (e.g., Davis, Burnette, Allison, & Stone, 2011; Dweck & Leggett, 1988), individuals' personal beliefs concerning the extent to which their SWB can change over time (vs. remain static) may also moderate the associations among the changes in SWB components.

Limitations. As with Study 1, results were based on an undergraduate student sample consisting of young adults that were primarily female. The homogeneity of the sample may not allow for generalizability of results to a male population or beyond the

current age group. Further, evaluations of LS, PA, and NA were subjective, and were therefore based on the perceptions of the individual. As mentioned previously, such subjective evaluations may be influenced by transient factors such as fleeting thoughts or memories, motivational factors, or external factors such as distractions in the testing room. There is also the possibility that when completing the self-report SWB measures, participants may have misunderstood instructions, failed to focus consistently on their own life, or felt the need to answer questions in a socially desirable manner to provide evidence of high SWB. Each of these possibilities may have influenced the present findings by failing to truly measure SWB (which requires participants to complete survey items in an attentive and truthful manner while focusing on their own life experiences), thereby increasing measuring error, which would lead to weaker associations observed among SWB components and possibly, weaker associations between change in the components over time.

Although the scheduling of sessions was closely monitored, the number of days between completion of Session 1 and completion of Session 2 varied across participants. On average, Session 1 and Session 2 were separated by nine days; however, for some individuals the sessions were separated by as little as one day or as many as 42 days. The number of days between sessions was significantly negatively correlated with PA at Session 2, such that individuals with more days between sessions had lower PA at Session 2. The number of days between sessions also significantly predicted change in PA (such that individuals with greater days between sessions were characterized by greater decreases in PA), but not change in LS or NA. However, including this variable as a covariate in the main analyses did not change the pattern of results reported above,

concerning the effects of the experimental conditions on change in LS, PA, or NA. Nonetheless, there were differences between participants in the number of days between sessions, which may have impacted results in other ways. For example, sessions occurring close together may have increased priming effects, thereby increasing measuring error, which could lead to weaker associations among changed in the components over time, and also biasing results concerning SWB strength as a moderator of the associations among change scores.

The sample size for Study 2 was significantly smaller than the sample size for Study 1. The smaller sample size was somewhat limiting, especially with regards to answering the second research question involving SWB strength as a moderator of the associations among SWB change scores. Given the number of conditions participants were randomly separated into, patterns of associations between change scores within conditions by SWB strength group (i.e., low SWB strength versus high SWB strength within each experimental condition) could not be examined. Splitting participants by condition, and then by SWB strength group, resulted in too few participants for the analyses to be conducted. A larger sample size may have indicated that, for example, SWB strength moderated the associations among the SWB change scores for individuals within the LS, and PA conditions, but not the NA or control conditions.

Responses to the suspicion check indicated that some participants suspected that the purpose of the study was to use the manipulation materials to change thoughts and emotions, and to assess these changes: "I think the researchers hoped or expected to find either a large change or a small change in our responses and how they varied between the two surveys" (Participant 147). Whether or not these participants tailored responses to

match researcher expectations, or if they did not give thought to the purpose of the study until they were explicitly asked at the end of Session 2 is unknown. If participants did not dwell on the purpose of the study until the end of Session 2, the results would not be impacted; however, if participants were aware of the purpose of the study throughout Session 2, reported SWB may have been inflated, resulting in exaggerated SWB change scores. Regardless, follow-up analysis comparing groups of suspicious (n = 34) and non-suspicious (n = 161) participants revealed no significant differences in Session 2 SWB scores or SWB change scores.

Finally, a moderator of the structure of SWB based on SWB strength-related variables was not identified. The focus of the current study was on informing the structure of SWB, therefore the strength dimensions selected were related to the structure of an attitude (in this case, the components of SWB). Structural consistency, SWB structural ambivalence, and subjective ambivalence all consist of information related to all three components of SWB. Beyond the dimensions examined in this study that were related to attitude structure, however, other aspects of SWB strength may have moderated the associations among the SWB change scores. In particular, given my interest in the structure of SWB with respect to changes in its components, strength dimensions related to attitude stability may be most promising. For example, temporal stability of one's attitude (as indicated by the extent to which thoughts towards an attitude object remain consistent over time) and attitude certainty both have been linked with the degree of change in attitudes over time, or their vulnerability to persuasion (Bassili, 1996; Cooke & Sheeran, 2004; Visser & Mirabile, 2004). Thus, examining additional strength

dimensions would be valuable before ruling out SWB strength as a moderator of the structure of SWB.

Conclusions. The present study provides the first evidence concerning the structure of SWB based on the effective experimental manipulation of the LS component of SWB. With regards to the structure of SWB, support for the relatedness of LS and PA, where manipulated change in LS led to change in both components was found. In addition, support for the independence of NA from LS, where manipulated change in LS was not accompanied by change in NA. These findings would appear to support an overall conclusion that the components of SWB are both independent (NA) and related (LS and PA). However, due to the differences in these findings based on the level of analysis (e.g., differences between conditions *vs*. differences between individuals within conditions), whether and how the components of SWB fit together (or not) may be complex, and depend on whether conclusions focus on the level of the group versus individual differences. With regards to SWB strength, there was no evidence to suggest that the strength of an individual's attitude towards his or her life moderated the associations among the SWB change scores.

General Discussion

The purpose of the current studies was to inform the structure of SWB - defined as how LS, PA, and NA fit together to form this central concept of well-being (see Table 20 and Table 21 for a summary of findings with respect to the hypotheses testing in Study 1 and Study 2). My focus was on addressing a fundamental issue concerning the nature of the associations among the SWB components – more specifically, whether changes in LS, PA, and NA were related to or independent of each other over time (**Study 1**) and following experimental manipulation (**Study 2**). Complete support for the *relatedness view* was found in Study 1, whereas partial support for the *independence view* and *relatedness view* was found in Study 2. Including a longitudinal and experimental study allowed me to establish that correlated change among the SWB components is a replicable phenomenon across different samples and experimental methods. To my knowledge, Study 1 is the first study to report correlations among changes in LS, PA, and NA over time. Up to this point, longitudinal studies of SWB have focused primarily on change in LS over time, disregarding the affective components of SWB (Lucas & Donnellan, 2007; Luhmann & Eid, 2009) as well as correlated change among the components. Therefore, Study 1 provides a comprehensive story regarding longitudinal change in the SWB components that focuses on not only changes in LS, but PA and NA as well. Up to this point, SWB manipulations that target one component at a time, and track the resulting changes in all three components separately, have yet to be established. Therefore, Study 2 provides an important first empirical step in establishing an effective manipulation for LS, but not PA and NA. In the remainder of this section I discuss what

Table 20

Study 1: Summary of Study 1 Findings and Conclusions

Hypothesis	Time Frame	Findings	Conclusion
Study 1(naturalistic)			
Hypothesis 1A: Change in LS, change in PA, and change in NA are independent.	3 months (Wave 1 to Wave 2)		No support for Hypothesis 1A
Hypothesis 1B: Change in LS, change in PA, and change in NA are related.	3 months (Wave 1 to Wave 2)	Statistically significant partial correlations were observed among all three of the SWB change scores.	Complete support for Hypothesis 1B
Hypothesis 2: Changes in LS, PA, and NA more strongly associated among individuals with high-strength SWB than individuals with low-strength SWB.	3 months (Wave 1 to Wave 2)	The partial correlations among SWB change scores did not significantly differ between the high-strength and low-strength groups.	No support for Hypothesis 2
Hypothesis 1A: Change in LS, change in PA, and change in NA are independent.	3 years (Wave 1 to Wave 4)		No support for Hypothesis 1A
Hypothesis 1B: Change in LS, change in PA, and change in NA are related.	3 years (Wave 1 to Wave 4)	Statistically significant partial correlations were observed among all three of the SWB change scores.	Complete support for Hypothesis 1B
Hypothesis 2: Changes in LS, PA, and NA more strongly associated among individuals with high-strength SWB than individuals with low-strength SWB.	3 years (Wave 1 to Wave 4)	The partial correlations among SWB change scores significantly differed between the high structural consistency and low structural consistency groups. Specifically, associations among the SWB change scores were more strongly linked among individuals in the high structural consistency group (i.e., high-strength group) compared to the low structural consistency group (i.e., low-strength group). The partial correlations among SWB change scores did not significantly differ between the high and low SWB strength index groups or the high and low affective structural ambivalence groups.	Partial support for Hypothesis 2, with respect to structural consistency.

Note. N = 452. LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being.

Table 21

Study 2: Summary of Study 2 Findings and Conclusions

Hypothesis	Level of Analysis	Covariate(s)	Findings	Conclusion
Study 2 (experimental)				
Hypothesis 1A: Change in LS, change in PA, and change in NA are independent.	ANCOVA; differences between conditions	Session 1 LS, PA, and NA	In the LS condition, a manipulated change in LS did not result in a change in NA.	Partial support for Hypothesis 1A, with respect to change in LS and change in NA in the LS condition.
	Change score correlations; differences among individuals within conditions	Session 1 LS, PA, and NA	In the LS condition, the partial correlation between change in LS and PA as well as the partial correlation between change in LS and NA was non-significant.	Partial support for Hypothesis 1A, with respect to the degree of correlated change between LS and PA as well as LS and NA in the LS condition.
Hypothesis 1B: Change in LS, change in PA, and change in NA are related.	ANCOVA; differences between conditions	Session 1 LS, PA, and NA	In the LS condition, a manipulate change in LS resulted in change in PA.	Partial support for Hypothesis 1B, with respect to change in LS and change in PA in the LS condition.
	Change score correlations; differences among individuals within conditions	Session 1 LS, PA, and NA	In the LS condition, change in PA and change in NA were significantly negatively correlated.	Partial support for Hypothesis 1B, with respect to the degree of correlated change between PA and NA in the LS condition.
Hypothesis 2: Changes in LS, PA, and NA more strongly associated among individuals with high-strength SWB than individuals with low-strength SWB.	Comparison of change correlations between high and low SWB strength groups; differences among individuals	Session 1 LS, PA, and NA	The partial correlations among SWB change scores did not significantly differ between the high-strength and low-strength groups.	No support for Hypothesis 2

Note. N = 195. LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being.

findings from both studies mean with respect to the five structural models of SWB outlined by Busseri and Sadava (2011).

Model 1: Three Separate Components

In Model 1, LS, PA and NA are treated as three separate constructs, and the associations among the components are irrelevant to understanding SWB per se, as are the associations among the changes in the components, and thus the components are treated (e.g., analyzed) as if they are functionally independent (Campbell, 1981; Lucas, 2008). Thus, for the purpose of the current thesis, Model 1 was categorized as a model in which the *independence view* of the structure of SWB is assumed. Drawing on the current findings, Study 1 indicated that the components of SWB moved together, over both shorter-term and longer-term intervals, even independent of baseline levels of SWB. Study 2 indicated that manipulated changes in LS resulted in changes in LS and PA, rather than just the individually-targeted component, suggesting that at least two out of the three SWB components move together following experimental manipulation. Nonetheless, the associations among the SWB change scores in Study 1 were not perfect (i.e., less than 1 or -1 in magnitude), and in Study 2 change in NA did not follow changes in LS and PA in the one effective experimental manipulation condition (i.e., the LS condition). These latter findings suggest partial independence among the SWB components. Together, however, findings from both studies suggest that ignoring the associations observed among the SWB components – as is typically done by researchers employing Model 1 – may be overlooking an important aspect of the structure of SWB.

Model 2: Hierarchical Structure

In Model 2, LS, PA, and NA are treated as three related components that reflect a higher-order SWB factor. In order for this model to be viable, it assumes that substantial associations exist between all of the components. Thus, for the purpose of the current thesis, Model 2 was categorized as a model in which the *relatedness view* of the structure of SWB is assumed. The moderate positive initial correlations between LS and PA, and moderate negative initial correlations between LS and NA, as well as PA and NA observed in both studies are consistent with the assumptions of this model. In Study 1, furthermore, the LS, PA, and NA change score correlations were of a similar magnitude and direction as the initial correlations. In Study 2, changes in LS and PA were observed following experimental manipulation of LS – but changes in NA were not.

Together, therefore, whereas the observed correlated changes in the SWB components in Study 1 are consistent with the assumptions of an underlying tendency toward change in SWB that impacts all three components, results from Study 2 provide support for this possibility but only with respect to LS and PA, rather than all three SWB components. Such findings are consistent with the proposed hybrid structural model of SWB (Busseri et al., 2007) – which encompasses both the commonality among the SWB components, and the unique variances in each of the individual components. An important next step for future research on the structure of SWB, therefore, is to test the possibility of a higher-order latent SWB factor based on findings from experimental and non-experimental designs.

Model 3: Causal System

In Model 3, LS is considered to be the essence of SWB whereas PA and NA are treated as predictors of LS (e.g., Bradburn, 1969; Brenner, 1975; Costa & McCrae, 1980; Kozma & Stone, 1980). For this model to be viable, both PA and NA need to be associated with LS, whereas the association between PA and NA is not directly relevant to understanding SWB per se. For the purpose of the current thesis, Model 3 was categorized as a model in which the *relatedness view* of the structure of SWB is assumed (at least for two out of the three SWB components). The fact that all three SWB components were associated with each other over time in Study 1 provides support for Model 3, although the correlational design did not allow for testing the directional/causal hypothesis of Model 3, in which PA and NA are thought to influence LS. Consequently, predictive models were not tested in Study 1, whereby changes in PA and NA were treated as predictors of changes in LS. Based on the experimental manipulation results in Study 2, however, it appears that a manipulated change in PA may also lead to a change in LS (ignoring, for the moment, that the PA manipulation did not appear to target PA in isolation of LS) – consistent with the assumptions of Model 3. However, manipulated change in LS also leads to a change in PA – which is inconsistent with Model 3. Together, therefore, results from both studies suggest the possibility of a bidirectional relationship between PA and LS, rather than the unidirectional relationship assumed by Model 3.

Model 4: Composite

In Model 4, LS, PA, and NA are treated as joint contributors to one's overall SWB in which omitting one of the components would result in an incomplete picture of

SWB (Sheldon & Hoon, 2007). According to this model, the associations among the SWB components, and among changes in the components, are irrelevant to understanding SWB per se. That is, Model 4 assumes that LS, PA, and NA *produce* SWB, and for this reason the associations among the SWB components are not a focus. For the purpose of the current thesis, Model 4 was categorized as a model in which the *independence view* of the structure of SWB is assumed. The findings from Study 1 make clear that the relatedness of the SWB components is observed not only at each wave, but also with respect to how the components change together over time. In addition, findings from Study 2 also make clear that LS and PA change together following experimental manipulation of LS. Therefore, findings from both studies suggest that ignoring the associations observed among the SWB components – as is typically done in Model 4 – may be overlooking an important aspect of the structure of SWB. In particular, Model 4 is unable to fully account for the structure of SWB.

Model 5: Configuration of Components

In Model 5, a person-centered approach is utilized which focuses on the configurations of LS, PA, and NA *within* individuals. Information regarding all three components is required to determine an individual's SWB configuration, and such configurations can vary across individuals (e.g., Busseri et al., 2009). Accordingly, associations among the SWB components, and changes in these components *across individuals*, are irrelevant to understanding SWB. Thus, for the purpose of the current thesis, Model 5 was categorized as a model in which the *independence view* of the structure of SWB is assumed. Study 1 findings suggest that there is some commonality in the underlying dynamics of all three SWB components with respect to how they change

(together) over time. The patterns of these correlations may make the observation of certain SWB configurations particularly likely, including the joint co-occurrence of high LS, high PA, and low NA (i.e., high SWB), as well as low LS, low PA, and high NA (i.e., low SWB). And in fact, in each of three studies examining SWB configurations to date, researchers have identified 'high SWB' and 'low SWB' configurations as characteristic of different sub-groups of individuals (Bergman & Daukantaite, 2009; Busseri et al., 2009; Busseri & Sadava, 2013).

Study 2 findings suggest that the co-occurrence of high LS and high PA as well as low LS and low PA is likely, given the fact that manipulated change in LS occurs with change in PA. Future research is needed to more directly explore how the sample-level associations observed among the SWB components in both of my studies may influence the types of frequencies of possible within-individual SWB configurations, using analyses designed to identify distinct configurations of the SWB components. In general, however, Model 5 provides no explanation for the overall relatedness among the SWB components, including the consistent associations observed between changes in LS and PA in both studies.

Summary and Conclusion

In summary, it appears that the assumptions underlying each structural model reviewed by Busseri and Sadava (2011) are partially supported by the Study 1 and Study 2 findings. It is clear, however, that my results highlight the need for a dynamic and flexible model of the structure of SWB. Such a model would incorporate both the relatedness among the SWB components, as well as their independence. In contrast, advocating for the complete independence *or* relatedness of the SWB components as

outlined above does not fully explain the associations among the SWB components. To further inform the structure of SWB, additional research is needed that empirically tests each of the existing structural models of SWB, including a comparison of the structural models against one another in order to ultimately support a meaningful synthesis of the existing SWB research.

In conclusion, understanding the connections, or lack thereof, among the SWB components is a necessary aspect of reaping the benefits of SWB research. Our thoughts and emotions towards our lives are complex abstractions that do not necessarily fit into neat categories within our minds or the available literature. As SWB researchers, we must embrace this complexity in order to more fully understand the structure of SWB, and thus further support individuals' efforts to live the best lives possible.

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Appendix A

1-Item Life Satisfaction Measure

Please rate your life at present:

0	1	2	3	4	5	6	7	8	9	10
worst life possible										best life possible

Appendix B

The Positive and Negative Affect Schedule (PANAS)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. **Indicate to what extent you generally feel this way, that is, how you feel on average.** Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	a little	Moderately	quite a bit	extremely

	interested		irritable
	distressed		alert
	excited		ashamed
	upset		inspired
	strong		nervous
	guilty		determined
	scared		attentive
	hostile		jittery
	enthusiastic		active
	proud		afraid

Appendix C

Certificate of Ethics Clearance for Study 2

Brock University
Research Ethics Office
Tel: 905-688-5550 ext. 3035
Email: reb@brocku.ca

Social Science Research Ethics Board

Certificate of Ethics Clearance for Human Participant Research

DATE:	9/12/2013		
PRINCIPAL INVESTIGATOR:	BUSSERI, Michael Psychology		
FILE:	13-030 - BUSSERI		
TYPE:	Masters Thesis/Project	STUDENT: SUPERVISOR:	Samantha Metler Michael Busseri

TITLE: Evaluating Thoughts and Feelings Towards 'My Life'

ETHICS CLEARANCE GRANTED

Type of Clearance: NEW Expiry Date: 9/30/2014

The Brock University Social Sciences Research Ethics Board has reviewed the above named research proposal and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement. Clearance granted from 9/12/2013 to 9/30/2014.

The Tri-Council Policy Statement requires that ongoing research be monitored by, at a minimum, an annual report. Should your project extend beyond the expiry date, you are required to submit a Renewal form before 9/30/2014. Continued clearance is contingent on timely submission of reports.

To comply with the Tri-Council Policy Statement, you must also submit a final report upon completion of your project. All report forms can be found on the Research Ethics web page at http://www.brocku.ca/research/policies-and-forms/research-forms.

In addition, throughout your research, you must report promptly to the REB:

a) Changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
b) All adverse and/or unanticipated experiences or events that may have real or potential unfavourable implications for participants;
c) New information that may adversely affect the safety of the participants or the conduct of the study;
d) Any changes in your source of funding or new funding to a previously unfunded project.

We wish you success with your research.

Approved:

Jan Frijters, Chair
Social Sciences Research Ethics Board

Note: Brock University is accountable for the research carried out in its own jurisdiction or under its auspices and may refuse certain research even though the REB has found it ethically acceptable.

If research participants are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and clearance of those facilities or institutions are obtained and filed with the REB prior to the initiation of research at that site.

Appendix D

Life Satisfaction Manipulation Materials

Manipulation of life satisfaction (LS) for Study 2.

READING PASSAGE

Instructions: Please read the paragraph below. Keep in mind that once you have finished reading the paragraph, you will be asked to a) summarize the main theme of the paragraph b) discuss the information you found most interesting c) and relate the paragraph to your own life.

Many people believe that being satisfied with *their life* (e.g., having positive thoughts about their life) is an important part of living the best life possible. Well-being experts have done extensive research regarding people who are satisfied with *their life*, known as high life satisfaction. Across cultures, research has shown that people who are satisfied with *their life* tend to also experience fewer symptoms of mental illness, stronger relationships with others, better overall health, and greater success in academics as well as their career (Lyubomirsky, Sheldon, & Schkade, 2013; Pressman & Cohen, 2011). Due to the many thoughts that occur every day, research indicates that people could really benefit from taking time out of their day to recognize what is satisfying about their life. Many people report that acknowledging what is satisfying about *their life* is an important part of successful day-to-day functioning. You have the ability to maximize the impact of your positive thoughts about *your life* simply by appreciating that, overall, you are satisfied with *your life*. In summary, being satisfied with *your life* can play a central role in helping you live the best life possible. So really, it seems like everyone could benefit from realizing that, in fact, they are satisfied with *their life*!

COMPREHENSION TASK

Instructions: Based on the paragraph you just read about current research on life satisfaction, are each of the following statements true or false? (Please circle "true" or "false" for each statement shown below.)

1. Many people believe that being satisfied with *their life* (e.g., having positive thoughts about their life) is an important part of living the best life possible.

TRUE		FALSE

2. According to recent research, being satisfied with *your life* can lead to better mental and physical health.

TRUE		FALSE

3. People could benefit from recognizing what is satisfying about *their life*.

TRUE		FALSE

4. Taking the time to recognize what is satisfying about *your life* is an important part of successful day-to-day functioning.

TRUE		FALSE

5. Being satisfied with *your life* can play a central role in helping you live the best life possible.

TRUE		FALSE

READING PASSAGE SUMMARY

Instructions: Please answer the following questions:

1. Please summarize the main theme of the reading passage in one or two sentences.

2. What information from the reading passage stood out to you the most?

3. What information did you find most interesting and why?

AUTOBIOGRAPHICAL THOUGHTS

Instructions: Please answer each of the following questions. When answering the following questions, please **focus on your positive thoughts concerning your life**, and not on your positive and/or negative emotions about your life.

1. What are some of the most satisfying life events you have experienced **in the past**?

2. Describe one or two **future life events** that will increase how satisfied you are with your life.

3. What are some of the most satisfying aspects of your life **right now**?

PERSUASIVE STORY WRITING

Instructions: Think about your life and imagine that you want to convince someone else that you have a really satisfying life. Please write a paragraph in which you convince someone else that your life is very satisfying by providing clear examples and convincing evidence. Be sure to be as persuasive as possible. Also, please focus on **your positive thoughts concerning your life**, and not on your positive and/or negative emotions about your life.

Appendix E

Positive Affect Manipulation Materials

Manipulation of positive affect (PA) for Study 2.

READING PASSAGE

Instructions: Please read the paragraph below. Keep in mind that once you have finished reading the paragraph, you will be asked to a) summarize the main theme of the paragraph b) discuss the information you found most interesting c) and relate the paragraph to your own life.

Many people believe that frequently experiencing positive emotions towards *their life* (such as joy or happiness) is an important part of living the best life possible. Well-being experts have done extensive research regarding people who frequently experience positive emotions towards *their life*. Across cultures, research has shown that people who frequently experience positive emotions towards *their life* tend to also experience fewer symptoms of mental illness, stronger relationships with others, better overall health, and greater success in academics as well as their career (Lyubomirsky, Sheldon, & Schkade, 2013; Pressman & Cohen, 2011). Due to the many emotions that occur every day, research indicates that people could really benefit from taking time out of their day to recognize that they frequently experience positive emotions about their life. Many people report that acknowledging that they frequently experience positive emotions about *their life* is an important part of successful day-to-day functioning. You have the ability to maximize the impact of your positive emotions towards *your life*, simply by appreciating that, overall, you frequently experience positive emotions towards *your life*. In summary, frequently experiencing positive emotions towards *your life* can play a central role in helping you live the best life possible. So really, it seems like everyone could benefit from realizing that, in fact, they do frequently experience positive emotions about *their life*!

COMPREHENSION TASK

Instructions: Based on the paragraph you just read about current research on positive emotions, are each of the following statements true or false? (Please circle "true" or "false" for each statement shown below.)

1. Many people believe that frequently experiencing positive emotions towards *their life* (such as joy or happiness) is an important part of living the best life possible.

TRUE		FALSE

2. According to recent research, frequently experiencing positive emotions towards *your life* can lead to better mental and physical health.

TRUE		FALSE

3. People could benefit from recognizing that they frequently experience positive emotions about *their life*.

TRUE		FALSE

4. Taking the time to recognize that you frequently experience positive emotions about *your life* is an important part of successful day-to-day functioning.

TRUE		FALSE

5. Frequently experiencing positive emotions towards *your life* can play a central role in helping you live the best life possible.

TRUE		FALSE

READING PASSAGE SUMMARY

Instructions: Please answer the following questions:

1. Please summarize the main theme of the reading passage in one or two sentences.

2. What information from the reading passage stood out to you the most?

3. What information did you find most interesting and why?

AUTOBIOGRAPHICAL THOUGHTS

Instructions: Please answer each of the following questions. When answering the following questions, please **focus on your frequent positive emotions about your life**, and not on your thoughts concerning your life and/or your negative emotions about your life.

1. What are some positive emotions you have experienced frequently in relation to your life **in the past**?

2. Describe one or two positive emotions you expect to experience frequently in your life **in the future**.

3. What are some positive emotions you are experiencing frequently in your life **right now**?

PERSUASIVE STORY WRITING

Instructions: Think about your life and imagine that you want to convince someone else that you frequently experience positive emotions related to your life. Please write a paragraph in which you convince someone else that your life is full of positive emotions by providing clear examples and convincing evidence. Be sure to be as persuasive as possible. Also, please focus on **your frequent positive emotions about your life**, and not on your thoughts concerning your life and/or your negative emotions about your life.

Appendix F

Negative Affect Manipulation Materials

Manipulation of negative affect (NA) for Study 2.

READING PASSAGE

Instructions: Please read the paragraph below. Keep in mind that once you have finished reading the paragraph, you will be asked to a) summarize the main theme of the paragraph b) discuss the information you found most interesting c) and relate the paragraph to your own life.

Many people believe that not frequently experiencing negative emotions towards *their life* (such as sadness and anger) is an important part of living the best life possible. Well-being experts have done extensive research regarding people who do not frequently experience negative emotions towards *their life*. Across cultures, research has shown that people who do not frequently experience negative emotions towards *their life*, tend to also experience fewer symptoms of mental illness, stronger relationships with others, better overall health, and greater success in academics as well as their career (Lyubomirsky, Sheldon, & Schkade, 2013; Pressman & Cohen, 2011). Due to the many emotions that occur every day, research indicates that people could really benefit from taking time out of their day to recognize that they do not frequently experience negative emotions about their life. Many people report that acknowledging that they do not frequently experience negative emotions about *their life* is an important part of successful day-to-day functioning. You have the ability to minimize the impact of your negative emotions related to *your life*, simply by appreciating that, overall, you do not frequently experience negative emotions towards *your life*. In summary, not frequently experiencing negative emotions towards *your life* can play a central role in helping you live the best life possible. So really, it seems like everyone could benefit from realizing that, in fact, they do not frequently experience negative emotions about *their life*.

COMPREHENSION TASK

Instructions: Based on the paragraph you just read about current research on negative emotions, are each of the following statements true or false? (Please circle "true" or "false" for each statement shown below.)

1. Many people believe that not frequently experiencing negative emotions towards *their life* (such as sadness and anger) is an important part of living the best life possible.

TRUE		FALSE

2. According to recent research, not frequently experiencing negative emotions towards *your life* can lead to better mental and physical health.

TRUE		FALSE

3. People could benefit from recognizing that they do not frequently experience negative emotions about *their life*.

TRUE		FALSE

4. Taking the time to recognize that you do not frequently experience negative emotions about *your life* is an important part of successful day-to-day functioning.

TRUE		FALSE

5. Not frequently experiencing negative emotions towards *your life* can play a central role in helping you live the best life possible.

TRUE		FALSE

READING PASSAGE SUMMARY

Instructions: Please answer the following questions:

1. Please summarize the main theme of the reading passage in one or two sentences.

2. What information from the reading passage stood out to you the most?

3. What information did you find most interesting and why?

AUTOBIOGRAPHICAL THOUGHTS

Instructions: Please answer each of the following questions. When answering the following questions, please **focus on your infrequent negative emotions about your life**, and not on your thoughts concerning your life and/or your positive emotions about your life.

1. What are some negative emotions you have not frequently experienced in relation to your life **in the past**?

2. Describe one or two negative emotions that you do not expect to experience very often **in the future**.

3. What are some negative emotions you are not experiencing frequently in your life **right now**?

PERSUASIVE STORY WRITING

Instructions: Think about your life and imagine that you want to convince someone else that you do not frequently experience negative emotions related to your life. Please write a paragraph in which you convince someone else that you do not frequently experience negative emotions, providing clear examples and convincing evidence. Be sure to be as persuasive as possible. Also, please focus on **your infrequent negative emotions about your life**, and not on your thoughts concerning your life and/or your positive emotions about your life.

Appendix G

Control Condition Neutral Tasks

Control tasks for Study 2.

READING PASSAGE

Instructions: Please read the paragraph below. Keep in mind that once you have finished reading the paragraph, you will be asked to a) summarize the main theme of the paragraph and b) answer questions regarding the information you read.

About once a day, the sky is lit up by a flash of energy. These events are known as gamma-ray bursts, or GRBs. Gamma-ray is short for gamma radiation, defined as electromagnetic radiation emitted during radioactive decay. For a few seconds this burst, coming from a random direction, ranks among the brightest objects in the sky. No one has ever witnessed such a flash directly because the energy comes almost entirely in the form of gamma-rays, which human eyes cannot detect. Even if our eyes were sensitive to this form of radiation, gamma-rays cannot penetrate the atmosphere. It is because of orbiting satellites that we know about these blasts. Gamma-ray bursts were first detected by satellites designed to detect covert nuclear weapons tests in 1967. Gamma-ray bursts are defined based on their observational properties: an intense flash of gamma-rays, lasting anywhere from a fraction of a second to up to a few minutes. The burst itself is also normally followed by a much longer-lived signal, or afterglow, visible at optical and other wavelengths (e.g., x-ray, ultraviolet, infrared). All observed gamma-ray bursts have originated from outside the Milky Way Galaxy, meaning the sources of most gamma-ray bursts are billions of light years away from Earth. It is currently hypothesized that these bursts of energy result from the explosion of massive stars in distant galaxies.

COMPREHENSION TASK

Instructions: Based on the paragraph you just read about gamma-ray bursts, are each of the following statements true or false? (Please circle "true" or "false" for each statement shown below.)

1. A gamma-ray burst cannot be detected by the human eye.

TRUE		FALSE

2. Gamma-ray bursts cannot penetrate the atmosphere.

TRUE		FALSE

3. Gamma-ray bursts come from what appears to be a random direction.

TRUE		FALSE

4. It is because of orbiting satellites that we know about gamma-ray bursts.

TRUE		FALSE

5. GRB stands for gamma-ray bursts.

TRUE		FALSE

READING PASSAGE SUMMARY

Instructions: Please answer the following questions:

1. Please summarize the main theme of the reading passage in one or two sentences.

2. What information from the reading passage stood out to you the most?

3. What information did you find most interesting and why?

LISTING TASK

Instructions: Please complete the following lists:

1. List five different sports.

2. List three different animals and where they live.

3. List five different types of fruit.

PERSUASIVE STORY WRITING

Instructions: Imagine that you want to convince someone else that gamma-ray bursts (GRBs) are valuable to study. Please write a paragraph in which you convince someone else that GRBs are valuable to study, providing clear examples and convincing evidence. Be sure to be as persuasive as possible.

Appendix H

Participant Self-Reported Focus

When you were reading the paragraph provided above and completing the questions that followed (the comprehension task, summary of the reading passage, autobiographical thoughts task, and persuasive story writing task) …

1. To what extent were you focusing on **thoughts about how satisfying your life is**?

1	2	3	4	5
not at all		moderately		a lot

2. To what extent were you focusing on **how frequently you experience positive emotions related to your life**?

1	2	3	4	5
not at all		moderately		a lot

3. To what extent were you focusing on **how infrequently you experience negative emotions related to your life**?

1	2	3	4	5
not at all		moderately		a lot

Appendix I

Blind Rater Focus Scores

Read the persuasive paragraph thoroughly. For each persuasive paragraph in the excel file, you will assign three ratings….

4. To what extent was the participant focusing on **thoughts about how satisfying their life is**?

1	2	3	4	5
not at all		moderately		a lot

5. To what extent was the participant focusing on **how frequently they experience positive emotions related to their life**?

1	2	3	4	5
not at all		moderately		a lot

6. To what extent was the participant focusing on **how infrequently they experience negative emotions related to their life**?

1	2	3	4	5
not at all		moderately		a lot

Appendix J

Demographics

Please indicate your sex by checking one of the boxes: Male ☐ Female ☐

Please indicate your gender by checking one of the boxes:

Male ☐

Female ☐

Trans ☐

Other _____

Prefer not to disclose ☐

Please state your age (in years): _____

Please state your university major: _____

Please state your year of study: _____

Which of the following best represents your racial or ethnic heritage? Check all that apply.

Non-Hispanic White or Euro-American ☐

Black, Afro-Caribbean, or African American ☐

Latino or Hispanic American ☐

East Asian or Asian American ☐

South Asian or Indian American ☐

Middle Eastern or Arab American ☐

Native American or Alaskan Native ☐

Other _____

Appendix K

The Satisfaction with Life Scale (SWLS)

Below are five statements with which you may agree or disagree. Using the 1 to 7 scale below, indicate your agreement with each item by placing the appropriate number underneath each item. Please be open and honest in your responding.

1. In most ways my life is close to my ideal.

1	2	3	4	5	6	7
strongly disagree	disagree	slightly disagree	neither agree or disagree	slightly agree	agree	strongly agree

2. The conditions of my life are excellent.

1	2	3	4	5	6	7
strongly disagree	disagree	slightly disagree	neither agree or disagree	slightly agree	agree	strongly agree

3. I am satisfied with life.

1	2	3	4	5	6	7
strongly disagree	disagree	slightly disagree	neither agree or disagree	slightly agree	agree	strongly agree

4. So far I have gotten the important things I want in life.

1	2	3	4	5	6	7
strongly disagree	disagree	slightly disagree	neither agree or disagree	slightly agree	agree	strongly agree

5. If I could live my life over, I would change almost nothing.

1	2	3	4	5	6	7
strongly disagree	disagree	slightly disagree	neither agree or disagree	slightly agree	agree	strongly agree

Appendix L

The Scale of Positive and Negative Experience (SPANE)

Please think about what you have been doing and experiencing **during the past four weeks**. Then read each item and report how much you experienced each of the following feelings by marking the appropriate answer in the space next to that word.
Use the following scale to record your answers.

1	2	3	4	5
very rarely or never	rarely	sometimes	often	very often or always

	positive
	negative
	good
	bad
	pleasant
	unpleasant

	happy
	sad
	afraid
	joyful
	angry
	contented

Appendix M

SWB Structural Ambivalence

We would like you to indicate your attitude toward your life. Below, you will see something that looks like a thermometer. We would like you to use this thermometer to indicate your attitude toward your life. Here's how it works. If you have a favourable attitude toward your life, you would give your life a score somewhere between 50 and 100, depending on how favourable you are toward this topic. On the other hand, if you have an unfavourable attitude toward your life, you would give this topic a score somewhere between 0 and 50, depending on how unfavourable you are. The degree labels will help you to locate your attitude on the thermometer. However, you are not restricted to the numbers indicated - feel free to use any number between 0 and 100. Please be honest. Your responses will be kept strictly confidential.

FAVOURABLE	100	Extremely favourable
	-	
	90	Very favourable
	-	
	80	Quite favourable
	-	
	70	Fairly favourable
	-	
	60	Slightly favourable
	-	
	50	Neither favourable nor unfavourable
	-	
	40	Slightly unfavourable
	-	
	30	Fairly unfavourable
	-	
	20	Quite unfavourable
	-	
	10	Very unfavourable
	-	
UNFAVOURABLE	0	Extremely unfavourable

My attitude toward MY LIFE is: _____

We are interested in the beliefs and thoughts that you have about your life. Please provide a list of thoughts that you have about your life. Please list only thoughts that are relevant. Provide as many beliefs and thoughts as you think are necessary to convey your overall impression of your life and to describe them adequately.

MY THOUGHTS ABOUT MY LIFE ARE:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Please look at the thoughts that you have provided. Decide for each thought whether it is positive, negative, or neutral, as you have used it to describe your life. Indicate your rating of each thought as follows:

Thoughts that are positive:
- slightly positive: write a plus (+) beside it.
- quite positive: write two pluses (++) beside it.
- extremely positive: write three pluses (+++) beside it.

Thoughts that are negative:
- slightly negative: write a minus (-) beside it.
- quite negative: write two minuses (--) beside it.
- extremely negative: write three minuses (---) beside it.

If the thought is not at all positive or negative, write a zero (0) beside it.

Please give your immediate first impression. Don't spend too much time on any one thought.

We are interested in how your life makes you feel. Please provide a list of the emotions that you experience when you think about your life (e.g., anger, joy). Please list only emotions that are relevant. Provide as many emotions as you think are necessary to convey your feelings towards your life and to describe them adequately.

MY FEELINGS AND EMOTIONS ABOUT MY LIFE ARE:

_____

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Please look at the feelings and emotions that you have provided. Decide for each feeling or emotion whether it is positive, negative, or neutral, as you have experienced it in response to YOUR LIFE. Indicate your rating of each feeling or emotion as follows:

Emotions that are positive:

slightly positive: write a plus (+) beside it.
quite positive: write two pluses (++) beside it.
extremely positive: write three pluses (+++) beside it.

Emotions that are negative:

slightly negative: write a minus (-) beside it.
quite negative: write two minuses (--) beside it.
extremely negative: write three minuses (---) beside it.

If the emotion is not at all positive or negative, write a zero (0) beside it.

Please give your immediate first impression. Don't spend too much time on any one emotion.

Appendix N

Subjective Ambivalence

1. How conflicted are your thoughts towards your life?

1	2	3	4	5
not at all				completely

2. To what degree do you have mixed thoughts towards your life?

1	2	3	4	5
not at all				completely

3. How conflicted do you feel in your emotions towards your life?

1	2	3	4	5
not at all				completely

4. To what degree do you have mixed feelings towards your life?

1	2	3	4	5
not at all				completely

Appendix O

The Brief Mood Introspection Scale (BMIS)

Indicate how well each adjective or phrase describes your **present mood** (i.e., **at this particular moment**). Read each item and then mark the appropriate answer in the space next to that word.

Use the following scale to record your answers.

1	2	3	4
definitely do not Feel	do not feel	slightly feel	definitely feel

	lively		drowsy
	happy		grouchy
	sad		peppy
	tired		nervous
	caring		calm
	content		loving
	gloomy		fed up
	jittery		active

Overall, my mood **at this moment** is:

Very Unpleasant Very Pleasant

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8 9 10

Appendix P

Supplementary Results

All of the analyses reported in the main thesis document were repeated, controlling simultaneously for Session 1 LS, PA, and NA as well as Session 2 positive and negative mood scores. These analyses thus inform whether results reported in the main thesis document, concerning the impact of the experimental manipulations on the three SWB change scores, are consistent when controlling for present mood at Session 2.

Research question 1: Do the components of SWB change together or independently from one another?

Differences between conditions within SWB components. Refer to Table 13 for descriptive information regarding mean changes in LS, PA, and NA by experimental condition. To evaluate the first research question with respect to differences between conditions, three one-way ANCOVAs were conducted in which condition (LS, PA, NA, control) was the independent variable, one of the SWB change scores (i.e., change in LS, change in PA, or change in NA) was the dependent variable, and Session 1 LS, PA, and NA in addition to Session 2 positive and negative mood were treated as covariates. Results are shown in Table P1.

Table P1

Study 2: Summary of Results from Comparisons of Change in SWB Components by Experimental Condition, Controlling for Session 1 LS, PA, and NA as well as Session 2 Present Mood

Condition	SWB component estimated marginal means		
	M (SE) change in LS	*M* (SE) change in PA	*M* (SE) change in NA
LS condition	$0.26\ (0.09)_{a}$	0.06 (0.05)	-0.11 (0.06)
PA condition	$0.18\ (0.09)_{a,b}$	0.06 (0.05)	0.03 (0.06)
NA condition	$-0.01\ (0.09)_{b}$	0.02 (0.05)	-0.13 (0.06)
control condition	$-0.02\ (0.09)_{b}$	-0.06 (0.05)	-0.13 (0.06)

Note. $N = 195$. For the control condition, $n = 48$. For the Life Satisfaction (LS) condition, $n = 50$. For the Positive Affect (PA) condition, $n = 49$. For the Negative Affect (NA) condition, $n = 48$. Estimated marginal means (*M*) and standard errors (*SE*) are shown. Within a given column, coefficients with different subscripts (a, b) indicate means that differed significantly ($p < .05$) between conditions. Note that a column without subscripts indicates that none of the coefficients significantly differed.

The main effect of condition on change in LS ($F(3,186) = 2.50$, $p = .06$ *partial* $\eta^2 = .04$), change in PA ($F(3,186) = 1.14$, $p = .33$, *partial* $\eta^2 = .02$), and change in NA ($F(3,186) = 1.37$, $p = .25$, *partial* $\eta^2 = .02$) was non-significant. Together these findings indicate that, when controlling for an individual's present mood (Session 2 positive and negative mood) in addition to Session 1 LS, PA, and NA, significant between condition differences in the amount of change individuals experienced in LS and PA were no longer observed (inconsistent with the main results). These findings provide no support for the *independence view* (Hypothesis 1A) or the *relatedness view* (Hypothesis 1B) of the structure of SWB, but instead suggest that the manipulations were not strong enough

to create changes in the SWB components independent of participants' mood at Session 2.

Differences among individuals within conditions. Correlations and partial correlations among the SWB change scores were also examined within each of the four conditions; see Tables P2, P3, P4, and P5 for results in the control, LS, PA, and NA conditions, respectively. In the control condition, the partial correlation between change in LS and PA was non-significant (consistent with the main results), as was the partial

Table P2

Study 2: Bivariate and Partial Correlations (Controlling for Session 1 LS, PA, and NA as well as Session 2 Present Mood) among SWB Change Scores in the Control Condition

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1.S1 LS	--	.60*	-.64*	.83*	.66*	-.70*	-.32*	.19	-.10	.24	-.18	-.64*	.52*	.36*	-.55*
2.S1 PA		--	-.66*	.56*	.79*	-.64*	-.08	-.18	.02	.29*	-.26	-.65*	.59*	.50*	-.36*
3.S1 NA			--	-.51*	-.62*	.76*	.24	-.04	-.33*	-.31*	.23	.62*	-.57*	-.45*	.51*
4.S2 LS				--	.61*	-.74*	.27	.16	-.34*	.15	-.27	-.62*	.51*	.37*	-.59*
5.S2 PA					--	-.71*	-.12	.46*	-.14	.33*	-.27	-.64*	.61*	.61*	-.46*
6.S2 NA						--	-.05	-.22	.36*	-.26	.30*	.63*	-.58*	-.60*	.60*
7. Δ S1S2 LS							--	-.07	-.41*	-.15	-.14	.06	-.03	.01	-.06
8. Δ S1S2 PA							-.04	--	-.26	.11	-.06	-.10	.13	.27	-.23
9. Δ S1S2 NA							-.45*	-.13	--	.07	.11	.02	-.03	-.23	.14
10. S1 Structural consistency							-.09	.08	.07	--	-.27	-.27	.71*	.36*	-.07
11. S1 Structural ambivalence							-.21	.01	.09		--	.16	-.67*	-.39*	.08
12. S1 Subjective ambivalence							-.12	-.09	.03			--	-.71*	-.42*	.51*
13. S1 SWB strength index							.13	.08	-.03				--	.56*	-.33*
14. S2 Positive mood														--	-.29*
15. S2 Negative mood															

Note. N = 195. S1 = Session 1; S2 = Session 2; LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. Bivariate correlations are presented above the diagonal, partial correlations (controlling for Session 1 LS, Session 1 PA, Session 1 NA, Session 2 positive mood, and Session 2 negative mood) are presented below the diagonal. *p < .05.

Table P3

Study 2: Bivariate and Partial Correlations (Controlling for Session 1 LS, PA, and NA as well as Session 2 Present Mood) among SWB Change Scores in the LS Condition

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1.S1 LS	--	.79*	-.62*	.83*	.72*	-.54*	-.53*	-.08	.23	.32*	-.27	-.57*	.57*	.29*	-.27
2.S1 PA		--	-.65*	.69*	.79*	-.47*	-.35*	-.29*	.35*	.24	-.24	-.51*	.48*	.46*	-.22
3.S1 NA			--	-.52*	-.57*	.72*	.32*	.09	-.54*	-.09	.15	.54*	-.37*	-.17	.46*
4.S2 LS				--	.69*	-.47*	.04	.03	.16	.22	-.32*	-.54*	.52*	.32*	-.29*
5.S2 PA					--	-.60*	-.23	.37*	.08	.25	-.41*	-.47*	.55*	.51*	-.34*
6.S2 NA						--	.23	-.23	.20	-.17	.21	.56*	-.45*	-.24	.56*
7. Δ S1S2 LS							--	.18	-.17	-.23	-.01	.20	-.22	-.02	.05
8. Δ S1S2 PA							.18	--	-.41*	.03	-.28	.03	.12	.09	-.19
9. Δ S1S2 NA							-.02	-.34*	--	-.08	.05	-.09	-.03	-.06	.03
10. S1 Structural consistency							-.07	.12	-.17	--	.04	-.31*	.69*	.003	-.004
11. S1 Structural ambivalence							-.12	-.25	-.01		--	.31*	-.56*	-.37*	.27
12. S1 Subjective ambivalence							-.11	.04	.18			--	-.78*	-.24	.40*
13. S1 SWB strength index							.06	.18	-.18				--	.28	-.31*
14. S2 Positive mood														--	-.12
15. S2 Negative mood															

Note. $N = 195$. S1 = Session 1; S2 = Session 2; LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. Bivariate correlations are presented above the diagonal, partial correlations (controlling for Session 1 LS, Session 1 PA, Session 1 NA, Session 2 positive mood, and Session 2 negative mood) are presented below the diagonal. *$p < .05$.

Table P4

Study 2: Bivariate and Partial Correlations (Controlling for Session 1 LS, PA, and NA as well as Session 2 Present Mood) among SWB Change Scores in the PA Condition

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1.S1 LS	--	.62*	-.55*	.84*	.58*	-.52*	-.47*	-.02	.02	-.01	-.39*	-.52	.41*	.57*	-.23
2.S1 PA		--	-.77*	.56*	.84*	-.63*	-.22	-.20	.14	.29*	-.44*	-.65*	.63*	.56*	-.22
3.S1 NA			--	-.53*	-.65*	.64*	.14	.14	-.40*	-.24	.59*	.61*	-.66*	-.45*	.26
4.S2 LS				--	.67*	-.55*	.09	.25	-.04	-.09	-.40*	-.49*	.37*	.73*	-.40*
5.S2 PA					--	-.68*	.04	.37*	-.06	.25	-.46*	-.60*	.60*	.68*	-.35*
6.S2 NA						--	.07	-.14	.46*	-.26	.47*	.51*	-.57*	-.34*	.37*
7. Δ S1S2 LS							--	.44*	-.09	-.12	.07	.16	-.16	.14	-.22
8. Δ S1S2 PA							.35*	--	-.33*	-.05	-.08	.03	.01	.26	-.25
9. Δ S1S2 NA							-.24	-.41*	--	-.04	-.13	-.10	.09	.12	.14
10. S1 Structural consistency							.04	.30*	-.24	--	-.12	-.14	.58*	-.14	.28*
11. S1 Structural ambivalence							.02	-.14	.24		--	.62*	-.81*	-.43*	.09
12. S1 Subjective ambivalence							.06	-.05	.09			--	-.79*	-.50*	.24
13. S1 SWB strength index							-.01	.26	-.30*				--	.36*	-.02
14. S2 Positive mood														--	-.39*
15. S2 Negative mood															

Note. $N = 195$. S1 = Session 1; S2 = Session 2; LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. Bivariate correlations are presented above the diagonal, partial correlations (controlling for Session 1 LS, Session 1 PA, Session 1 NA, Session 2 positive mood, and Session 2 negative mood) are presented below the diagonal. *$p < .05$.

Table P5

Study 2: Bivariate and Partial Correlations (Controlling for Session 1 LS, PA, and NA as well as Session 2 Present Mood) among SWB Change Scores in the NA Condition

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1.S1 LS	--	.71*	-.63*	.90*	.70*	-.53*	-.13	.32*	.17	.22	-.04	-.63*	.46*	.52*	-.48*
2.S1 PA		--	-.53	.68*	.84*	-.55*	.01	.19	.01	.13	-.13	-.60*	.44*	.56*	-.43*
3.S1 NA			--	-.61*	-.54*	.74	-.02	-.27	-.41*	-.20	.01	.54*	-.38*	-.39*	.49*
4.S2 LS				--	.72*	-.50*	.32*	.39*	.19	.07	.04	-.61*	.33*	.46*	-.43*
5.S2 PA					--	-.55*	.12	.69*	.02	.15	-.09	-.51*	.38*	.63*	-.45*
6.S2 NA						--	.03	-.27	.31*	-.23	-.05	.45*	-.32*	-.45*	.61*
7. Δ S1S2 LS							--	.19	.06	-.31*	.17	-.02	-.23	-.07	.06
8. Δ S1S2 PA							.30	--	.02	.10	.01	-.13	.11	.40*	-.24
9. Δ S1S2 NA							.05	-.04	--	-.04	-.08	-.15	.10	-.06	.13
10. S1 Structural consistency							-.32*	.09	-.19	--	-.18	-.12	.64*	-.05	-.08
11. S1 Structural ambivalence							.17	.14	-.22		--	.15	-.68*	-.33*	.09
12. S1 Subjective ambivalence							-.09	.17	.01			--	-.65*	-.49*	.29*
13. S1 SWB strength index							-.24	-.10	.02				--	.40*	-.23
14. S2 Positive mood														--	-.41*
15. S2 Negative mood															

Note. N = 195. S1 = Session 1; S2 = Session 2; LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. Bivariate correlations are presented above the diagonal, partial correlations (controlling for Session 1 LS, Session 1 PA, Session 1 NA, Session 2 positive mood, and Session 2 negative mood) are presented below the diagonal. *$p < .05$.

correlation between change in PA and NA (inconsistent with the main results). The partial correlation between changes in LS and NA was negative and significant, meaning individuals characterized by greater increases in LS also tended to report greater decreases in NA (consistent with the main results). In the LS condition, the partial correlation between change in LS and PA as well as the partial correlation between change in LS and NA was non-significant (consistent with the main results). Change in PA and change in NA were significantly negatively correlated, such that individuals characterized by greater increases in PA also tended to report greater decreases in NA (consistent with the main results). In the PA condition, the partial correlation between changes in LS and PA was significant and positive, meaning individuals characterized by greater increases in LS also tended to report greater increases in PA (consistent with the main results). The partial correlation between change in LS and NA was non-significant (consistent with the main results). The partial correlation between changes in PA and NA was significant and negative, such that individuals who reported greater increases in PA also tended to report greater decreases in NA (consistent with the main results). In the NA condition, partial correlations between the three SWB change scores were non-significant (consistent with the main results).

The partial correlations between SWB change scores were compared statistically (Preacher, 2002; see Table P6) in order to determine whether the patterns of within-condition associations between the SWB change scores differed across conditions. The magnitude of the partial correlation between change in LS and change in PA did not significantly differ across conditions (inconsistent with the main results). The magnitude of the partial correlation between change in LS and change in NA significantly differed

between the control condition and the LS and NA conditions, such that change in LS and change in NA was more strongly associated in the control condition (consistent with the main results). The magnitude of the partial correlation between change in LS and change in NA did not significantly differ between the remaining conditions (consistent with the main results). The magnitude of the partial correlation between change in PA and change in NA did not significantly differ across conditions (consistent with the main results).

Table P6

Study 2: Partial correlations (Controlling for Session 1 LS, PA, and NA as well as Session 2 Present Mood) among SWB Change Scores by Experimental Condition

	Partial correlations among SWB change scores		
Condition	ΔLS and ΔPA	ΔLS and ΔNA	ΔPA and ΔNA
control condition	-.04	$-.45_{a}$*	-.13
LS condition	.18	$-.02_{b}$	-.34*
PA condition	.35*	$-.24_{a,b}$	-.41*
NA condition	.30	$.05_{b}$	-.04

Note. *n*s = 48, 50, 49, and 48, respectively, for control, LS, PA, and NA conditions. * $p < .05$ for testing the significance of the partial correlation coefficient. Within a given column, coefficients with different subscripts differed significantly ($p < .05$).

Note, however, that only the results concerning the LS condition are informative with respect to Hypothesis 1A and Hypothesis 1B because only the LS manipulation (and not the PA or NA manipulation) was effective in focusing individuals on the target component and not on the non-target components, as reviewed in the main thesis document. Consistent with the main results, the within-condition findings specific to the LS condition provide limited support for Hypothesis 1B (*relatedness view*), in that, of the three pairs of SWB components, changes in PA and NA were correlated; in contrast,

associations between changes in LS and changes in PA, as well as changes in LS and changes in NA, were non-significant within the LS condition – providing somewhat greater support for Hypothesis 1A (*independence view*).

Research question 2: Does SWB strength moderate the associations among changes in LS, PA, or NA? Within the high, moderate, and low SWB strength index groups, the partial correlations among the SWB change scores were evaluated for the entire sample (controlling for the Session 1 LS, PA, and NA scores and Session 2 positive and negative mood); see Table P7. The corresponding correlations were compared statistically between the high-strength and low-strength groups. The partial correlations between changes in LS and PA, and changes in LS and NA were non-significant (consistent with the main results). The partial correlations between change in PA and change in NA were significantly different when controlling for Session 1 LS, PA, and NA scores and Session 2 mood, such that change in PA and NA was more strongly associated within the low SWB strength group compared to the high SWB strength group (inconsistent with the main results).

When participants were divided into high, moderate, and low strength groups based on each of the individual strength variables (structural consistency, structural ambivalence, subjective ambivalence), statistical comparisons of the partial correlations between the low and high strength groups were non-significant (consistent with the main results). The only exception involved the high and low SWB structural ambivalence groups in which the partial correlation between change in PA and change in NA was significantly larger within the low-strength SWB structural ambivalence group (i.e., high SWB structural ambivalence) compared to the high-strength SWB structural ambivalence

(i.e., low SWB structural ambivalence) group (inconsistent with the main results); see Table P7.

Table P7

Study 2: Partial Correlations (Controlling for Session 1 LS, PA, and NA as well as Session 2 Present Mood) among SWB Change Scores in the Low, Moderate, and High SWB Strength Groups for the Entire Sample

	Low strength		Moderate strength		High strength		Comparison *p*-values	
Moderator	Δ PA	Δ NA	Δ PA	Δ NA	Δ PA	Δ NA	Δ PA	Δ NA
SWB strength index								
Δ LS	.15*	-.18	.10	-.07	.48*	-.02	.08	.44
Δ PA		-.36*		-.25*		.11		.02
Structural consistency								
Δ LS	.03	-.06	.35*	-.07	.27	-.14	.24	.70
Δ PA		-.15		-.30*		.06		.31
Structural ambivalence								
Δ LS	.30*	-.23	.05	-.01	.45*	.05	.40	.17
Δ PA		-.46*		-.17		-.02		.02
Subjective ambivalence								
Δ LS	.29*	-.12	.14	-.10	.32*	.08	.86	.30
Δ PA		-.36*		-.11		-.16		.26

Note. $N = 195$. LS = life satisfaction; PA = positive affect; NA = negative affect; SWB = subjective well-being; Δ = change. For the SWB strength index, low strength index group $n = 47$, moderate strength index group $n = 98$, high strength index group $n = 50$. For structural consistency, low structural consistency group $n = 49$, moderate structural consistency group $n = 97$, high structural consistency group $n = 49$. For structural ambivalence, low structural ambivalence group $n = 52$, moderate structural ambivalence group $n = 95$, high structural ambivalence group $n = 48$. For subjective ambivalence, low subjective ambivalence group $n = 64$, moderate subjective ambivalence group $n = 79$, high subjective ambivalence group $n = 52$. Results from statistical comparison of high and low group correlations are presented in the comparison p-values column. $^*p < .05$.

These findings provide no support for Hypothesis 2, according to which partial correlations among the SWB change scores should have been stronger among individuals in the high-strength groups compared to the low-strength groups. Instead, findings suggest that in regards to SWB structural ambivalence and the overall SWB strength index, change in PA and change in NA was more strongly related among individuals in the low-strength group (i.e., high SWB structural ambivalence) compared to the high-strength group (i.e., low SWB structural ambivalence).