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## Strength and Vulnerability Integration (SAVI): A Model of Emotional Well-Being Across Adulthood

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### Abstract

The following paper presents the theoretical model of Strength and Vulnerability Integration (SAVI) to explain factors that influence emotion regulation and emotional well-being across adulthood. The model posits that trajectories of adult development are marked by age-related enhancement in the use of strategies that serve to avoid or limit exposure to negative stimuli, but age-related vulnerabilities in situations that elicit high levels of sustained emotional arousal. When older adults avoid or reduce exposure to emotional distress, they often respond better than younger adults; when they experience high levels of sustained emotional arousal, however, age-related advantages in emotional well-being are attenuated, and older adults are hypothesized to have greater difficulties returning to homeostasis. SAVI provides a testable model to understand the literature on emotion and aging and to predict trajectories of emotional experience across the adult life span.

### Keywords

emotion; aging; elderly; age differences; well-being

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Philosophers and scientists have pursued the study of happiness throughout history. Their interest is spurred by both theoretical and practical considerations: people who are happy and report high levels of emotional well-being are more productive at work, earn higher salaries, have more satisfying relationships, and recover more rapidly from physical health setbacks than their less happy counterparts (see review by Lyubomirsky, King, & Diener, 2005). Although emotional well-being is relatively stable over time, so much so that researchers acknowledge its trait-like properties (e.g., Diener, Suh, Lucas, & Smith, 1999), nonetheless findings suggest that overall well-being increases with age. Cross-sectional and longitudinal studies reveal that negative emotional experiences occur less often, and positive experiences occur with similar if not greater frequency across adulthood (see review by Charles & Carstensen, 2007 see review by Charles & Carstensen, 2010).

Age-related increases in affective well-being contradict early life-span developmental theories which posited that trajectories of emotional experience in adulthood paralleled biological aging, peaking in the early twenties and slowly declining thereafter (Banham, 1951; Buhler, 1935; Frenkel-Brunswik, 1968). These theories were quick to point out age-

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related vulnerabilities from biological processes that place middle-aged and older adults at risk when managing their emotional well-being. Changes related to biological aging may place older adults at risk for managing some aspects of emotional experience, but early theories underestimated the powerful effects of psychosocial processes that systematically vary by age, and which enhance emotional well-being. The current paper presents the model of Strength and Vulnerability Integration (SAVI) to describe emotional well-being across adulthood. SAVI acknowledges strengths that accompany aging, but also vulnerabilities that may make modulating certain types of emotional experiences more difficult. Integrating these strengths and vulnerabilities together creates a comprehensive picture of when emotional well-being is better with age, when it is not, and the mechanisms behind these relatively predictable trajectories.

## Overview of SAVI

Strength and Vulnerability Integration (SAVI) describes how processes of emotion regulation change in later adulthood. This model, illustrated in Figure 1, posits that age-related differences in emotion regulation outcomes vary according to the timing of the emotion regulation process. Aging is related to increased strengths in the frequency and successful use of attentional strategies, appraisals, and behaviors to regulate everyday emotional experiences. These emotion regulation skills explain why researchers generally find higher levels of overall affective well-being with age when surveying younger, middle-aged and older adults. In addition, these strategies often allow people to circumvent or minimize the experience of negative emotions and stabilize or even enhance positive emotional experiences after initial exposure to minor irritations or setbacks. These strategies are also used long after an emotional event is over, when people are recalling the past. The greater reliance and successful use of these strategies with age stem from age-related changes in perspective garnered from time lived and time left to live.

If these strategies are not employed appropriately or successfully, people will experience emotional distress. Because strategies to employ thoughts and behaviors to change the nature of the situation are no longer possible, subjective reports of emotional states of older adults will be more similar to those of younger adults. At the same time, age-related vulnerabilities are hypothesized to result in greater difficulty modulating the high and sustained levels of physiological arousal occurring at this time. Reduced physiological flexibility leads to prolonged physiological arousal, hence delaying recovery from the event. Prolonged arousal may also create greater stress on the physical system with age. Thus, SAVI proposes that when older adults are able to employ the strengths of aging (skills including attentional strategies, appraisals and behavior) to avoid or de-escalate a negative event, age-related improvements in affective well-being will emerge. Slower physiological arousal to these events may even help to quickly de-escalate a short-lived experience. In situations where people cannot avoid negative experiences, however, age-related improvements in affective well-being will be attenuated and may even disappear completely. Situations where people cannot easily employ these skills include times when they encounter the threat or loss of social belonging, the continued exposure to chronic unrelenting stressors, or neurobiological dysregulation that makes employing skills to avoid distress difficult if not impossible.

In the following pages, SAVI is described in more detail, beginning first with brief definitions of emotional experience and emotion regulation. The paper then details age differences in overall emotional well-being and emotional experience before, during, and after people are exposed to emotion-eliciting events. Within these sections, the strengths of aging are discussed to explain why older age is related to improved generation of emotional well-being (assessed usually by overall affective well-being), more effective strategies at the

initial exposure to emotion-eliciting events, and more successful strategies after these events have passed. The vulnerabilities of aging are discussed in the section describing emotional reactivity when people are in the midst of an emotion-eliciting event.

This paper includes an analysis of the existing literature, pointing to areas where conclusions are strongly supported and others where additional research will inform and potentially redefine thinking in the field of emotion and aging. Throughout these descriptions, mechanisms posited to be responsible for these age differences (including both the strengths and the vulnerabilities) are offered to explain how and why age differences exist in emotional well-being across adulthood.

### **Defining Emotion and Emotional Well-Being**

Although precise definitions of emotions continue to be debated<sup>1</sup> (Ekman & Davidson, 1994), virtually all theorists concur that emotions are adaptive experiences with strong physiological and subjective components which were selected in evolution for their survival value. Emotions serve this adaptive function by eliciting experiential, behavioral, cognitive, and physiological responses that promote action tendencies. When we are frightened, we flee. When we are happy, we explore (Fredrickson, 2001). In this paper, the term emotional experience refers to people's reports of their subjective states (also referred to as their affective experience) and is often assessed by emotion checklists asking about affective experience (e.g., feeling sad, happy, or excited); questionnaires asking about life satisfaction; and questionnaires asking about emotion-related thoughts, behaviors, and physiological sensations. SAVI is limited to these subjective experiences of emotions as opposed to psychological constructs related to emotional well-being such as maturity (Allport, 1961), wisdom (Erikson, Erikson, & Kivnick, 1986), self-regulation (Labouvie-Vief, 2003; Mroczek, Spiro, Griffin, & Neupert, 2006), purpose in life (e.g., Ryff & Singer, 2006) and deriving meaning in life (Frankl, 1959). We also limit the review and the model to western societies. A growing number of researchers from non-western cultures are examining emotion and aging, but more findings are necessary before evaluating the generalizability of SAVI to eastern cultures.

### **Regulating Emotional Well-Being**

Emotional well-being is tied to how well people regulate their emotions. The definition of emotion regulation is as complicated as that of emotion, with debates about what factors are included in the definition described in detail elsewhere (Gross, 1988; Gross & Thompson, 2007; Thompson, 1994). Because emotions are multi-factorial phenomena, emotion regulation encompasses physiological, cognitive, and behavioral processes both external and internal to the individual. Process models of emotion regulation often focus on volitional activities, where emotion regulation consists of behaviors employed after a person is exposed to a personally relevant event that elicits an emotional response (e.g., Gross & Thompson, 2007). Other researchers do not separate emotion and emotion regulation, instead describing them as on-going, interactive, and concurrent processes (Campos, Frankel, & Camras, 2004).

According to interactive models of emotion regulation, people continually experience and modulate their emotional responses with or without the presence of an identified emotion elicitor (Campos et al., 2004). The thoughts, behaviors, and physiological processes involved in emotion generation (assessed by overall well-being or how people feel 'in

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<sup>1</sup>Questions such as whether specific emotions have specific physiological profiles, whether emotions are distinct episodes or more general states of arousal, or whether emotions are separate from emotion regulation remain controversial but resolution is not necessary for the purposes of the current review and integration of the literature.

general') are the same processes as those involved when modulating emotional experience in response to an identified, personally relevant, emotion-eliciting event. This paper uses the definition of emotion regulation as control over the types of emotions that we experience, when we experience them, and the degree to which they are experienced (Gross & Levenson, 1997). The control of these emotions is influenced not only by agentic actions on the part of the individual, but also age-related changes to the person (such as a physical health condition) and his or her environment that make control over emotional experience -- both the generation of high levels of affective well-being and the regulation of emotions in response to an emotion-eliciting event -- easier in some situations and more difficult in others.

Successful emotion regulation is often reflected by higher levels of positive than negative emotions (e.g., Campos et al., 2004; Gross, 1998), and researchers often assess successful aging by the degree to which people report a positive sense of well-being (e.g., Jopp & Smith, 2006; Smith, Borchelt, Maier, & Jopp, 2002). This does not mean that negative emotions are abolished entirely. Negative affect, or the subjective experience of negative emotions, is necessary and adaptive in some situations. For example, fear motivates people to engage in safer behaviors, and frustration may be necessary when working towards difficult goals. Successful emotion regulation processes, therefore, may paradoxically entail the elicitation of negative emotions (Campos et al., 2004), as well as the co-occurrence of positive and negative affect (e.g., Ong & Bergeman, 2004). Indeed, older adults are less likely to report goals aimed at enhancing positive affect than are younger adults, instead reporting goals focused on maintaining current levels of positive affect (Riediger, Schmiedek, Wagner, & Lindenberger, 2010). Older age is also related to a greater co-occurrence of positive and negative emotions (Carstensen, Pasupathi, Mayr, & Nesselrode, 2000). In general, however, higher reports of affective well-being indicate more successful emotion regulation outcomes (e.g., Smith et al., 2002).

## Overall Emotional Well-Being in the Absence of a Negative Stimulus

To the extent that successful emotion regulation results in high levels of affective well-being, the majority of older adults achieve this aim. Older adults report equal if not higher levels of overall affective well-being than their younger counterparts (see review by Charles & Carstensen, 2007; Consedine & Magai, 2006), and greater control over their emotions (Gross et al., 1997; Phillips, Henry, Hosie, & Milne, 2006). Even centenarians report high levels of happiness (Jopp & Rott, 2006). Moreover, with the exception of the dementias, older adults report lower levels of most psychological disorders, including major depression and anxiety (Jorm, 2000; Kessler, Berglund, Demler, Jin, & Walters, 2005; see review by Piazza & Charles, 2006).

When examining negative emotions, both cross-sectional and longitudinal studies find a consistent pattern of age-related decreases in negative affect from early to mid-adulthood (e.g., Carstensen et al., 2000; Charles, Reynolds, & Gatz, 2001; Diener & Suh, 1998; Mroczek, & Kolarz, 1998). When examining age differences of specific negative emotions or negative emotion states, the pattern is generally consistent with that observed for overall levels of negative affect for high intensity, surgent emotions, such as rage, despair, or anger (Lawton et al., 1992; Phillips et al., 2003; Schieman, 1999). For some lower intensity emotional states, such as worry, age-related decreases are also found (Basevitz, Pushkar, Chaikelson, Conway, & Dalton, 2008).

Although some studies find that negative affect, or single-items asking about negative emotions, continue to decrease even in very late life (Kobau et al. 2004, Stone, Schwartz, Broderick, & Deaton, 2010), other studies have found that negative affect stabilizes or even

shows slight increases with age beginning in the mid-sixties or early seventies. For example, data from the Swedith/Adoption Twin Study of Aging (e.g., Fiske, Gatz, & Pedersen, 2003), and the Baltimore Longitudinal Study of Aging (Davey, Halverson Zonderman & Costa, 2004) have found age-related increases in depressive symptoms, and the Berlin Study of Aging found no age differences in negative affect among people ranging from 70–103 years-old (Kunzmann, Little, & Smith, 2000). Another large cross-sectional study also found a u-shape relationship between age and negative affect, with increases first appearing when comparing people in their sixties to their younger counterparts (Diener & Suh, 1997). Importantly, however, researchers often have found that certain factors, such as health and functional limitations, account for these findings, and that age is again related to lower levels of negative affect when controlling for these factors (e.g., Kunzmann et al., 2000; see discussion by Gatz, Kasl-Godley, & Karel, 1996). Thus, researchers are beginning to identify the specific reasons, or circumstances, that are responsible for the uptick in symptoms sometimes found in the literature. And, when controlling for these reasons, older adults look better on emotional well-being measures than do younger adults (e.g., Kunzmann et al., 2000).

The trajectory of positive affect also bodes well for older adults. In one study spanning over two decades, positive affect remained relatively stable among younger and middle-aged adults, although it decreased very slightly (12% over 23 years) among people from their mid-sixties to their late eighties (Charles et al., 2001). In another study, reports of life satisfaction increased until around age 65, at which time levels decreased slightly (Mroczek & Spiro, 2004). However, decreases in satisfaction were slight, such that the oldest adults in the sample were reporting satisfaction similar to that of the forty year-olds and nowhere near the lower levels reported by people in their late twenties.

Using cross-sectional samples, researchers have found increases in positive affect with age in samples ranging from 25 to 74 years-old (Mroczek & Kolarz, 1998). Other cross-sectional findings suggest relative stability after age 65 (Carstensen, Pasupathi, Nesselroade, & Mayr, 2000) and still others indicate slight decreases in positive affect among very old adults (Diener & Suh, 1997). When examining discrete positive emotions and emotion states, researchers maintain that the age-related decreases in late life – when they are observed – are best explained by the higher energy, more surgent emotions such as enthusiasm and excitement (Lawton et al., 1992; but see Charles & Piazza, 2007). In another large study, some specific positive emotions (such as enjoyment and happiness) show little age-related change after age 70, although reports asking people to rate their overall well-being increase with age (Stone et al., 2010). A meta-analysis pooling results from over 100 studies replicates this result (Pinquart, 2001). Findings indicate that age-related declines in emotional experience are driven predominantly by high-arousal negative and positive emotions. Low-arousal positive emotions show no significant age-related decrease.

Considering findings on positive and negative emotional experiences together, adults are reporting relatively high levels of well-being into old age. Even when age-related upturns in negative affect or downturns in positive affect have been observed, the oldest adults still report better subjective well-being than do the youngest adults (e.g., Charles et al., 2001; Mroczek & Spiro, 2003).

### **Why is Older Age Related to Affective Well-Being? Explaining Age-Related Strengths**

The studies above asked people about their affective experiences, a process which requires thought (e.g., Basevitz et al., 2008; Davern, Cummins, & Stokes, 2007; Diener, Scollon, & Lucas, 2004; Mroczek & Spiro, 2003). These questions often demand that people weigh information about themselves against what they perceive about other people, or what they perceive about themselves at other points of time to form their basis of comparison (e.g.,

Davern et al., 2007). Theorists describe age-related changes in how people evaluate their lives and in the knowledge with which they form these appraisals (e.g., Carstensen, 2006). SAVI incorporates these theories, positing that age-related changes result from an awareness of diminished temporal horizons and the self-knowledge and social expertise gained from time lived.

### **Age-related strengths: The role of time**

**Socioemotional Selectivity Theory**—Socioemotional selectivity theory posits that the priority placed on emotion-related goals increases with age (Carstensen, 2006; Carstensen, Isaacowitz, & Charles, 1999). The theory maintains that two overarching sets of goals motivate much of human behavior. One set encompasses goals related to information and knowledge acquisition, and the other set of goals centers around emotional states and emotionally meaningful activities. Although both sets of goals are important for all adults throughout the life span, the relative importance of each one depends on a person's temporal perspective. According to socioemotional selectivity theory, all people have a conscious or unconscious perception of time left to live, and this temporal perspective correlates strongly with age. When people perceive time as expansive, as is normative for a younger adult living in a society with a long life expectancy, information goals are most important. When time left to live grows shorter, as in late life, emotional goals assume primacy.

Studies have directly examined both age and the role of time perspective on thoughts and behaviors aligned with emotion regulation strategies (see review by Charles & Carstensen, 2007). Time is intrinsically related to age. Although people have successfully manipulated time perspective by asking people to imagine an impending ending or an expansive future, chronological age serves as a constant marker for the passage of time (Carstensen, 2006). As such, emotions increase in salience with age. In a test of age-related changes in the saliency of emotional versus non-emotional information, younger, middle-aged, and older adults were presented with emotional and non-emotional material and then later asked to recall what they could remember (Carstensen & Turk-Charles, 1994). Consecutively older age groups mentioned a greater proportion of emotion-related information.

Socioemotional selectivity theory posits that greater emotional saliency and desire to maintain emotional well-being will motivate people to regulate their emotions to maintain high levels of well-being. One study confirmed that people who are primed to focus on emotional control have a greater tendency to engage in emotion regulation strategies (Mauss, Cook, & Gross, 2007). In this study of younger adults, people who were primed with emotion control-related words exhibited reduced emotional reactivity to negative stimuli. The authors attribute reductions in reactivity to greater increases in automatic emotion regulation strategies once emotional control was primed (Mauss et al., 2007). Future studies need to examine whether age-related increased saliency of emotion extends to increased saliency for emotion regulation goals, as posited by socioemotional selectivity.

Critical to the argument that time perspective relates to emotional processes are findings showing that younger adults, when placed in situations that limit their temporal horizons, shift their focus to more emotion-related goals. For instance, younger adults who are terminally ill select social partners for their emotional value and not the information they offer, consistent with the affectively-laden judgments of older adults (Carstensen & Fredrickson, 1998). As a result of this greater emphasis on emotion-related goals, people with a more limited time perspective direct their efforts towards maintaining emotional well-being and engaging in successful emotion regulation strategies to a greater extent than do younger adults (Carstensen et al., 1999; Carstensen, Fung, & Charles, 2003).

**Temporal perspective and age-related strengths in cognitive appraisals:** Socioemotional selectivity posits that the realization that time is limited is accompanied by a more present-focused awareness (Carstensen et al., 1999). Whereas younger adults are striving to gain information and resources for the future, older adults instead focus on the strengths of the present. Researchers have found age differences in appraisals that are consistent with this tenet of socioemotional selectivity theory and which directly relate to enhanced emotional well-being.

**Goal discrepancies:** Goal discrepancy refers to the difference between a person's perception of his or her actual versus ideal situation (Higgins, 1987). Achieving a valued goal is related to positive emotions, and failure in goal attainment is related to negative affectivity and the need to engage in emotion-repair strategies (Heckhausen, 2005). Thus, less disparity between actual and ideal goals relate to higher levels of well-being, whereas a greater disconnect between actual versus ideal self is related to greater feelings of disappointment and sadness (Higgins, 1987). According to socioemotional selectivity theory, older adults focus more often on the present, and younger adults strive more often towards attainment of future goals. As a result of this emphasis on the present versus the future, older adults may engage in reappraisals of their current and future goals to be more content with their current status and less likely to think about and strive towards future goals compared to their younger peers.

This reasoning is consistent with age-related decreases in goal discrepancy. In one study, a sample of younger, middle-aged, and older adults rated six dimensions of psychological well-being according to their ideal versus actual levels (Ryff, 1991). These well-being dimensions included areas such as autonomy, purpose in life, and personal relations with others. Younger adults had the greatest discrepancy in their ratings of their current versus ideal selves on these dimensions. The middle-aged group was slightly less discrepant than the youngest group, but the oldest age group showed the least discrepancy of all. Older and younger adults did not vary in their ratings of their actual selves, but the ideal selves were rated much higher for younger adults than for older adults. Thus, actual-ideal discrepancy showed a linear decrease across the three age groups (Ryff, 1991). This same age-related pattern was observed when examining current life situations to ideal states among a group of Chinese adults ranging from 18 to 89 years-old (Cheng, 2004). These findings are consistent with an age-related increase in appraisals focused on valuing the present and optimizing current emotional well-being.

**Social comparisons:** Older adults' greater focus on the present may also influence their objects of social comparison. People constantly evaluate themselves, both in relation to others and to their future, past, and ideal selves. Evaluation of their relative position in society correlates with life satisfaction and happiness, such that people who use downward or lateral comparisons (comparing themselves to others who are worse off or in a similar situation) report higher levels of well-being than those engaging in upward social comparisons (comparing themselves to more fortunate others; e.g., Neugebauer, Katz, & Pasch, 2003). Moreover, the less happy a person is, the stronger the influence of social comparison (Lyubomirsky, 2001). Knowing that happier people are less influenced by social comparisons does call into question issues of causality, but regardless, findings clearly indicate that these evaluations correlate with well-being. Several studies suggest that younger adults more often compare themselves to their superiors or their ideal selves than do older adults. For example, older tennis players and older runners compare their performance to same-aged peers, whereas younger tennis players and younger runners compare themselves to their future selves (Frey & Ruble, 1990; Sheldon, 2004).

**Temporal perspective and age-related enhancement of social behavior related to well-being:** A number of studies, including those that first established socioemotional selectivity theory, examined how temporal perspective influences social partner preference (see review by Carstensen et al., 1999; Lang, 2001). These social choices have direct relevance to levels of well-being. Emotion regulation theorists state that arguably the best way to regulate negative emotions is to avoid experiencing them in the first place (e.g., Carstensen, Gross, & Fung, 1997). Daily stressors, those that comprise the minor hassles and annoyances of life, contribute to immediate distress on the days they occur (Almeida, 2005; Bolger, DeLongis, Kessler, & Schilling, 1989); over time, these effects accumulate and leave people who experience a greater number of stressors more vulnerable to anxiety and depression (e.g., Zautra, 2003). The majority of daily stressors, and the stressors eliciting the highest level of daily distress, are interpersonal conflicts (Almeida, 2005).

Socioemotional selectivity theory posits that older adults actively decrease the size of their social network for emotion regulation purposes. Findings that only less close social partners decrease in number, and not emotionally meaningful family members and friends, have led researchers to conclude that the general age-related decrease in social partners documented in the literature represents a proactive culling of less desired social partners and not the result of age-related loss (Lang & Carstensen, 1994). To bolster this argument, decreases begin relatively early in life (when people are in their thirties; Carstensen, 1992), indicating that they are not based on losses specific to very old age. Moreover, studies show that this social selection promotes affective well-being. For example, older adults report greater satisfaction and higher intensity positive emotional experiences with close members from their social network than do younger adults (Charles & Piazza, 2007; Fingerman, Hay, & Birditt, 2004; Lansford, Sherman, & Antonucci, 1998). Older age is also related to higher scores on a measure of positive relations with others, a domain of well-being where high scores indicate social networks characterized by warm, satisfying and trusting relationships (Ryff & Keyes, 1995). Thus, findings suggest that even though social networks are smaller, these networks confer greater benefits among older adults than middle-aged adults, who in turn report stronger relationships than younger adults.

**Age-related strengths from time lived – Accrued experience and knowledge—**SAVI incorporates the importance of time left in life, posited by socioemotional selectivity theory, but also posits that time lived provides additional advantages to many older adults. Thoughts and behaviors that promote well-being – such as decreasing one’s goal discrepancy or interacting more often with emotionally close social partners – are not difficult to understand. Many such emotion regulation strategies have been successfully taught to people with even mild intellectual disabilities (see review by Hatton, 2002). These skills do, however, require continued practice, and greater practice is related to improved emotion-related treatment outcomes (see review by Thase & Callan, 2006). Sustainable changes in well-being require active striving by the individual (Sheldon & Lyubomirsky, 2007). SAVI, therefore, recognizes not only time left to live (as posited by socioemotional selectivity theory) but also time lived as an important mechanism whereby people gain practice and experience when navigating the problems of daily life (e.g., Blanchard-Fields, 2007; Magai et al., 2006).

Researchers have stated that the experience garnered from time already lived is related to increased use of emotion regulation strategies (Blanchard-Fields, 2007; Magai et al., 2006). They assert that older adults, after experiencing countless positive and negative experiences, have learned what they are capable of surviving, what they need to do to feel contentment, and the actions necessary to avoid high levels of distress in their daily lives (cf, Rothermund & Brandstädter, 2003). For example, Differential Emotions Theory (DET) places great importance on the thoughts and behaviors related to emotional experience, and states that



even though the foundation for fundamental emotions remains unchanged across the life course, shifts in motivations and abilities may alter emotion experience across adulthood. They recognize that older adults often report more nuanced emotional experiences (e.g., Charles, 2005; Magai et al., 2006; Ong & Bergeman, 2004), and they posit that greater complexity, as a result of accumulated life experiences, increases the ability to predict the emotions of both the self and others (Magai, 2001). This ability, in turn, leads to better regulation of emotion (Magai, 2001; Magai et al., 2006).

Emotion theorists assert that past experiences create greater “exposure to and assimilation of cultural rules and norms” (Campos et al., 2004, p. 381). Studies of social cognition provide support for age-related increases in expertise that may benefit emotion regulation. For example, Hess and his colleagues have completed a series of studies showing that older adults are more sensitive to emotional cues when making social inferences than are younger adults, which they interpret as indicative of greater social expertise (Hess & Auman, 2001; Hess, Bolstad, Woodburn, & Auman, 1999; Hess, Osowski, & Leclerc, 2005; Leclerc & Hess, 2007). According to these researchers, emotional cues are based on cultural knowledge and belief systems. People in the United States, for example, weigh negative information about a person’s moral behavior, such as evidence of dishonesty, more heavily than they weigh negative information about a person’s abilities, such as intelligence. The reverse is true for positive information, which is weighed more heavily for issues of abilities than issues of morality. This cultural practice results in an asymmetric use of emotional information when making social judgments for the purpose of successfully navigating social experiences. Hess and his colleagues interpret this nuanced use of emotional information as evidence of social expertise (Hess et al., 2005). They also find that older adults report this asymmetric use of emotional information to a greater degree than do younger adults (Hess et al., 2005). Among younger adults, only those who reported high levels of social experience use this strategy to the same extent as do older adults. If older adults employ better social judgment, as this research indicates, they may be more successful at avoiding potentially negative interpersonal situations. Future studies tying this expertise to information about their actual social behaviors would further strengthen this postulate.

Given that both positive and negative social exchanges are related to emotional well-being (e.g., Rook, 2001; Rook, Mavandadi, Sorkin, & Zettel, 2007), accrued social experience and expertise would provide powerful emotion regulation skills. Knowledge about the self, however, may be as important, or even more so, than knowledge about others. Baltes and Baltes (1990) included the importance of self in the model of selective optimization with compensation to describe successful aging. According to this model, old age is associated with accumulated losses in social, mental, physical, and functional domains. Successful adaptation requires that people select areas in their life that they would like to maintain, areas chosen either by elective selection (e.g., choosing an activity for its enjoyment) or loss-based selection (e.g., needing to engage in physical therapy to preserve functioning after a stroke). This selection is only possible when people recognize losses in their lives and adapt to these losses. They solicit help which allows them to compensate for their losses and focus on their remaining areas of strength. This model does not predict what will be selected in people’s lives, although researchers have used this model to describe the gradual selection of emotion-related goals as people age (Baltes & Carstensen, 2003).

SAVI incorporates the premise that accrued self-knowledge allows older adults to navigate their worlds more successfully than younger adults. Accrued knowledge helps to explain why older adults report fewer problems in their daily lives compared to younger adults (Aldwin, Sutton, Chiaro, & Spiro, 1996; Folkman, Lazarus, Pimley, & Novacek, 1987). For example, in a study where adults ranging from 25 to 74 years-old were queried nightly about

the number of minor, but negative, stressors that occurred throughout the course of their day, older age was related to fewer daily stressors (Almeida & Horn, 2004).

**Alternative Explanations**—Researchers offer an alternative explanation for age-related reductions in stressor occurrence, such that fewer stressors reflect changes in the environment and not actions by the individual (Lawton, et al., 1992). For example, retirement allows freedom from obligatory and potentially noxious work responsibilities and increased time spent in voluntary and intrinsically motivated experiences (Ginn & Fast, 2006; Rosenkoetter, Garris, & Engdahl, 2001). In addition, family members may treat older adults with more deference and respect, such that social experiences with close social partners are more pleasant with age (Fingerman & Baker, 2006). Others may also be more reluctant to argue or express their negative emotions with older adults (Fingerman, Miller, & Charles, 2008). These explanations may partly explain the fewer number of stressors with age. Yet, explanations based on retirement or deference to the elderly are less convincing when linear age-related decreases continue long after retirement, and long after people have entered the venerable category of “old age.” For example, in a daily diary study of women ranging from 63 to 93 years-old, older age continued to relate to fewer stressors experienced over the course of a week, such that healthy 80 year-olds were reporting fewer stressors in their lives than healthy 70 year-olds (Charles et al., 2010). Another study questioned whether greater freedom and leisure time may account for the age-related improvements in well-being. In this study, researchers examined the number of times people reported situations where they wanted to do something else, or where they preferred to do something else instead of their current activities (Riediger & Freund, 2008). Older adults reported less of both types of conflictual situations. Although these occurrences partially mediated age differences in affect – explaining 15% of the age effect – older age remained significantly related to a more positive affect balance in these models (Riediger & Freund, 2008).

### **Age-Related Strengths when Modulating Emotions in Response to Emotion-Eliciting Events**

Affective well-being arguably provides an indicator of how well people regulate their emotional experiences. Higher levels of happiness, for example, are related to better self-regulation and coping strategies (e.g., Aspinwall, 1998; see review by Lyubomirsky et al., 2005). Contemporary emotion theorists posit that the same factors are responsible for both the generation of emotion prior to exposure to a real or imagined negative event (assessed by overall emotional experience) and the regulation of emotional states in response to such a threat (Campos et al., 2004). These factors include cognitive, behavioral, and physiological components that are influenced by genetic, social, cognitive, and physiological processes and unfold throughout childhood and early adolescence (see reviews by Calkins & Hill, 2007; Campos et al., 2004; Eisenberg, Hofer, & Vaughan, 2007; Harris, 2000; Stegge & Teravogt, 2007; Thompson & Meyer, 2007 for factors contributing to emotion regulation and how they develop throughout infancy, childhood, and early adolescence). By adulthood, age differences in emotion-related processes are less pronounced, yet they are still observed across the second half of the life span (see review Charles & Carstensen, 2007). SAVI posits that time left in life and time lived, as described in the section above, are related to these differences. Studies consistently produce results indicating age-related increases in efforts to reduce the exposure to negative experiences across adulthood. In some situations, these strategies even allow people to optimize their exposure to positive experiences.

### **Attention Focused on Negative Aspects of the Environment**

Whether reading the morning newspaper, flipping through channels on a television, perusing books in a library, choosing between conflicting social engagements, or reading about the

pros and cons of a health insurance policy, people are constantly confronted with decisions throughout the course of daily life. The choices are many, and people must decide where to direct their attention in this rich and complex environment. Emotion theorists describe attention deployment as an emotion regulation strategy whereby people attend away from negative information and towards positive information (see description by Gross, 1998; 2007). They have found that the attention directed toward the negative stimuli partially predicts the strength of the emotional response (e.g., Scheier & Carver, 1977). Thus, by averting attention from a negative event, people may reduce its impact.

Researchers state that the ratio of positive to negative material to which people attend becomes more positive with age – a phenomenon referred to as the positivity effect (Carstensen & Mikels, 2005; Charles, Mather & Carstensen, 2003). In a series of studies, researchers have examined age differences in visual attention when people are presented with positive, negative, and neutral stimuli (see review by Isaacowitz, 2006). For example, in one study older and younger adults were seated before a computer screen and watched as two faces flashed quickly before them (Mather & Carstensen, 2003). Immediately after their presentation, a dot appeared at the site of either the previously viewed neutral or emotional (either positive or negative) face. If someone were already looking at the place where the dot probe appeared, reaction time would be faster than if he or she had to reorient attention to a different position on the screen. Therefore, faster reaction time to the dot probe indicates greater attention to the stimulus previously presented in that location. Findings show that older adults were faster to react to a dot immediately following the position of a neutral compared to a negative face, and a positive compared to a neutral face, revealing an age-associated tendency to focus away from negative stimuli and towards positive stimuli (Mather & Carstensen, 2003).

Studies that examine attention by tracking eye gaze confirm these age differences (Isaacowitz, 2006; Isaacowitz, Wadlinger, Goren, & Wilson, 2006). Again, older age is related to increased focus away from negative information and towards positive information (e.g., Isaacowitz, Toner, Goren, & Wilson 2008; Mikels & Carstensen, 2006). When viewing positive and negative information about possible healthcare plans, older adults spend a greater proportion of their reading time on positive information than negative information compared to younger adults (Löckenhoff & Carstensen, 2007). The only notable exception to this pattern of age-related positivity is when people are detecting fear (Mather & Knight, 2006). Researchers posit that because attention to threatening stimuli is governed by a more automatic response than attention to positive information, age-related biases in attention allocation may only appear when attentional processes are under the control of the individual (Mather & Carstensen, 2005). Consistent with this stance, age-related biases for more positive information only appear after people have initially viewed all the stimuli (Isaacowitz, Allard, Murphy, & Schlangel, 2009). Together, these findings suggest that when given the choice to attend to either a positive or negative stimulus, older adults are more likely to turn their attention to the more positive and less negative option.

The above studies examine visual attention, and future studies need to examine how quickly people attend, and distance themselves, from negative information in other contexts and with others types of stimuli. Two studies, however, suggest that this phenomenon occurs in other situations, as well. For example, in one study older and younger men and women listened to three different tape-recorded conversations where two people were making disparaging comments about another, and they were asked to imagine that they were the subject of derision (Charles & Carstensen, 2008). The tapes paused at four different points, at which time participants rated their current feelings of sadness and anger and voiced aloud their current thoughts and feelings. Younger adults directed their comments towards the content of the conversation and mentioned that they wanted to learn more about the cause of

these peoples' complaints. Older adults, in contrast, made fewer comments about what they had heard, instead distancing themselves from the situation with such comments as, "You can't please all the people all the time." They also made fewer spontaneous comments about wanting to learn more about the source of these peoples' complaints. The authors interpreted these responses as indicative of an age-related increase in actions that limit time spent thinking about a negative situation. In the other study, men ranging from 45 to 92 years-old responded to questions about their initial appraisals of a stressor that had occurred in the prior week (Boeninger, Shiraishi, Aldwin, & Spiro, 2009). These appraisals were: thoughts about the extent to which the event posed a threat, a harm-loss, and a challenge; whether they had felt at a loss for what to do next; and the extent to which they felt annoyed or worried about others as a result. Older age was related to fewer appraisals overall, and these fewer appraisals were related to lower levels of perceived stressfulness as a result.

**Is it just mood-congruency?**—When evaluating all of the above studies, a possible explanation for the age-related focus away from negative information is that the observed phenomenon simply reflects a mood congruency effect. Older adults have higher levels of well-being, so they are more likely to focus on information consistent with their emotional state. This explanation has a solid rationale: happier and more optimistic people think about and attend to information differently than less happier people (e.g., Lyubomirsky, 2001; Issacowitz, 2006). If these attentional mechanisms are partially responsible for, or reflective of, the higher levels of well-being of older adults, then the same people who use these attentional strategies are the same who will report high levels of well-being. Controlling for well-being, then, would remove the individual differences responsible for age differences in attentional strategies.

Incredibly, however, the studies above controlled for current reports of emotional experience -- such as overall negative emotions, depressive symptoms and anxiety -- and the age differences in attentional biases remained (e.g., Löckenhoff & Carstensen, 2007; Mather & Carstensen, 2003). Even when current emotional states were hypothesized to mediate age differences in the amount of appraisals directed towards negative information, self-reported emotional states failed to account for the differences (Charles & Carstensen, 2008). And, in perhaps the strictest test of mood congruency effects, researchers induced older and younger adults into a sad mood state and then examined their attention to positive and negative stimuli (Isaacowitz et al., 2008). They found that older adults, even those induced into a negative mood state, still focused more on positive and less on negative stimuli. Younger adults induced in a negative mood state, in contrast, showed the expected mood-congruency bias by focusing more on negative than positive information.

### **Further Age-Related Strengths: Quickly Disengaging from the Negative Experience**

The above literature suggests that older adults are more likely to focus their attention away from negative stimuli and are less likely to request further information about noxious events than are younger adults. Findings from studies examining how people act when in the midst of an unpleasant situation are consistent with an age-related increase in the use of behaviors that reduce the likelihood of prolonged exposure to these noxious events (Birditt & Fingerma, 2005; Folkman et al., 1987).

When a group of people ranging from adolescents to octogenarians were asked how they coped with daily hassles, older adults were more likely than younger adults to report that they distanced themselves from a diverse array of problem types to decrease their emotional engagement with them (Folkman et al., 1987). When asked to recall specific negative interpersonal encounters, older age was related to a greater tendency to use passive strategies (such as doing nothing) as opposed to engaging others in debate or discussion that

may have escalated the conflict (Birditt & Fingerman, 2005). In another study examining people ranging in age from adolescence to later adulthood, older age was related to more flexible and mature coping strategies (Diehl, Coyle, & Labouvie-Vief, 1996). Importantly, the passive strategies assessed in these studies above were not those that focused on denying that the event occurred, or using the silent treatment as a passive-aggressive maneuver. Instead, these strategies encompassed appraisals such as transforming a conflict into a life lesson and downplaying the experience by giving it a neutral or positive meaning (Diehl et al., 1996).

Researchers have posited that these behaviors point to strategic decisions on the part of older adults to regulate their emotions as opposed to an inability to employ other problem-solving methods (Blanchard-Fields, 2007). For example, when describing how they approach instrumental problems – such as issues with home management or with consumer goods – older adults are just as active and problem-focused as are middle-aged and younger adults (Blanchard-Fields, Chen, & Norris, 1997). When discussing how to handle interpersonal conflicts with friends, however, older adults report different tactics; although younger adults are more likely to prefer problem-solving strategies, older adults instead opt to avoid conflict and to focus their attention away from these contentious situations (Blanchard-Fields et al., 1997; Blanchard-Fields, Mienaltowski, & Seay, 2007). Age differences become even more pronounced as situations increase in emotional salience (Blanchard-Fields, Jahnke, & Camp, 1995; Blanchard-Fields, Stein, & Watson, 2004; Watson & Blanchard-Fields, 1998).

Researchers have proposed that older adults choose more passive strategies in response to interpersonal problems with close friends to maintain harmony and positive social experiences (e.g., Blanchard-Fields, 2007). In one study, adults ranging from 65 to 90 years-old were asked to describe a negative social exchange that had occurred in the last month (Sorkin & Rook, 2006). When asked about their goal when responding to the event, people most often stated that they wanted to preserve harmony in the relationship as opposed to other goals such as getting the other person to change or standing one's ground. In addition, people who had the goal to preserve harmony reported less emotional distress in response to the event than did respondents who endorsed other outcome-related goals.

Older adults regard passive strategies as efficacious for managing interpersonal tensions. When asked how best to respond to videotaped vignettes depicting a woman encountering a series of interpersonal conflicts, older adults are more likely to recommend strategies such as doing nothing or letting the situation pass, compared to middle-aged and younger adults (Charles, Carstensen, & McFall, 2001). In addition, older adults report that these more passive strategies are the best way to handle interpersonal problems, and they recommend their use for others who are experiencing these problems (Charles et al., 2001). Notably, others agree with older adults' recommendations, rating less confrontational strategies as the best way to handle interpersonal conflicts with close friends and family members (Blanchard-Fields et al., 2007).

Participants' reports of recalled or recommended strategies are subject to memory bias and selective recall of past behaviors, yet laboratory studies suggest that faulty memory cannot explain age differences in the likelihood of either escalating or disengaging from conflict situations. Laboratory studies comparing middle-aged and older married couples also find that older age is related to greater reluctance to escalate negative experiences (Carstensen, Gottman, & Levenson, 1995). In one study, middle-aged and older adults were instructed to discuss areas of disagreement in their marriage for 15 minutes. Researchers then coded the number of negative start-up occurrences, defined as sequences where neutral affect expressed by one spouse was followed by negative affect by the other spouse, during this

discussion. Older couples who were unhappy in their marriages were the least likely to engage in negative start-ups, a difference interpreted by the researchers as a greater reluctance to kindle negative affect in an already suboptimal marital arrangement (Carstensen et al., 1995). In another study where couples discussed an area of contention, each spouse completed a questionnaire immediately after assessing their level of anger and anxiety and the warmth/hostility of his or her partner (Smith et al., 2009). Older couples reported lower levels of anger and perceived greater warmth from their spouses than did middle-aged couples.

## After a Negative Event Has Passed

### Perceptions of Severity

After an event has passed, older age is related to more positive and less negative memories of the experience. For example, older adults appraise daily stressors they had experienced earlier in the day as less severe than do younger adults even though severity ratings by objective coders yield no age differences (Almeida & Horn, 2004). Thus, the age difference in perceived severity is not an artifact of exposure to less severe daily events. Differences in cognitive appraisals with age are also observed when asking family members about time spent with one another (Lefkowitz & Fingerma, 2003). When evaluating their previous interactions, elderly mothers report more frequent positive and less frequent negative emotions than do their adult daughters. A study examining spousal interactions confirms age-related increases in positive reappraisals of potentially difficult situations (Story, Berg, Smith, Beveridge, Henry, & Pearce, 2007). When evaluating how their spouse had behaved during a prior discussion where couples had discussed an area of contention, older adults rated their spouse higher on positive interpersonal attributes than did middle-aged couples. Notably, older adults rated the actions of their spouses more positively than did objective coders of these interactions (Story et al., 2007).

Laboratory studies examining recall and recognition for positive, negative, and neutral events reveal more positive and less negative memories for older adults than for younger adults – performance that is included in the positivity effect described previously (Carstensen & Mikels, 2005; Mather & Carstensen, 2005). In one study, for example, people viewed positive, negative, and neutral images and later were asked to recall what they had seen and to determine if what they had viewed was different from a series of newly presented images (Charles et al., 2003). Younger adults recognized and recalled a greater proportion of negative images than positive or neutral ones, showing a bias towards the negative images. Compared with younger and middle-aged adults, older adults remembered a greater proportion of positive images relative to neutral and negative ones. These age differences remained after controlling for current mood (positive and negative affect) and current levels of depressive symptoms. In another study, negative pictures were not remembered as well as were positive or neutral pictures among the older adults (Gruhn, Scheibe, & Baltes, 2007). These findings held after controlling for trait affect and current mood. Other studies find that older adults do not recall more positive and less negative information than younger adults, yet the older adults' performance, nonetheless, indicates a greater saliency for positive stimuli than negative stimuli. For example, false memory is higher for positive than negative stimuli among older adults compared to younger adults (Fernandes, Ross, Wiegand, Schryer, 2008), and older adults report a greater familiarity for positive words than for negative words (Spaniol, Voss, & Grady, 2008)

Older adults appraise previous events in their lives more positively as well. When asked about their past and current overall satisfaction about their life, older adults report the past more positively than do middle-aged and younger adults (Lachman, Röcke, Rosnick, & Ryff, 2008). Moreover, when examining specific aspects of the past, people recall

autobiographical incidents more positively over time, but this phenomenon is even stronger among older adults than younger adults. A study including people ranging from 47 to 102 years-old showed that these memories, however, are even more positive among older adults than younger adults even after controlling for the amount of time since the event (Kennedy, Mather, & Carstensen, 2004). Even descriptions of negative events are more positive for older adults than younger adults; when recalling a negative event, older adults are more likely to infuse negative memories with positive memories than are younger adults (Comblain, D'Argembeau, & Van der Linden, 2005).

### **When Disengaging or De-escalating Negative Experiences Does Not Occur: Vulnerabilities of Aging**

SAPI posits that older adults are motivated to experience positive emotional experiences as a result of their diminished temporal horizon (as described in socioemotional selectivity theory) and that they have both the self-knowledge (described in DET theory and the model of selective optimization and compensation) and the accumulated experience necessary to use emotion regulation strategies effectively to help them strive towards this goal. Older adults are motivated to avoid or quickly extricate themselves from negative situations, but what happens when stressors are unavoidable? In these situations, when older adults face sustained exposure to highly arousing, inescapable negative situations, SAPI posits that age-related advantages will be attenuated and sometimes may even disappear. As a result of an inability to use thoughts and behavior to escape the situation, subjective emotional reports will be more similar across age groups. As a result of the sustained and higher levels of physiological arousal, age-related decreases in the ability of the body to down-regulate these strong responses may lead to more adverse physical responses with age.

**Subjective response during highly negative situations**—Several studies have examined age differences in the intensity of emotional experience without examining emotion regulation, per se. These studies were conducted to test whether older adults were capable of experiencing emotions with the same intensity as that reported by younger adults (e.g., Lawton et al., 1992). In short, they are equally adept. Whether emotions were elicited by emotional film clips (Tsai, Levenson, & Carstensen, 2000), psychosocial stressors (Uchino, Uno, Holt-Lunstad, & Flinders, 1999) or the re-experiencing of previous emotional events (Labouvie-Vief et al., 2003; Levenson et al., 1991; Magai et al., 2006), older and younger adults reported similar subjective responses to negative stimuli. In response to films that are specifically relevant to their age group (including topics such as bereavement, Alzheimer's Disease, and terminal cancer) older adults reported even greater subjective distress (Kunzmann & Gruhn, 2005; Kunzmann & Richter, 2009). Thus, older and younger adults are capable of experiencing emotions of equal intensity, but it is unclear whether age differences exists in the ability to modulate emotional experience.

Other studies have examined age differences between middle-aged and older couples during and immediately after they discuss an area of conflict in their marriage (described above, Carstensen et al., 1995; Smith et al., 2009). Older adults report less anger in response to these situations (Smith et al., 2009). However, because older adults display more positive emotions in these situations (Carstensen et al., 1995, but see Story et al., 2008), and perceive these situations more positively (Smith et al., 2009; Story et al., 2008) age differences in reported emotions are difficult to interpret. Age differences may be the result of enhanced emotion regulation, or they may reflect the more positive and less negative nature of the argument for the older adults than the younger adults.

**When asked to regulate emotions**—Few studies have examined age differences when people are given explicit instructions to regulate a negative emotional state. One study examined age differences in emotion regulation by instructing older and younger adults to watch a negative film clip, but to think about a happy memory if they found themselves becoming upset by what they were viewing (Phillips, Henry, Hosie, & Milne, 2008). Researchers compared their responses to a control condition where participants watched a negative film clip with no regulation instructions. In the regulation condition, no significant age differences were observed. Older age, then, was *not* related to enhanced emotion regulation outcomes in this situation. In the control condition, older adults expressed more negative facial expressions and reported greater negative affect than did younger adults.

In another study, younger, middle-aged and older adults watched films that elicited either sadness or disgust and were told to either adopt a detached and unemotional attitude; to think about positive affect, or to suppress the behavioral expressions of their reactions (Shiota & Levenson, 2009). Compared to the “just watch condition” older age was associated with a linear decrease in their subjective distress when they thought about the positive aspects, but a linear increase in their subjective distress and physiological reactivity when they were asked to adopt a detached attitude. Finally, one other published study found no age differences in regulation while viewing film clips, but this study focused on regulating the facial expression and not the subjective intensity of their emotional experience (Kunzmann, Kupperbusch, & Levenson, 2005).<sup>2</sup>

Outside of the laboratory, researchers have examined emotion regulation indirectly by studying emotional reactivity to daily stressors. On days when people experience a stressor in their lives, such as a problem at work, an argument with a partner, or a traffic jam, they report higher levels of emotional distress than on days when they do not experience stressors (Almeida, 2005). The difference between the level of emotional distress reported on a stressor day compared to a non-stressor day represents a person’s level of emotional reactivity. In a study examining reactivity to different types of daily stressors, older age was related to decreased reactivity to interpersonal stressors, but not work-related, home-related, or network-related stressors (network stressors defined by distress over a negative event that happened to someone close, such as hearing of a family member’s illness or job loss; Neupert, Almeida, & Charles, 2007).

A more fine-grained analysis of reactivity to interpersonal stressors suggests an explanation for this age difference. In a daily diary study, adults ranging from 25 to 74 years-old reported the emotions they had experienced that day (Charles, Piazza, Luong, & Almeida, 2009). They also reported whether they had experienced an actual argument, and whether they had been in a situation where they could have argued but instead decided to let the situation pass. Results indicate that older adults were less emotionally reactive to an avoided argument than they were to an actual argument. This finding points to the strengths of aging, whereby adults quickly used behaviors that limited their exposure to an unpleasant event, and they experienced less affective distress as a result. Among younger adults, both the avoided and the actual argument elicited the same level of emotional reactivity (Charles et al., 2009). Furthermore, older adults displayed less emotional reactivity to an avoided argument than did younger adults. These findings are consistent with those from a prior study where the use of distancing as a coping strategy was related to lower levels of hostility and blame among older adults than among younger adults (Folkman et al., 1987). For an actual argument, however, people of all ages reported the same degree of emotional reactivity. In this situation where they did not avoid the argument, age-related benefits in emotion regulation disappeared.

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<sup>2</sup>This study found no age differences in the ability to either suppress or amplify emotional experiences.



Two other studies have examined age differences in reports of subjective emotional experience in daily life using momentary sampling techniques. In one study, people ranging from 18 to 94 years-old reported their positive and negative emotional experiences five random times a day over the course of a week (Carstensen et al., 2000). Researchers examined the stability of undesirable emotional states (i.e., lower positive or higher negative affect compared to their individual mean-levels of each of these states) and the stability of more desirable emotional states (i.e., higher positive or lower negative emotional levels than their usual mean-level reports of these experience) as well as the transition from one state to the other. Findings indicate that older age is related to stability of desirable states (low negative and high positive emotional experience) across time points. When examining the transition from a high negative to low negative emotional state, however, a quadratic age pattern emerged. The researchers examined the lability of undesirable states among people younger and older than sixty years of age to understand this pattern. Findings suggest that transitions from higher to lower negative mood states were greatest between early to middle adulthood. After age 60, however, the likelihood of changing from an undesirable to a desirable emotional state no longer correlated with age.

In the second study, people ranging from 36 to 75 years-old reported their emotions and whether they experienced a daily hassle or problem every 45 minutes during a one-day, eight to nine hour time period (Uchino, Berg, Smith, Pearce, & Skinner, 2006). Results indicated that when people reported hassles, their levels of both positive and negative affect increased from what they reported when they were not experiencing a hassle. In addition, older age was related to less stressor reactivity, as assessed by comparing the positive and negative emotions reported on hassle versus hassle free moments during the day. Unfortunately, unlike the daily diary studies of emotional reactivity to stressors (e.g., Almeida, 2005), no information was included to determine what constituted a daily hassle in this study, such as whether they involved interpersonal situations or non-relational issues or whether these problems varied in objective ratings of intensity. Thus, it is impossible to discern what constituted a hassle for these age groups and to interpret these results as either supporting or refuting SAVI.

Together, these results reveal age differences that are much less consistent than those in studies examining appraisals, memory, and behavior in response to emotional stimuli. More research will be needed to examine age differences in response to stressful situations both inside and outside of the laboratory. Laboratory studies are necessary to attempt to control (and study) the many psychosocial factors that may favor older adults, and naturalistic studies are necessary to capture authentic emotional stressors for people across these age groups.

### **In the Midst of a Negative Event: Physiological Arousal**

As the prior section revealed, few studies have examined age differences when people are actively down-regulating a negative emotional response. Thus, predictions regarding age differences using down-regulating processes are difficult and at this point largely untested. Emotion theorists reason that emotion regulation strategies are constantly used, and the types of strategies used are similar before, during, and after an emotion-eliciting event (e.g., Campos et al, 2004). The time course of an emotion eliciting event, however, varies in emotional intensity and arousal.

For situations eliciting low levels of physiological reactivity and ones that dissipate quickly, age may still be related to better outcomes (Levenson, 2000). When events elicit high levels of sustained physiological arousal, however, SAVI posits that age-related advantages in subjective emotional experience will be attenuated and sometimes may disappear completely. This occurs because people can no longer employ many behaviors that provide

age-related advantages to well-being. In addition, many age differences in the physiological reactivity to these events point to worse repercussions for the physical health of older adults relative to younger adults. The basis of this postulate stems from literature acknowledging that physiological processes inform emotional experiences (albeit imperfectly), and from literature proposing that older age is associated with poorer physiological tolerance to stress.

Researchers have proposed that older age is related to poorer physiological responses to stressful situations. For example, Dienstbier (1989) discussed how prior life experience and stress inoculation (exposure to low levels of stressors) leads to greater physiological toughness and resistance in response to stressors. Although aggregated exposure to stressors and prior life experiences are correlated with age, Dienstbier (1989) clearly stated that aging would instead have weakening effects on regulation. Similarly and more recently, researchers have discussed the adverse effects of both psychological stress and aging on the immune system (see review by Graham, Christian, & Kiecolt-Glaser, 2006). Importantly, they review literature indicating that psychological stress and aging may have interactive effects, where the effects of stress are much worse for older rather than younger adults.

**Defining age-associated vulnerabilities**—The strengths of aging – garnered from time perspective of both a life lived (experience and self-knowledge) and time left to live (socioemotional selectivity theory) – result in age-related increases in the avoidance or tempering of negative situations. Vulnerabilities of aging result in greater difficulty modulating sustained emotional arousal. Age-associated changes in physiology lead to reductions in the flexibility to return to stasis, including having less reserve capacity across systems which reduces the ability to recover from physiological arousal (e.g., Goldspink, 2003); greater dysregulation in the immune system after psychological stressors (Graham et al., 2006); prolonged elevations in blood pressure and greater increases in fibrinogen after a stressfully arousing event (Wirtz et al., 2008); and a hypothesized decreased ability to down-regulate the hypothalamic-pituitary-adrenal (HPA) axis (Sapolsky, Krey, & McEwen, 1986). This greater age-related difficulty in down-regulating arousal is hypothesized to create greater wear and tear on the physiological system (e.g., Graham et al, 2006). Age-related reductions in flexibility in response to sustained arousal are discussed in more detail below for the cardiovascular system and the HPA system. First, basic age-associated changes in each system are discussed. Following, sections describe how older age may lead to greater physiological vulnerabilities in both systems when responding to these stressors.

**Age-related changes in the cardiovascular system**—When examining physiological responses to a stressful event, researchers often study cardiovascular (also called hemodynamic) and neuroendocrinological reactivity. Hemodynamic and neuroendocrinological processes occur within coordinated activation systems and display high inter-task consistency for both younger and older adults (Hawkey et al., 2001). Older age, however, is associated with reduced flexibility in both systems. Older age is related to increased resistance in the cardiovascular system, the result of slower metabolic rate, lack of physical activity, and fibrosis and calcium deposits that produce permanent thickening of the cardiac lining (epithelium), aortic-pulmonary valves, and throughout the vasculature (e.g., Ferrari, Radaelli, & Centola, 2003; Folkow & Svanborg, 1993). Heart contractile strength diminishes such that maximum stroke volume is reduced, and both the systolic and the relaxation phase of the heart are prolonged. Even in situations where stroke volume and heart rate are equal across age groups, oxygen needs are greater for older hearts as a result of greater ventricular tissue mass and a prolonged diastolic period (Folkow & Svanborg, 1993).

Less flexibility within the system is also evidenced by age-related decreases in heart rate variability (see review by De Meersman & Stein, 2006), attributed to age-related declines in resting cardiac vagal tone (parasympathetic nervous system; Hrushesky, Fade, Schmitt, &

Gilbergesen, 1984). Heart rate variability reflects sympathetic and parasympathetic function of the autonomic nervous system, with greater heart rate variability representing greater flexibility to adapt to demands on the system. Reduced variability is correlated with negative health outcomes; for example, lower heart rate variability is associated with increased risk for sudden cardiac death among people with chronic heart failure (Sandercock & Brodie, 2006).

**Age differences in the neuroendocrine system**—Less flexibility with age is also observed in the neuroendocrinological system. Researchers who study neuroendocrine reactivity often assess changes in levels of cortisol, the end product of activity along the hypothalamic-pituitary-adrenal (HPA) axis. When people perceive an imagined or actual threat, a cascading response along the HPA axis ensues, beginning in the hypothalamus with the release of corticotropin-releasing hormone (CRH), traveling down to the pituitary gland causing the release of adrenocorticotropin hormone (ACTH), and ending at the adrenal cortices with the release of cortisol into the bloodstream. Studies examining HPA reactivity often rely on changes in levels of plasma or salivary cortisol to determine the magnitude of the stress response. This reactivity occurs in a different biological environment for older and younger adults given age-related differences in structural and functional aspects of the HPA axis (Dodt, Theine, Uthgenannt, Born, & Fehm, 1994; see review by Ferrari et al., 2003).

For people of all ages, cortisol fluctuates in a diurnal waveform, highest in the morning and slowly declining throughout the day. At its nadir, cortisol enters into a quiescent period before slowly increasing as awakening nears. Of course, like all physiological systems, individual differences exist both in the levels and patterns of cortisol. People vary widely from each other in their diurnal waveform, and the pattern of this waveform can fluctuate even within person from day to day depending on, for example, diet, exercise, and sleep patterns. In addition, the effects of age will vary widely as a function of prior exposure to stress and overall physical fitness (Seeman & Robbins, 1994). When examining across large groups of people, however, this pattern flattens with age: although the peak level of cortisol is similar among older and younger adults, the slope of this diurnal waveform is not as steep for older adults, with an end result of higher evening levels of cortisol (e.g., Ferrari et al., 2003; Wilkinson et al., 2001). In addition, the quiescent period – the time in the middle of the night when cortisol is lowest – is not only marked by higher levels of cortisol, but also has a shorter duration among older adults (Ferrari et al., 2003). Higher evening cortisol among older adults is regarded as a sign of hyperactivity of the HPA axis with age (Deuschle et al., 1997), which results in less variability in the diurnal rhythm.

Changes in diurnal patterns of cortisol are often considered the result of corticotrophin-releasing hormone (CRH) disinhibition (Buckley & Schatzberg, 2005). Cortisol released in circulation travels back to the brain where it inhibits ACTH and CRH through negative feedback at the hippocampus. According to the glucocorticoid cascade hypothesis, older age leads to greater reductions in this ability to down-regulate the activity of the HPA axis (Sapolsky et al., 1986; Wilkinson, Peskind, & Raskind, 1997; Wilkinson et al., 2001). This hypothesis is consistent with structural changes in the hypothalamus. Mineralocorticoid receptors, high-affinity receptors responsible for feedback inhibition in the HPA axis and located primarily in the hippocampus, decrease in number with age (Dodt et al., 1994). Dysregulation of these high-affinity receptors, and an imbalance between these receptors and low-affinity glucocorticoid receptors, are further hypothesized reasons for greater disinhibition needed to down-regulate activity with age (Dodt et al., 1994; Giordano et al., 2005).

## Age Differences in Physiological Reactivity to Stressors

How will age-related changes in these systems influence emotion reactivity? SAVI predicts that when people undergo experiences that are severe enough to create heightened and sustained arousal, older adults have less physiological flexibility necessary to recover rapidly from these experiences. Researchers have examined age differences in reactivity (and recovery) most often in the context of physical stressors, such as the stress induced by exercise. The next section begins by examining age-related changes in physiological reactivity to high levels of arousal from physical stressors. Physical stressors vary from emotional stressors because they generally do not increase levels of negative affect or perceived stress, as opposed to emotional stressors that increase both experiences (Glynn, Christenfeld, & Gerin, 2002). These studies are included, however, because the same physiological activation pathways are activated for emotional and non-emotional stressors. In addition, reactivity to a physical stressor (that does not elicit affective distress) is less susceptible to modulation by non-physiological factors (i.e., cognitive appraisals), so physiological reactivity can be assessed with less concern that cognitive appraisals are driving age differences. The few studies that have examined age differences in reactivity to emotional stressors will then be presented. The section begins first with the literature on hemodynamic reactivity and then cortisol reactivity.

**Hemodynamic reactivity to physical and emotional stressors**—Across age groups, mean differences exist in both structure and function of the cardiovascular system that influence reactivity to stressors (for reviews see Ferrari et al., 2003; Folkow & Svanborg, 1993). Reactivity is often measured by changes in heart rate, respiratory sinus arrhythmia, blood pressure, and blood coagulation response. In some ways, responses to physical stressors (assessed commonly by treadmill, cycling, or grip strength tasks) are comparable across age groups. The pattern of catecholamine release and cardiovascular response is similar, although attenuated in old age for both physical and emotional stressors. Older adults have higher plasma levels of epinephrine and greater norepinephrine spillover (remaining catecholamines released by synapses and present in the blood), but the synthesis of cardiac norepinephrine is similar across age groups, as is the level of sympathetic activation (Esler et al., 1995).

Age-related reductions in the vasodilatory effects of epinephrine (a result of increased thickening of smooth muscles of the vasculature commonly seen among older adults) can increase blood pressure and place a greater load on the aging heart. In addition, studies of sustained physiological arousal point to slower recovery periods for older adults (e.g., Folkow & Svanborg, 1993). For example, older adults have a prolonged recovery period after exercise compared to younger adults when examining heart rate relative to peak levels thirty minutes later (Deschenes et al., 2006). This slower recovery may be even more pronounced for emotional reactivity, as emotion stimulation often produces greater cardiac activation than does physical exercise in older adults (Folkow & Svanborg, 1993).

Researchers have confirmed that heart rate increase in response to acute emotional stressors is attenuated with age (Labouvie-Vief et al., 2003; Levenson, Carstensen, Friesen, & Ekman, 1991; Smith, Hillman, & Duley, 2005; Tsai et al., 2000). These reductions are believed to be a product of poorer modulation of the cardiac response as a result of reduced vagal withdrawal (Esler et al., 1995; Taylor, Hayano, & Seals, 1995; Uchino, Holt-Lunstad, Bloor, & Campo, 2005; but see Kunzmann & Gruhn, 2005). Fewer studies have examined age differences in other hemodynamic processes that are associated with adverse physical outcomes and may create greater vulnerabilities with age, such as increases in blood pressure or hypercoagulation.

Consistent with findings for reactivity to physical stressors, laboratory and daily diary studies show that blood pressure reactivity to emotional stressors increases with age in both cross-sectional (Uchino, Berg, Smith, Pearce, & Skinner, 2006; Uchino et al., 1999) and longitudinal (Uchino et al., 2005) investigations (see review by Uchino, Birmingham, & Berg, 2010). Moreover, older adults exhibit less recovery than do younger adults, as indicated by no significant decreases in blood pressure during low stress periods compared to higher stress periods (Ritvanen, Louhevaara, Helin, Väisänen, & Hänninen, 2006). Another study examined three indicators of blood hypercoagulation (fibrinogen; fibrin degradation fragment D-dimer; and plasma clotting factor VII activity) in response to a psychological stressor (Wirtz et al., 2008). Among these healthy men, older age was related to greater increases in these factors. Because hypercoagulation is a risk factor for cardiovascular disease, these researchers interpret the findings to suggest that older adults may be more vulnerable to adverse cardiovascular changes as a result of emotional stressors.

Physiological reactivity from both physical and emotional stressors may pose increased risks to cardiac health with age. Physiological reactivity occurs in an overall system that is less flexible and resilient with age. Rates of chronic illness also increase with age, and physiological reactivity to emotional stressors among older adults may place them at risk for an adverse physical response (Seals & Dinneno, 2004). For people with cardiovascular disease, strong emotions – either positive or negative – can overwhelm the capabilities of the heart and lead to sudden cardiac death, as described in medical case studies (Davidson, Rieckmann, & Clemow, 2004; Folkow & Svanborg, 1993). Older adults, therefore, may experience both age-related reductions in flexibility as well as further reductions in flexibility arising from concurrent chronic illnesses. Currently only a handful of studies have examined these many aspects of hemodynamic reactivity to emotional stressors. Study replication and additional research in this area will likely yield important insights into potential age-related vulnerabilities that accompany emotion regulation processes.

**Cortisol reactivity to physical and emotional stressors**—In both human and animal models, the HPA response to physical and emotional stressors is prolonged with age, such that returning to baseline levels takes a longer period of time (see review by Bjorntorp, 2002; Otte et al., 2005). According to Sapolsky's glucocorticoid cascade hypothesis, this slower recovery of the HPA axis results from the same disinhibition along the HPA axis responsible for the age-related attenuated diurnal variation in cortisol (Sapolsky et al., 1986). Thus, once the physiological response is activated, inhibitory failures appear to reduce the ability to dampen physiological arousal. This hypothesis originated and received support from animal studies (e.g., Buchanan, Sparkman, Chen, & Johnson, 2008), but has expanded to encompass human aging and the physiological response to psychological stressors (Bakke et al., 2004; see review by Seeman & Robbins, 1994).

Fewer studies have examined age differences using human samples, and they have yielded mixed results. Some studies examining differences in cortisol reactivity to laboratory stressors across younger, middle-aged, and older adults have revealed no differences, although older adults had higher overall levels of basal cortisol (Kudielka, Buske-Kirschbaum, Hellhammer, & Kirschbaum, 2004; Nicolson, Storms, Ponds, & Sulon, 1997). Other studies have found greater reactivity to stressors with age (Bakke et al., 2004). In another study, older un-fit women (determined by maximal oxygen consumption assessed in a treadmill task) showed greater HPA axis reactivity than younger unfit and fit women (Traustadottir, Bosch, & Matt, 2005). Physically fit older women, however, showed an attenuated response to the stressors task. Finally, one study compared middle-aged and older adults across periods of high and low stress across situations in their daily lives (Ritvanen et al., 2006). Findings indicate that older adults showed less of a decrease in cortisol levels and blood pressure during low stress periods. Researchers interpreted these findings as indicative

of age-related decreases in the ability to down-regulate physiological reactivity, resulting in longer periods of sustained arousal (Ritvanen et al., 2006). Thus, older adults may be less reactive to stressors, but once activated they may have greater difficulty recovering from these experiences. Given the mixed results and the limited number of studies and types of emotional stressors included in these investigations, further research is needed to confirm whether and when age is related to vulnerabilities in this system, and how these vulnerabilities may lead to more adverse physical consequences with age.

### Why Does Overall Well-Being Sometimes Decrease in Late Life?

The prior sections discussed the strengths of aging -- defined by age-related increases in attention, appraisal, and behavioral processes -- to explain age-related increases in overall well-being. The vulnerabilities of aging -- defined by reductions in physiological flexibility -- were then introduced to explain why age-related advantages decrease or even disappear when people experience events that elicit high levels of sustained arousal. SAVI takes these strengths and vulnerabilities and integrates them within the context of opportunities and constraints on individual behavior. Returning to Figure 1, the strengths and vulnerabilities are combined together by the dashed rectangle encompassing them both. This rectangle represents how strength and vulnerabilities exist within the same context.

For the most part, older adults are successful at employing attentional, appraisal, and/or behavioral strategies to avoid the experience of negative affect. Why then, do a minority of people experience affective distress in late life? What is responsible for the attenuated age-related increases that sometimes appear starting in the late sixties or seventies when examining large samples of older adults (e.g., Davey et al., 2004; Haynie et al., 2001)? Slight decreases in life satisfaction (even if they never reach the levels observed among younger adults -- Mroczek & Spiro, 2003) sometimes appear, leaving researchers to wonder what happens to a sizeable number of older adults that make them less effective at regulating their emotions.

SAVI posits that upturns in negative affect (and downturns in positive affect) sometimes observed in longitudinal studies or in studies comparing younger and older adults are explained by specific circumstances where older adults cannot avoid or decrease their exposure to the eliciting event. Sometimes, situations arise when people cannot direct their attention elsewhere, select their environment, or appraise their situations in a way that eliminates the negative event. In these situations, the strengths of aging cannot be employed to avoid or curtail these situations, and age-related enhancement of emotional experience will not be observed. Moreover, the prevalence rates for three such situations increase with age. One situation involves threats and loss to social belonging, another is exposure to uncontrollable chronic stressors, and the third is neurological dysregulation. These situations may largely account for the upturns in negative affect, and downturns in positive affect, sometimes observed in studies examining people in very old age.

**The loss of social belonging**—The importance and need for social belonging has been emphasized by Maslow, Frankl, and many other researchers and philosophers, and has figured prominently in theories that discuss central human motives (e.g., Baumeister & Leary, 1995; Frankl, 1959; Maslow, 1943). People with stronger social ties report higher levels of well-being (Cohen & Wills, 1985) and live longer than those who are socially isolated or have low quality social support (e.g., House, Landis, & Umberson, 1988). Loneliness is related to a less positive outlook on life, higher levels of evening cortisol, and greater physiological reactivity to psychological stressors (Cacioppo et al., 2000).

Researchers have studied the negative effects of loneliness for people ranging from as young as five years-old to those in later adulthood (e.g., Asher & Paquette, 2003; Dykstra, 2009).

Older adults generally report greater satisfaction with family members over time (Carstensen, 1992) and are more satisfied with the size of their social networks than are younger adults (Lansford et al., 1998). Indeed, some studies have found that older adults report less loneliness compared to younger and middle-aged adults (e.g., Green, Richardson, Lago, & Schatten-Jones, 2001; Nolen-Hoeksema & Ahrens, 2002). Other studies, however, find that the relationship between age and loneliness is best depicted by a u-shaped curve, highest among younger and older adults and lowest in midlife (Pinquart & Sorenson, 2004). For example, across 40 different surveys, approximately 40–50% of people aged 80 and over reported feeling lonely often, but percentages which were only slightly higher than the reports of people aged 15 to 24 years-old (Dystra, 2009).

The presence of a significant romantic partner plays a stronger role in predicting emotional loneliness for older adults than younger adults (Green et al., 2001). And, unfortunately, a situation that may result in a lack of social belonging is the loss of the romantic partner. The prevalence rate of spousal bereavement increases with age, and this loss is associated with increases in loneliness over time (Dykstra, van Tilburg, & Gierveld, 2005). The percentage of people who reported symptoms meeting the criteria for major depressive disorder a year after spousal bereavement was estimated at 16%, compared to the 4 to 8% observed in same-aged non-bereaved samples (Clayton & Darvish, 1979; Zisook & Shuchter, 1991). Marriage can confer multiple benefits beyond the feelings of emotional belonging, including a partner for social activities, a provider of financial security, or an aide for instrumental assistance. Studies from the literature on suicide, however, suggests that social integration, or feelings of belonging within a community, is the primary mechanism explaining the protective role of marriage for overall mental health for both men and women (Cutright, Stack, & Fernquist, 2006; 2007). Although some bereaved individuals may still experience a sense of belonging with other social partners, such as children and close friends and confidants, those who have relied solely on their partner for their needs of belonging may be particularly at risk for affective distress.

The marital relationship serves as one example of a situation that often fulfills the need of social belonging that, when lost, may lead to sustained physiological arousal in the face of this loss and poor emotion regulation outcomes over time. The loss of social belonging, however, is not limited to this union. The loss of any beloved person who fulfills the needs of belonging will cause distress, whether the loss is a cherished friend or family member. Indeed, the loss of a child is rated as the most severe stressor that can be experienced, just above the loss of a spouse in severity ratings on life stress scales (e.g., Miller & Rahe, 1997). With age, the probability of experiencing the loss of people who provide this sense of belonging increases. Among older adults, this lack of belonging, manifested in feelings of loneliness, is associated with depression (Cacioppo, Hughes, Waite, Hawkey, & Thisted, 2006) and increased blood pressure (Hawkey, Masi, Berry, & Cacioppo, 2006).

**Chronic uncontrollable stressors**—Negative life events often exert insidious effects through the ensuing chronic stressors they create (Wagner, Compas, & Howell, 1988). Constant demands created by chronic, uncontrollable, unpredictable, and pervasive stressors override age-related strengths in emotion regulatory abilities. Older adults cannot redirect their attention, explain away, or reappraise such chronic stressors. Over time, this wearing away of psychological and physical reserves from unrelenting assaults can result in decreases in emotion regulation capacity. Many circumstances constitute situations that engender high levels of chronic, unremitting stress characterized by low levels of control, such as living in intense poverty, living with an abusive spouse, or living with a painful, functionally limiting, and deteriorating health condition. The uncontrollable aspect of these experiences leaves people poorly equipped to predict daily stressors in these situations. Two such situations, however, increase in prevalence with age: functional impairment and

spousal caregiving. Living with chronic disabilities is associated with distress, and people who have a severe disability report lower levels of well-being years after the onset of their conditions (Lucas, 2007). Caregiving for a spouse with dementia is another circumstance marked by unpredictability, loss of control, and higher levels of distress (Schulz & Beach, 1999).

Researchers have estimated the number of community dwelling people aged 70 years and older with dementia in 1993 to be 880,000 with mild dementia and 1.2 million with moderate or severe dementia (Langa et al., 2001). These numbers will only increase over time as the population in developed countries ages. Among those caring for community-dwelling people with dementia, 35% consist of the spouse of the affected person. The role of spousal caregiver demands emotional and physical stamina and takes its toll in both of these domains. Rates of depression and anxiety among caregivers are higher than among non-caregivers (Schulz, O'Brien, Bookwala, & Fleissner, 1995). Among caregivers, greater feelings of distress and perceived burden are the best predictors of poorer mental and physical health outcomes, including higher levels of major depressive disorder and higher rates of mortality (Covinsky et al., 2003; Schulz & Beach, 1999). In addition, caregivers with lower social support show increased cardiovascular reactivity to psychological stressors compared to non-caregivers and caregivers with higher levels of social support (Uchino, Kiecolt-Glaser, & Cacioppo, 1992).

The caregiving experience may be particularly pernicious relative to other types of chronic stressors because it presents a double jeopardy for older adults: not only does the task constitute a chronic, unrelenting and uncontrollable stressor, but it also represents a situation where the caregiver slowly loses a person who provides him or her with a sense of belonging. Perhaps this is one reason why the negative effects continue even after caregiving responsibilities end; in a study examining bereaved spousal caregivers, health risk behaviors decreased after the loss of the spouse, but depression levels remained high and unchanged among strained caregivers (Schulz et al., 2001). In another study, depression levels remained higher than those of non-caregivers three years after the death of the spouse (Robinson-Whelen, Tada, MacCallum, McGuire, & Kiecolt-Glaser, 2001).

**Neurological dysfunction**—Emotion regulation strategies do not demand superior intelligence, but they often require some judgment and forethought. As a result, people with cognitive deficits or other processes causing neurological dysregulation affecting the brain will have a more difficult time engaging in these strategies. Without the use of strategies that allow people to avoid or decrease their exposure to unpleasant situations, people are more susceptible to experiencing negative distress. This inability to decrease their exposure to such events leaves them more vulnerable to age-associated declines in physiological regulation. People of any age will have greater problems using cognitive and behavioral emotion regulation strategies in the face of neurological dysregulation, but these conditions increase in prevalence with age.

The cognitive control model posits that even age-related declines in attentional control that are subtle and unrelated to a diagnosed disease process will influence emotion regulation strategies (Knight, Seymour, Gaunt, Baker, Nesmith, & Mather, 2007; Mather & Knight, 2005). When older adults experience decreases in their working memory or are placed in situations that tax their cognitive capacity, this model states that they will not engage in strategies of emotion regulation, such as biasing their memory and attention towards positive information (Mather & Knight, 2005). Furthermore, they will not report high levels of emotional well-being if they are experiencing cognitive decline (e.g., Dotson, Resnick, & Zonderman, 2008). In support of this model, older adults who scored the highest on tests assessing attentional processes displayed a positivity bias that was attenuated among their



lower scoring peers (Mather & Knight, 2005). In addition, when engaged in a distraction task that reduced their cognitive resources, older adults failed to show a positivity bias in their memory (Mather & Knight, 2005). Moreover, adults who score higher on fluid intelligence measures show less reactivity to daily stressors (Stawski, Almeida, Lachman, Tun, & Rosnick, 2010). These findings are consistent with a large literature in clinical psychology revealing that poor cognitive functioning is related to higher levels of depressive symptomatology (e.g., Dotson et al., 2008). Together, these studies suggest that high levels of cognitive functioning are necessary for maintaining high levels of emotional well-being.

**Are these situations worse for older than younger adults?**—The three situations above – loss of social belonging, exposure to uncontrollable and unrelenting stressors, and neurological dysfunction – are clearly linked to poor emotional and physical outcomes. Spousal bereavement (often linked to loss of social belonging), spousal caregiving and functional disability (often resulting in uncontrollable and unrelenting stressors) and neurological dysregulation also increase with age. Thus, these three situations are posited to explain why – in some longitudinal studies of older adults – a subset of people will experience an increase in depressive symptoms or overall affective distress over time. And because incidence rates for these situations increase with age, scientists need to carefully control for these three factors when examining differences in affective well-being across younger and older adults.

SAVI posits that these situations may explain the reason why some people do not continue to show an improving trajectory of affective well-being over time, but will these situations also have worse ramifications for older than younger adults? Will vulnerabilities of aging lead older adults to suffer more adverse physical consequences from these circumstances? Few studies have examined how age may interact with feelings of social belonging. Hawkley, Cacioppo and their colleagues have suggested that the physiological effects of loneliness accelerate the physiological declines associated with aging (Hawkley & Cacioppo, 2007). One study found a significant interaction between age and systolic blood pressure revealing a stronger effect among older adults (Hawkley et al., 2006). Further research will need to investigate this possibility in more detail. A second circumstance was exposure to chronic, unremitting stressors in daily life, such as caregiving for a spouse with dementia. Researchers posit that the physiological stress of caregiving has worse physical health consequences for older than younger adults (Graham et al., 2006), but only a handful of studies have examined how age related to physiological changes across caregivers and non-caregiving controls. Studying whether respite from caregiving leads to greater physiological benefits for older than younger caregivers would be one way to test the degree to which this experience (and the reprieve from this experience) interacts with age to influence physical outcomes. Finally, neurological dysregulation is hypothesized to limit the ability to employ cognitive and behavioral strategies necessary to avoid negative stimuli, or to at least decrease exposure to unpleasant situations. Presumably, the cognitive deficits would have a similar effect for both younger and older adults.

## Areas for Future Research

Some aspects of SAVI are strongly supported: researchers have replicated patterns of affective well-being across large samples of older adults, and researchers have found that time left in life strongly predicts how people value emotional goals. Other aspects described by SAVI, however, need to be empirically examined to either support, refine, or dispute its hypotheses. Below are specific areas of research highlighted by SAVI's tenets.

## Explaining Age-Related Reductions in Positive Emotions

Affective well-being is often conceptualized as the difference between positive and negative affect: the higher the ratio of positive to negative affect, the higher the level of happiness (Fredrickson & Losada, 2005) and well-being (Bradburn, 1969). In some questionnaires, however, older adults do not report higher levels of certain positive emotions; for example, older adults report that they experience lower levels of higher arousal positive emotions, such as excitement, than do younger adults, but no age differences are observed for low arousal positive emotions, such as contentment (see review by Pinquart, 2001). One reason for these decreases in highly surgent positive emotions may lie in the fact that all emotions, both positive and negative, have the potential to elicit physiological arousal and disrupt homeostasis. As a result, older adults may choose not to engage in activities, even positive ones, if these experiences elicit undesirable levels of physiological activation. Examining motivations and reasons behind changes in discrete positive emotions will help researchers understand why older age is related to changes in different types of positive emotions.

## Exploring Other Emotion Regulation Strategies and the Mechanisms Responsible

SAVI discusses specific attentional processes and appraisals previously identified as emotion regulation strategies (e.g., Gross, 1998 e.g., Gross, 2001). Age differences in other strategies, however, have yet to be tested. For example, it is unclear whether patterns of maladaptive thoughts and behaviors, as defined by clinical researchers (e.g., Beck, Rush, Shaw, & Emery, 1979; Burns, 1989; Young, Beck, & Weinberger, 1993) change with age. Understanding age differences across multiple processes will allow us to establish whether the age-related benefits described above generalize to a vast array of cognitive and behavioral processes or are specific to only certain types. Additionally, examining these questions longitudinally will allow us to disentangle time and cohort effects from actual developmental processes.

In addition to establishing age differences in different processes of emotion regulation, further research would also help to substantiate, or to qualify, the mechanisms posited to drive age differences in these strategies. Theories offer different reasons for why thoughts and behaviors that optimize emotional experience increase with age. These theories are not mutually exclusive, and research examining each of these various postulates would advance this field. Studies that examine how time perspective relates directly to emotional experience and emotion regulation strategies would strengthen theoretical ties posited by socioemotional selectivity theory. The role of time lived, specifically the experience and knowledge gained as a result of this time, also needs further study. Obviously not all life experiences lead to enhanced emotion regulation abilities. Researchers have documented well the damaging effects of early deprivation and abuse on emotion regulation (e.g., Korkeila et al., 2005). In contrast, other research has examined the role of positive role models and the experience of personal success in shaping future behavior and positive belief outcomes (Bandura, 1997). Documenting types of experiences related to greater use of specific emotion regulation strategies would greatly contribute to our understanding of the importance of experiences from time lived and how they shape developmental trajectories throughout adulthood.

Questions also remain as to why people choose certain types of emotional goals over others. For example, researchers discuss the importance in distinguishing between hedonic and eudaemonic aspects of well-being (Ryff & Singer, 2006). Studies should examine motivations that underlie optimizing emotional experience potentially at the cost of other aspects of their own needs, such as focusing on information that may be unpleasant, but which could provide important information when making decisions about health care of about other important areas in their lives (cf, Löckenhoff & Carstensen, 2004; 2008).

### Future Directions for Age and Physiological Arousal

The vulnerabilities of aging also present a number of empirical questions that need to be addressed. Studies examining physiological vulnerability that capture both the time to peak in physiological reactivity as well as the return to baseline after sustained emotional arousal will be important contributions to understand emotion regulation across adulthood. Disentangling ongoing thoughts with physiological reactivity will also be particularly challenging albeit necessary to advance scientific understanding of emotion and aging. For example, researchers who examine age differences in emotional expression to emotional stimuli in a suppression condition proposed that older adults may be engaging in cognitive strategies spontaneously to down-regulate emotional experience (Magai et al., 2006). A challenge to researchers examining age differences in physiological activation, then, will be to differentiate the influences of cognitive skills from general physiological regulatory capacities. Controlling for other potential confounding factors, such as physical fitness, will also be necessary. Some of the age-related vulnerabilities that produce loss of physiological flexibility are potentially modifiable by health behaviors (e.g., Traustadottir et al., 2005). In addition, more sophisticated assessments that provide indicators of brain activity influencing both HPA activity and hemodynamic response will also enhance this research area.

### Studying the Effects of Low Level Emotional Arousal

SAVI posits that when people experience heightened and sustained arousal, older adults will not show better emotion regulation outcomes than younger adults. But, will age be related to emotion regulation for situations eliciting lower levels of emotional arousal? Levenson (2000) suggested that age-related reductions in cardiovascular reactivity may lead to serendipitous age benefits of reduced arousal. The idea that reduced initial arousal will provide an age-related advantage when people are first exposed to negative stimuli is consistent with findings indicating that older age has been associated with lower levels of heart rate and skin conductance response in many studies (e.g., Labouvie-Vief, Lumley, Jain, & Heinze, 2003; Levenson, Carstensen, Friesen, & Ekman, 1991; Tsai, Levenson, & Carstensen, 2000) but contrasts with studies finding that older adults have higher increases in blood pressure than do younger adults (Uchino et al., 2006).

A number of reasons, however, may support age-related advantages under conditions of less physiological arousal. Given the reduced physiological flexibility with age, older adults may not react to situations of very low arousal as frequently as younger adults. If older adults have a slower response time to stressors and manage to disengage from the situation quickly, they may prevent the reactivity from occurring more often than do younger adults. Finally, older adults may be more likely to engage in appraisals and behaviors that simultaneously aid emotion regulation during these experiences. Researchers have acknowledged older adults' use of emotion regulation strategies that may prevent or dampen the physiological arousal processes (John & Gross, 2004) and researchers further suggest that reduced physiological reactivity may be the result of older adults automatically employing these cognitive strategies earlier in the emotion regulation process than younger adults (Magai et al., 2006). Future studies will have to examine these questions.

### Does Physiological Arousal Play any Role in Subjective Experience?

SAVI posits that physiological vulnerabilities reduce the ability to regulate physiological effects of the stressors, but how does it inform the subjective emotional state? Researchers have speculated that the correlation between subjective and physiological response may be weaker among older adults than younger adults (Uchino et al., 1999). Other work, however, has shown that loneliness is more strongly related to physiological reactivity in older adults than in younger adults (Hawkey et al., 2006). If age-related increases in physiological reactivity are confirmed but are unrelated to subjective emotional experience, then

researchers might want to question the definition of emotion regulation success. If poor emotion regulation results in poorer physiological outcomes in late life, then it is insufficient to only assess subjective well-being outcomes as indicators of emotion regulation success. Researchers will need to include physical health indicators in their definitions of successful emotion regulation, particularly when discussing older adults.

### **Circumstances of Sustained, High Emotional Arousal**

In addition to examining the areas of age-related strengths and age-related vulnerabilities, the three types of situations that are posited to hamper the use of age-related strengths will have to be further tested and refined. Identifying aspects of the social network that provide a sense of social belonging and how these feelings predict differences in response to bereavement may help to clarify individual differences in bereavement outcomes. Differentiating physical health conditions that comprise unrelenting disruption to daily life from those that do not disturb daily activities or create daily hassles may also help to identify specific types of illnesses and disability accounting for increased levels of depressive symptoms observed in late life among some groups of older adults.

### **Examining Individual Differences**

Finally, this model posits relatively consistent patterns for all people, but of course individual differences exist across both age-related strengths and age-related vulnerabilities. For example, high levels of neuroticism may create vulnerabilities to trajectories of well-being over time. In a longitudinal analysis examining negative affect over almost 25 years, for example, the majority of the sample reported decreased negative affect and relatively stable positive affect over time. For people who scored high in neuroticism, however, levels of negative affect remained high and unchanged over time (Charles et al., 2001). People with higher levels of neuroticism are more reactive to daily events (Bolger & Schilling, 1991), and greater reactivity over years of responding to daily stressors has been hypothesized to leave older adults who are high in neuroticism particularly vulnerable to poor emotion regulation abilities (Mroczek et al., 2006). Perhaps for people with higher levels of neuroticism, life experiences are not modeling successful coping styles and outcomes, and instead their experience may only sensitize them to distress. They may also be more sensitive to physiological perturbations, as Eysenck had hypothesized (1963). This potential pathway may explain why older adults high in neuroticism are poorer at regulating their emotions than are their younger counterparts (Mroczek & Almeida, 2004).

Individual differences may also reflect cultural influences. For example, cultures vary in the value they place on emotional control. In a culture heavily influenced by Confucianism or Buddhism, emotional moderation is highly valued (Chiu & Kosinski, 1994). Asian cultures may adopt philosophies and religions that place a stronger emphasis on achieving balance in their emotional experiences than do Western societies (Tsai, 2007). For cultures that emphasize emotional control and moderation earlier in life, age differences in reappraisal strategies may be less pronounced. Societal context also influences exposure to life experiences that will shape experience with emotion regulation, which will influence the degree to which time lived is related to enhanced emotion regulation skills.

### **Summary and Conclusion**

Strength and Vulnerability Integration (SAVI) posits that age differences in the success of emotion regulation will vary according to when the subjective and physiological response to the emotional experience is captured. Aging is associated with strengths in emotion regulation that entail the use of attentional, appraisal, and behavioral strategies of emotion regulation. Older adults engage in strategies that avoid or at least mitigate the elicitation of

negative emotions more so than younger adults. They organize their social lives such that their satisfaction with their social network is higher than that reported by younger adults; they direct their attention to positive stimuli; and they appraise situations in a way that places them in a more positive light. As a result, older age is related to better emotional outcomes in general, and when people engage in activities to avoid or disengage with the unpleasant situation. Mechanisms responsible for these age differences include changes in perspective from both the realization that time left to live is growing shorter (socioemotional selectivity theory) and both the experience and the knowledge (including self-knowledge) resulting from years lived.

SAVI further states that aging is also related to vulnerabilities in emotion regulation as a consequence of reduced physiological flexibility. The model posits that older adults will engage in emotion regulation strategies that will result in age-related increases in affective well-being; in certain situations, however, implementing these skills becomes difficult if not impossible, and the physiological consequence of failure will result in poorer emotion regulation outcomes. These circumstances may arise as a result of age-related increases in the likelihood of experiencing the loss of people who fulfill social belonging needs; exposure to chronic, unrelenting, and uncontrollable stressors; and neurological dysregulation. This model offers a springboard for researchers to use when examining emotion regulation across adulthood, providing specific testable postulates for researchers to continue to test, refine, and extend knowledge in the field of aging and emotion.

In sum, we become savvier in the strategies we use to regulate our emotions with age....but we are all subject to environmental influences. When faced with constraining conditions where we cannot avoid the elicitation of a sustained emotional experience, age-related vulnerabilities in physiological flexibility will become apparent. SAVI predicts when and why emotion regulation abilities improve with age, and when these advantages attenuate or disappear to understand the complex story of how physiology, appraisals, and life context are integrated together in the adult developmental trajectory of emotional experience.

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## References

- Aldwin CM, Sutton KJ, Chiaro G, Spiro A III. Age differences in stress, coping, and appraisal: Findings from the normative aging study. *Journals of Gerontology: Series B: Psychological Sciences & Social Sciences*. 1996; 51B:179–188.
- Allport, GW. *Patterns and growth in personality*. New York: Holt, Rinehart, & Winston; 1961.
- Almeida DM. Resilience and vulnerability to daily stressors assessed via diary methods. *Current Directions in Psychological Science*. 2005; 14:64–68.
- Almeida, DM.; Horn, MC. Is daily life more stressful during middle adulthood?. In: Brim, OG.; Ryff, CD., editors. *How healthy are we?: A national study of well-being at midlife*. Chicago: University of Chicago Press; 2004. p. 425-451.
- Asher SR, Paquette JA. Loneliness and peer relations in childhood. *Current Directions in Psychological Science*. 2003; 12:75–78.
- Aspinwall LG. Rethinking the role of positive affect in self-regulation. *Motivation and Emotion*. 1998; 22:1–32.

- Bakke M, Tuxen A, Thomsen CE, Bardow A, Alkjaer T, Jensen BR. Salivary cortisol level, salivary flow rate, and masticatory muscle activity in response to acute mental stress: A comparison between aged and young women. *Gerontology*. 2004; 50:383–392. [PubMed: 15477699]
- Baltes, PB.; Baltes, MM. Selective optimization with compensation. In: Baltes, PB.; Baltes, MM., editors. *Successful Aging: Perspectives from the Behavioral Sciences*. New York: Cambridge University Press; 1990. p. 1-34.
- Baltes, MM.; Carstensen, LL. The process of successful aging: Selection, optimization and compensation. In: Staudinger, UM.; Lindenberger, U., editors. *Understanding human development: Dialogues with lifespan psychology*. Dordrecht, Netherlands: Kluwer Academic Publishers; 2003. p. 81-104.
- Bandura, A. *Self-efficacy: The exercise of control*. New York: Freeman; 1997.
- Banham KM. Senescence and the emotions: A genetic theory. *Journal of Genetic Psychology*. 1951; 78:175–183. [PubMed: 14861404]
- Basevitz P, Pushkar D, Dalton C, Chaikelson J, Conway M. Age-related differences in worry and related processes. *International Journal of Aging and Human Development*. 2008; 66:283–305. [PubMed: 18507331]
- Baumeister RF, Leary MR. The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*. 1995; 117:497–529. [PubMed: 7777651]
- Beck, AT.; Rush, AJ.; Shaw, BF.; Emery, G. *Cognitive therapy of depression*. New York: Guilford; 1979.
- Birditt KS, Fingerman KL. Age and gender differences in adults' descriptions of emotional reactions to interpersonal problems. *Journals of Gerontology: Series B: Psychological Sciences & Social Sciences*. 2003; 58B:237–245.
- Birditt KS, Fingerman KL. Do we get better at picking our battles? Age group differences in descriptions of behavioral reactions to interpersonal tensions. *Journals of Gerontology: Series B: Psychological Sciences & Social Sciences*. 2005; 60B:121–128.
- Birditt KS, Fingerman KL, Almeida DM. Age differences in exposure and reactions to interpersonal tensions: A daily diary study. *Psychology and Aging*. 2005; 20:330–340. [PubMed: 16029096]
- Bjorntorp, P. *Novartis Foundation Symposium. Novartis Foundation Symposium 242 - Endocrine Facets of Ageing*. London: Wiley; 2002. Alterations in the ageing corticotropic stress-response axis; p. 46-58.
- Blanchard-Fields F. Everyday Problem Solving and Emotion: An Adult Developmental Perspective. *Current Directions in Psychological Science*. 2007; 16:26–31.
- Blanchard-Fields F, Chen Y, Norris L. Everyday problem solving across the adult life span: Influence of domain specificity and cognitive appraisal. *Psychology and Aging*. 1997; 12:684–693. [PubMed: 9416636]
- Blanchard-Fields F, Jahnke HC, Camp C. Age differences in problem-solving style: The role of emotional salience. *Psychology & Aging*. 1995; 10:173–180. [PubMed: 7662177]
- Blanchard-Fields F, Mienaltowski A, Seay RB. Age differences in everyday problem-solving effectiveness: Older adults select more effective strategies for interpersonal problems. *Journals of Gerontology: Psychological Science*. 2007; 62:61–64.
- Blanchard-Fields F, Stein R, Watson TL. Age differences in emotion-regulation strategies in handling everyday problems. *Journals of Gerontology: Series B: Psychological Sciences and Social Sciences*. 2004; 59:261–269.
- Bolger N, DeLongis A, Kessler RC, Schilling EA. Effects of daily stress on negative mood. *Journal of Personality & Social Psychology*. 1989; 57:808–818. [PubMed: 2810026]
- Bolger N, Schilling EA. Personality and the problems of everyday life: The role of neuroticism in exposure and reactivity to daily stressors. *Journal of Personality*. 1991; 59:355–386. [PubMed: 1960637]
- Bradburn, NM. *The structure of psychological well-being*. Aldine: Oxford; 1969.
- Buchanan JB, Sparkman NL, Chen J, Johnson RW. Cognitive and neuroinflammatory consequences of mild repeated stress are exacerbated in aged mice. *Psychoneuroendocrinology*. 2008; 33:755–765. [PubMed: 18407425]

- Buckley TM, Schatzberg AF. Aging and the role of the HPA axis and rhythm in sleep and memory-consolidation. *American Journal of Geriatric Psychiatry*. 2005; 13:344–52. [PubMed: 15879582]
- Buhler C. The curve of life as studied in biographies. *Journal of Applied Psychology*. 1935; 1:184–211.
- Burns, D. *The Feeling Good Handbook*. New York: William Morrow; 1989.
- Cacioppo JT, Ernst JM, Burleson MH, McClintock MK, Malarkey WB, Hawkley LC, et al. Lonely traits and concomitant physiological processes: The MacArthur social neuroscience studies. *International Journal of Psychophysiology*. Special Issue: Proceedings of the 9th World Congress of the International Organization of Psychophysiology (IOP). 2000; 35:143–154.
- Cacioppo JT, Hughes ME, Waite LJ, Hawkley LC, Thisted RA. Loneliness as a specific risk factor for depressive symptoms: Cross-sectional and longitudinal analyses. *Psychology and Aging*. 2006; 21:140–151. [PubMed: 16594799]
- Calkins, SD.; Hills, A. Caregiver influences on emerging emotion regulation: Biological and environmental transactions in early development. In: Gross, JJ., editor. *Handbook of Emotion Regulation*. New York: The Guilford Press; 2007. p. 229-248.
- Campos JJ, Frankel CB, Camras L. On the nature of emotion regulation. *Child Development*. 2004; 75:377–394. [PubMed: 15056194]
- Carstensen LL. Social and emotional patterns in adulthood: Support for socioemotional selectivity theory. *Psychology and Aging*. 1992; 7(3):31–338.
- Carstensen LL. The influence of a sense of time on human development. *Science*. 2006; 312:1913–1915. [PubMed: 16809530]
- Carstensen LL, Fredrickson BL. Influence of HIV status and age on cognitive representations of others. *Health Psychology*. 1998; 17:494–503. [PubMed: 9848799]
- Carstensen LL, Fung H, Charles ST. Socioemotional selectivity theory and emotion regulation in the second half of life. *Motivation and Emotion*. 2003; 27:103–123.
- Carstensen LL, Gottman JM, Levenson RW. Emotional behavior in long-term marriage. *Psychology & Aging*. 1995; 10:140–149. [PubMed: 7779311]
- Carstensen, LL.; Gross, JJ.; Fung, HH. The social context of emotional experience. In: Schaie, KW.; Lawton, MP., editors. *Annual Review of Gerontology and Geriatrics, Vol. 17. Focus on Emotion and Adult Development*. New York: Springer; 1997. p. 325-352.
- Carstensen LL, Isaacowitz DM, Charles ST. Taking time seriously: A theory of socioemotional selectivity. *American Psychologist*. 1999; 54:165–181. [PubMed: 10199217]
- Carstensen LL, Mikels JA. At the intersection of emotion and cognition: Aging and the positivity effect. *Current Directions in Psychological Science*. 2005; 14:117–121.
- Carstensen LL, Pasupathi M, Mayr U, Nesselroade JR. Emotional experience in everyday life across the adult life span. *Journal of Personality & Social Psychology*. 2000; 79:644–655. [PubMed: 11045744]
- Carstensen LL, Turk-Charles S. The salience of emotion across the adult life span. *Psychology and Aging*. 1994; 9:259–264. [PubMed: 8054174]
- Charles ST. Viewing Injustice: Age Differences in Emotional Experience. *Psychology and Aging*. 2005; 20:159–164. [PubMed: 15769221]
- Charles, ST.; Carstensen, LL. Emotion regulation and aging. In: Gross, JJ., editor. *Handbook of Emotion Regulation*. New York: Guilford Press; 2007. p. 307-327.
- Charles ST, Carstensen LL. Social and emotional aspects of aging. *Annual Review of Psychology*. (in press).
- Charles ST, Carstensen LL, McFall RM. Problem-solving in the nursing home environment: Age and experience differences in emotional reactions and responses. *Journal of Clinical Geropsychology*. Special Issue: Management of Behavioral Problems in Late Life--Therapeutic Approaches and Related Issues. 2001; 7:319–330.
- Charles ST, Luong G, Almeida DM, Ryff C, Sturm M, Love G. Fewer ups and downs: Daily stressors mediate age differences in negative affect. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*. 2010

- Charles ST, Mather M, Carstensen LL. Aging and emotional memory: The forgettable nature of negative images for older adults. *Journal of Experimental Psychology: General*. 2003; 132:310–324. [PubMed: 12825643]
- Charles ST, Piazza JR. Memories of social interactions: Age differences in emotional intensity. *Psychology and Aging*. 2007; 22:300–309. [PubMed: 17563185]
- Charles ST, Piazza J, Luong G, Almeida DM. Now You See it, Now You Don't: Age Differences in Affective Reactivity to Social Tensions. *Psychology & Aging*. 2009; 24:645–653. [PubMed: 19739920]
- Charles ST, Reynolds CA, Gatz M. Age-related differences and change in positive and negative affect over 23 years. *Journal of Personality and Social Psychology*. 2001; 80:136–151. [PubMed: 11195886]
- Cheng ST. Age and subjective well-being revisited: A discrepancy perspective. *Psychology and Aging*. 2004; 19:409–415. [PubMed: 15382992]
- Clayton, PJ.; Darvish, HS. Course of depressive symptoms following stress of bereavement. In: Barrett, J.; Klerman, GL., editors. *Stress and Mental Disorder*. New York: Raven Press; 1979. p. 121-136.
- Cohen S, Wills TA. Stress, social support, and the buffering hypothesis. *Psychological Bulletin*. 1985; 98:310–357. [PubMed: 3901065]
- Comblain C, D'Argembeau A, Van der Linden M. Phenomenal characteristics of autobiographical memories for emotional and neutral events in older and younger adults. *Experimental Aging Research*. 2005; 31:173–189. [PubMed: 15981795]
- Consedine, NS.; Magai, C. Emotional development in adulthood: A developmental functionalist review and critique. In: Hoare, C., editor. *Handbook of adult development and learning*. Oxford: Oxford University Press; 2006. p. 123-148.
- Covinsky KE, Newcomer R, Fox P, Wood J, Sands L, Dane K, Yaffe K. Patient and caregiver characteristics associated with depression in caregivers of patients with dementia. *Journal of General Internal Medicine*. 2003; 18:1006–1014. [PubMed: 14687259]
- Cutright P, Stack S, Fernquist. The age structures and marital status differences of married and not married male suicide rates: 12 developed countries. *Archives of Suicide Research*. 2006; 10:365–382. [PubMed: 16920687]
- Cutright P, Stack S, Fernquist. Marital Status Integration, Suicide Disapproval, and Societal Integration as Explanations of Marital Status Differences in Female Age-Specific Suicide Rates. *Suicide & Life-Threatening Behavior*. 2007; 37:715–724. [PubMed: 18275377]
- Davern MT, Cummins R, Stokes M. Subjective wellbeing as an affective-cognitive construct. *Journal of happiness studies: an interdisciplinary forum on subjective well-being*. 2007; 8:429–449.
- Davey A, Halverson CFJ, Zonderman AB, Costa PTJ. Change in depressive symptoms in the Baltimore Longitudinal Study of Aging. *Journals of Gerontology: Series B: Psychological Sciences and Social Sciences*. 2004; 59:270–277.
- Davidson KW, Rieckmann N, Clemow L. Coronary heart disease. *CNS Spectrums*. 2004; 9:12–13. [PubMed: 14999171]
- De Meersman RE, Stein PK. Vagal modulation and aging. *Biological Psychology*. 2006; 74:165–173. [PubMed: 17045727]
- Deschenes MR, Carter JA, Matney EN, Potter MB, Wilson MH. Aged men experience disturbances in recovery following submaximal exercise. *Journals of Gerontology, Series A: Biological Sciences and Medical Sciences*. 2006; 61:63–71.
- Deuschle M, Blum WF, Strasburger CJ, Schweiger U, Weber B, Körner A, et al. Insulin-like growth factor-1 (IGF-1) plasma concentrations are increased in depressed patients. *Psychoneuroendocrinology*. 1997; 22:493–503. [PubMed: 9373883]
- Diehl M, Coyle N, Labouvie-Vief G. Age and sex differences in strategies of coping and defense across the life span. *Psychology and Aging*. 1996; 11:127–139. [PubMed: 8726378]
- Diener, E.; Scollon, CN.; Lucas, RE. The evolving concept of subjective well-being: *The multifaceted nature of happiness*. In: Costa, PT.; Siegler, IC., editors. *Advances in cell aging and gerontology*. Vol. 15. Amsterdam: Elsevier; 2004. p. 187-220.



- Diener, E.; Suh, EM. Subjective well-being and age: An international analysis. In: Schaie, KW.; Lawton, MP., editors. *Annual review of gerontology and geriatrics*. Vol. 17. 1998. p. 304-324.
- Diener E, Suh EM, Lucas R, Smith H. Subjective well-being: Three decades of progress. *Psychological Bulletin*. 1999; 125:276–302.
- Dienstbier RA. Arousal and physiological toughness: Implications for mental and physical health. *Psychological Review*. 1989; 96:84–100. [PubMed: 2538855]
- Dotz C, Theine KJ, Uthgenannt D, Born J, Fehm HL. Basal secretory activity of the hypothalamo-pituitary-adrenocortical axis is enhanced in healthy elderly. An assessment during undisturbed night-time sleep. *European Journal of Endocrinology*. 1994; 131:443–50. [PubMed: 7952154]
- Dotson VM, Resnick SM, Zonderman AB. Differential association of concurrent, baseline, and average depressive symptoms with cognitive decline in older adults. *American Journal of Geriatric Psychiatry*. 2008; 16:318–330. [PubMed: 18378557]
- Dykstra PA. Older adult loneliness: Myths and realities. *European Journal of Ageing*. 2009; 6:91–100. [PubMed: 19517025]
- Dykstra PA, van Tilburg TG, Gierveld J. Changes in older adult loneliness; results from a seven-year longitudinal study. *Research on Aging*. 2005; 27:725–747.
- Eisenberg, H.; Hofer, C.; Vaughan, J. Effortful control and its socioemotional consequences. In: Gross, JJ., editor. *Handbook of Emotion Regulation*. New York: The Guilford Press; 2007. p. 287-306.
- Ekman, P.; Davidson, RJ., editors. *The Nature of Emotion: Fundamental Questions*. New York: Oxford University Press; 1994.
- Erikson, JM.; Erikson, EH.; Kivnick, H. *Vital involvement in old age*. New York: Norton; 1986.
- Esler M, Kaye D, Thompson J, Jennings G, Cox H, Turner A, Lambert G, Seals D. Effects of aging on epinephrine secretion and regional release of epinephrine from the human heart. *Journal of Clinical Endocrinology and Metabolism*. 1995; 80:435–442. [PubMed: 7852502]
- Eysenck HJ. Biological basis of personality. *Nature*. 1963/1998; 199:1031–1034. Republished in *Neuropsychiatry and Clinical Neuroscience* 10: 230–231. [PubMed: 14066934]
- Fernandes M, Ross M, Wiegand M, Schryer E. Are the memories of older adults positively biased? *Psychology and Aging*. 2008; 23:297–306. [PubMed: 18573004]
- Ferrari AU, Radaelli A, Centola M. *Journal of Applied Physiology*. 2003; 95:2591–2597. [PubMed: 14600164]
- Fingerman, KL.; Baker, B. Socioemotional aspects of aging. In: Wilmoth, J.; Ferraro, K., editors. *Perspectives in Gerontology*. 3. New York: Springer; 2006. p. 183-202.
- Fingerman KL, Hay EL, Birditt KS. The best of ties, the worst of ties: Close, problematic, and ambivalent relationships across the lifespan. *Journal of Marriage and Family*. 2004; 66:792–808.
- Fingerman KL, Miller L, Charles S. Saving the best for last: How adults treat social partners of different ages. *Psychology & Aging*. 2008; 23:399–409. [PubMed: 18573013]
- Fiske A, Gatz M, Pedersen N. Depressive symptoms and aging: the effects of illness and non-health-related events. *Journal of Gerontology: Psychological Sciences*. 2003; 58B:320–328.
- Folkman S, Lazarus RS, Pimley S, Novacek J. Age differences in stress and coping processes. *Psychology and Aging*. 1987; 2:171–184. [PubMed: 3268206]
- Folkow B, Svanborg A. Physiology of cardiovascular aging. *Physiological Review*. 1993; 73:725–64.
- Frankl, VE. *Man's Search for Meaning: An Introduction to Logotherapy*. New York: Simon & Schuster; 1959.
- Frazier P, Arikian N, Benson S, Losoff A. Desire for marriage and life satisfaction among unmarried heterosexual adults. *Journal of Social and Personal Relationships*. 1996; 13:225–239.
- Fredrickson BL. The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist*. 2001; 56:218–226. [PubMed: 11315248]
- Fredrickson BL, Losada MF. Positive affect and the complex dynamics of human flourishing. *American Psychologist*. 2005; 60:678–686. [PubMed: 16221001]
- Frenkel-Brunswik, E. Adjustments and reorientation in the course of the life span. In: Neugarten, BL., editor. *Middle age and aging*. Chicago: University of Chicago Press; 1968. p. 77-84.

- Frey, KS.; Ruble, DN. Strategies for comparative evaluation: Maintaining a sense of competence across the lifespan. In: Sternberg, R.J.; Kolligian, J., Jr, editors. *Competence Considered*. New Haven: Yale University Press; 1990. p. 167-189.
- Gatz, M.; Kasl-Godley, J.E.; Karel, M.J. Aging and mental disorders. In: Birren, J.E.; Schaie, K.W., editors. *Handbook of the Psychology of Aging*. 4. San Diego: Academic Press; 1996. p. 367-382.
- Ginn J, Fast J. Employment and social integration in midlife: Preferred and actual time use across welfare regime types. *Research on Aging*. 2006; 28:669-690.
- Giordano R, Bo M, Pellegino M, Vezzari M, Baldi M, Picu A, Balbo M, Bonelli L, Migliaretti G, Ghigo E, Arvat E. Hypothalamus-pituitary-adrenal hyperactivity in human aging is partially refractory to stimulation by mineralocorticoid receptor blockade. *The Journal of Clinical Endocrinology and Metabolism*. 2005; 90:5656-5662. [PubMed: 16014406]
- Glynn LM, Christenfeld N, Gerin W. The role of rumination in recovery from reactivity: cardiovascular consequences of emotional states. *Psychosomatic Medicine*. 2002; 64:714-26. [PubMed: 12271102]
- Green LR, Richardson DS, Lago T, Schatten-Jones EC. Network correlates of social and emotional loneliness in young and older adults. *Personality & Social Psychology Bulletin*. 2001; 27:281-288.
- Gross JJ. The emerging field of emotion regulation: An integrative review. *Review of General Psychology*. Special New Directions in Research on Emotion. 1998; 2:271-299.
- Gross JJ, Carstensen LL, Pasupathi M, Tsai J, Götestam Skorpen C, Hsu AYC. Emotion and aging: Experience, expression, and control. *Psychology & Aging*. 1997; 12:590-599. [PubMed: 9416628]
- Gross JJ, Levenson RW. Hiding feelings: The acute effects of inhibiting negative and positive emotion. *Journal of Abnormal Psychology*. 1997; 106:95-103. [PubMed: 9103721]
- Gross, J.J.; Thompson, R.A. Emotion regulation: Conceptual foundations. In: Gross, J.J., editor. *Handbook of emotion regulation*. New York, NY: Guilford Press; 2007. p. 3-24.
- Grühn D, Scheibe S, Baltes PB. Reduced negativity effect in older adults' memory for emotional pictures: The heterogeneity-homogeneity list paradigm. *Psychology & Aging*. 2007; 22:644-649. [PubMed: 17874962]
- Harris, P.L. Understanding emotions. In: Lewis, M.; Haviland-Jones, J.M., editors. *Handbook of emotions*. 2. New York: Guilford Press; 2000. p. 281-292.
- Hatton C. Psychosocial interventions for adults with intellectual disabilities and mental health problems. *Journal of Mental Health*. 2002; 11:357-373.
- Hawley LC, Burlinson MH, Poehlmann KM, Berntson GG, Malarkey WB, Cacioppo JT. Cardiovascular and endocrine reactivity in older females: intertask consistency. *Psychophysiology*. 2001; 38:863-72. [PubMed: 12240662]
- Hawley LC, Cacioppo JT. Aging and loneliness: Downhill quickly? *Current Directions in Psychological Science*. 2007; 16:187-191.
- Hawley LC, Masi CM, Berry JD, Cacioppo JT. Loneliness is a unique predictor of age-related differences in systolic blood pressure. *Psychology and Aging*. 2006; 21:152-64. [PubMed: 16594800]
- Hawley LC, Thisted RA, Cacioppo JT. Loneliness predicts reduced physical activity: Cross-sectional and longitudinal analyses. *Health Psychology*. 2009; 28:354-363. [PubMed: 19450042]
- Haynie DA, Berg S, Johansson B, Gatz M, Zarit SH. Symptoms of depression in the oldest old: A longitudinal study. *Journal of Gerontology: Psychological Sciences*. 2001; 56B:111-118.
- Heckhausen, J. Competence and motivation in adulthood and old age: Making the most of changing capacities and resources. In: Elliot, A.J.; Dweck, C.S., editors. *Handbook of Competence and Motivation*. New York: Guilford; 2005. p. 240-256.
- Hess TM. Memory and aging in context. *Psychological Bulletin*. 2005; 131:383-406. [PubMed: 15869334]
- Hess TM, Auman C. Aging and social expertise: The impact of trait-diagnostic information on impressions of others. *Psychology and Aging*. 2001; 16:497-510. [PubMed: 11554526]

- Hess TM, Bolstad CA, Woodburn SM, Auman C. Trait diagnosticity versus behavior consistency as determinants of impression change in adulthood. *Psychology and Aging*. 1999; 14:77–89. [PubMed: 10224633]
- Hess TM, Osowski NL, Leclerc CM. Age differences in sensitivity to diagnostic cues and the flexibility of social judgments. *Psychology and Aging*. 2005; 20:447–459. [PubMed: 16248704]
- Higgins ET. Self-discrepancy: A theory relating self and affect. *Psychological Review*. 1987; 94:319–340. [PubMed: 3615707]
- House JS, Landis KR, Umberson D. Social relationships and health. *Science*. 1988; 241:540–545. [PubMed: 3399889]
- Hrushesky WJ, Fader D, Schmitt O, Gilbertsen V. The respiratory sinus arrhythmia: A measure of cardiac age. *Science*. 1984; 224:1001–1004. [PubMed: 6372092]
- Isaacowitz DM. Motivated gaze: The view from the gazer. *Current Directions in Psychological Science*. 2006; 15:68–72.
- Isaacowitz DM, Wadlinger HA, Goren D, Wilson HR. Is there an age-related positivity effect in visual attention? A comparison of two methodologies. *Emotion*. 2006; 6:511–516. [PubMed: 16938091]
- John OP, Gross JJ. Healthy and unhealthy emotion regulation: Personality processes, individual differences, and life span development. *Journal of Personality*. Special Issue: Emotions, Personality and Health. 2004; 72:1301–1333.
- Jopp D, Rott C. Adaptation in very old age: Exploring the role of resources, beliefs, and attitudes for centenarians' happiness. *Psychology and Aging*. 2006; 21:266–280. [PubMed: 16768574]
- Jopp D, Smith J. Resources and life-management strategies as determinants of successful aging: On the protective effect of selection, optimization, and compensation. *Psychology and Aging*. 2006; 21:253–265. [PubMed: 16768573]
- Jorm AF. Does old age reduce the risk of anxiety and depression? A review of epidemiological studies across the adult life span. *Psychological Medicine*. 2000; 30:11–22. [PubMed: 10722172]
- Kennedy Q, Mather M, Carstensen LL. The role of motivation in the age-related positivity effect in autobiographical memory. *Psychological Science*. 2004; 15:208–214. [PubMed: 15016294]
- Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*. 2005; 62:593–602. [PubMed: 15939837]
- Knight M, Seymour TL, Gaunt JT, Baker C, Nesmith K, Mather M. Aging and goal-directed emotional attention: Distraction reverses emotional biases. *Emotion*. 2007; 7:705–714. [PubMed: 18039037]
- Kobau R, Safran MA, Zack MM, Moriarty DG, Chapman D. Sad, blue, or depressed days, health behaviors and health-related quality of life. Behavioral Risk Factor Surveillance System, 1995–2000. *Health Quality of Life Outcomes*. 2004; 2:1–8.
- Korkeila K, Korkeila J, Vahtera J, Kivimaki M, Kivela S, Sillanmaki L, Koskenvuo M. Childhood adversities, adult risk factors and depressiveness: A population study. *Social Psychiatry & Psychiatric Epidemiology*. 2005; 40:700–706. [PubMed: 16151596]
- Kudielka BM, Buske-Kirschbaum A, Hellhammer DW, Kirschbaum C. HPA axis responses to laboratory psychosocial stress in healthy elderly adults, younger adults, and children: Impact of age and gender. *Psychoneuroendocrinology*. 2004; 29:83–98. [PubMed: 14575731]
- Kunzmann U, Gruhn D. Age differences in emotional reactivity: The sample case of sadness. *Psychology and Aging*. 2005; 20:47–59. [PubMed: 15769213]
- Kunzmann U, Kupperbusch CS, Levenson RW. Behavioral inhibition and amplification during emotional arousal: A comparison of two age groups. *Psychology and Aging*. 2005; 20:144–158. [PubMed: 15769220]
- Kunzmann U, Richter D. Emotional reactivity across the adult life span: The cognitive pragmatics make a difference. *Psychology of Aging*. 2009; 24:879–889.
- Labouvie-Vief G. Dynamic Integration: Affect, Cognition, and the Self in Adulthood. *Current Directions in Psychological Science*. 2003; 12:201–206.

- Labouvie-Vief G, Diehl M, Jain E, Zhang F. Six-year change in affect optimization and affect complexity across the adult life span: A further examination. *Psychology and Aging*. 2007; 22:738–751. [PubMed: 18179294]
- Lachman M, Rocke C, Rosnick C, Ryff CD. Realism and illusion in Americans' temporal views of their life satisfaction: Age differences in reconstructing the past and anticipating the future. *Psychological Science*. 2008; 9:889–897. [PubMed: 18947354]
- Lang FR. Regulation of social relationships in later adulthood. *Journal of Gerontology: Psychological Sciences*. 2001; 56B:1–6.
- Lang FR, Carstensen LL. Time counts: Future time perspective, goals and social relationships. *Psychology and Aging*. 2002; 17:125–139. [PubMed: 11931281]
- Langa KM, Chernew ME, Kabeto MU, Herzog AR, Ofstedal MB, Willis RJ, Wallace RB, Mucha LM, Straus WL, Fedrick AM. National estimates of the quantity and cost of informal caregiving for the elderly with dementia. *Journal of General Internal Medicine*. 2001; 16:770–778. [PubMed: 11722692]
- Lansford JE, Sherman AM, Antonucci TC. Satisfaction with social networks: An examination of socioemotional selectivity theory across cohorts. *Psychology and Aging*. 1998; 13:544–552. [PubMed: 9883455]
- Lawton MP, Kleban MH, Rajagopal D, Dean J. Dimensions of affective experience in three age groups. *Psychology and Aging*. 1992; 7:171–184. [PubMed: 1610505]
- Leclerc CM, Hess TM. Age differences in the bases for social judgments: Tests of a social expertise perspective. *Aging Research*. 2007; 33:95–120.
- Lefkowitz ES, Fingerma KL. Positive and negative emotional feelings and behaviors in mother-daughter ties in late life. *Journal of Family Psychology*. 2003; 17:607–617. [PubMed: 14640809]
- Levenson, RW. Expressive, physiological, and subjective changes in emotion across adulthood. In: Qualls, SH.; Abeles, N., editors. *Psychology and the aging revolution: How we adapt to longer life*. Washington, D.C: American Psychological Association; 2000. p. 123-140.
- Levenson RW, Carstensen LL, Friesen WV, Ekman P. Emotion, physiology, and expression in old age. *Psychology & Aging*. 1991; 6:28–35. [PubMed: 2029364]
- Löckenhoff CE, Carstensen LL. Socioemotional selectivity theory, aging, and health: The increasingly delicate balance between regulating emotions and making tough choices. *Journal of Personality*. 2004; 72:1395–1424. [PubMed: 15509287]
- Löckenhoff CE, Carstensen LL. Aging, emotion, and health-related decision strategies: Motivational manipulations can reduce age differences. *Psychology and Aging*. 2007; 22:134–146. [PubMed: 17385990]
- Löckenhoff CE, Carstensen LL. Decision strategies in health care choices for self and others: Older but not younger adults make adjustments for the age of the decision target. *Journals of Gerontology: Psychological Sciences*. 2008; 63:106–109.
- Lucas RE. Adaptation and the set-point model of subjective well-being: Does happiness change after major life events? *Current Directions in Psychological Science*. 2007; 16:75–79.
- Lyubomirsky S. Why are some people happier than others? The role of cognitive and motivational processes in well-being. *American Psychologist*. 2001; 56:239–249. [PubMed: 11315250]
- Lyubomirsky S, King LA, Diener E. The benefits of frequent positive affect: Does happiness lead to success? *Psychological Bulletin*. 2005; 131:803–855. [PubMed: 16351326]
- Magai, C. Emotions over the lifespan. In: Birren, JE.; Schaie, KW., editors. *Handbook of the psychology of aging*. 5. San Diego, CA: Academic Press; 2001. p. 310-344.
- Magai C, Consedine NS, Krivoshekova YS, Kudadjie-Gyamfi E, McPherson R. Emotion experience and expression across the adult life span: Insights from a multimodal assessment study. *Psychology and Aging*. 2006; 21:303–317. [PubMed: 16768577]
- Maslow AH. A theory of human motivation. *Psychological Review*. 1943; 50:370–396.
- Mather M, Carstensen LL. Aging and attentional biases for emotional faces. *Psychological Science*. 2003; 14:409–415. [PubMed: 12930469]
- Mather M, Carstensen LL. Aging and motivated cognition: The positivity effect in attention and memory. *Trends in Cognitive Sciences*. 2005; 9:496–502. [PubMed: 16154382]

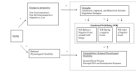
- Mather M, Knight M. Goal-directed memory: The role of cognitive control in older adults' emotional memory. *Psychology and Aging*. 2005; 20:544–570.
- Mauss IB, Cook CL, Gross JJ. Automatic emotion regulation during an anger provocation. *Journal of Experimental Social Psychology*. 2007; 43:698–711.
- Miller MA, Rahe RH. Life changes scaling for the 1990s. *Journal of Psychosomatic Research*. 1997; 43:279–292. [PubMed: 9304554]
- Mroczek DK, Almeida DM. The effect of daily stress, personality, and age on daily negative affect. *Journal of Personality*. 2004; 72:355–378. [PubMed: 15016068]
- Mroczek DK, Kolarz CM. The effect of age on positive and negative affect: A developmental perspective on happiness. *Journal of Personality & Social Psychology*. 1998; 75:1333–1349. [PubMed: 9866191]
- Mroczek DK, Spiro A III. Modeling intraindividual change in personality traits: Findings from the Normative Aging Study. *Journals of Gerontology: Psychological Sciences*. 2003; 58B:153–165.
- Mroczek DK, Spiro A III. Change in life satisfaction over 20 during adulthood: Findings from the VA Normative Aging Study. *Journal of Personality and Social Psychology*. 2005; 88:189–202. [PubMed: 15631584]
- Mroczek, DK.; Spiro, A.; Griffin, PW.; Neupert, S. Social Influences on Adult Personality, Self-Regulation and Health. In: Schaie, KW.; Carstensen, L., editors. *Social structures, aging and self-regulation*. New York: Springer; 2006. p. 69-84.
- Neugebauer A, Katz PP, Pasch LA. Effect of valued activity disability, social comparisons, and satisfaction with ability on depressive symptoms in rheumatoid arthritis. *Health Psychology*. 2003; 22:253–262. [PubMed: 12790252]
- Neupert S, Almeida DM, Charles ST. Age differences in reactivity to daily stressors: The role of personal control. *The Journals of Gerontology: Psychological Sciences*. 2007; 62:216–225.
- Nicolson N, Storms C, Ponds R, Sulon J. Salivary cortisol levels and stress reactivity in human aging. *Journals of Gerontology: Medical Sciences*. 1997; 52A:68–75.
- Nolen-Hoeksema S, Ahrens C. Age differences and similarities in the correlates of depressive symptoms. *Psychology & Aging*. 2002; 17:116–124. [PubMed: 11931280]
- Ong AD, Bergeman CS. The complexity of emotions in later life. *Journal of Gerontology: Psychological Sciences*. 2004; 59:117–122.
- Otte C, Hart S, Neylan TC, Marmar CR, Yaffe K, Mohr DC. A meta-analysis of cortisol response to challenge in human aging: Importance of gender. *Psychoneuroendocrinology*. 2005; 30:80–91. [PubMed: 15358445]
- Piazza, J.; Charles, ST. Mental health and the baby boomers. In: Whitbourne, SK.; Willis, SL., editors. *The baby boomers at midlife: Contemporary perspectives on middle age*. New Jersey: Lawrence Erlbaum Associates; 2006. p. 111-146.
- Phillips LH, Henry JD, Hosie JA, Milne AB. Age, anger regulation and well-being. *Aging and Mental Health*. 2006; 10:250–256. [PubMed: 16777652]
- Pinquart M. Correlates of subjective health in older adults: a meta-analysis. *Psychology & Aging*. 2001; 16:414–426. [PubMed: 11554520]
- Riediger M, Schmiedek F, Wagner GG, Lindenberger U. Seeking pleasure and seeking pain. *Psychological Science*. 2009; 20:1529–1535. [PubMed: 19891749]
- Ritvanen T, Louhevaara V, Helin P, Väisänen S, Hänninen O. Responses of the autonomic nervous system during periods of perceived high and low work stress in younger and older female teachers. *Applied Ergonomics*. 2006; 37:311–318. [PubMed: 16171770]
- Robinson-Whelen S, Tada Y, MacCallum RC, McGuire L, Kiecolt-Glaser JK. Long-term caregiving: What happens when it ends? *Journal of Abnormal Psychology*. 2001; 110:573–584. [PubMed: 11727947]
- Rook KS. Emotional health and positive versus negative social exchanges: A daily diary analysis. *Applied Developmental Science*. 2001; 5:86–97.
- Rook, KS.; Mavandadi, S.; Sorkin, DH.; Zettel, LA. Optimizing social relationships as a resource for health and well-being in later life. In: Aldwin, CM.; Park, CL.; Spiro, A., III, editors. *Psychology of aging and health*. New York: Guilford; 2007.

- Rosenkoetter MM, Garris JM, Engdahl RA. Postretirement use of time: Implications for preretirement planning and postretirement management. *Activities, Adaptation & Aging*. 2001; 25:1–18.
- Rothermund K, Brandstadter J. Coping with deficits and losses in later life: From compensatory action to accommodation. *Psychology and Aging*. 2003; 18:896–905. [PubMed: 14692874]
- Ryff CD. Possible selves in adulthood and old age: A tale of shifting horizons. *Psychology and Aging*. 1991; 6:286–295. [PubMed: 1863398]
- Ryff CD, Keyes CLM. The structure of psychological well-being revisited. *Journal of Personal and Social Psychology*. 1995; 69:719–727.
- Ryff CD, Singer BH. Best news yet on the six-factor model of well-being. *Social Science Research*. 2006; 35:1103–1119.
- Sandercock GR, Brodie DA. The role of heart rate variability in prognosis for different modes of death in chronic heart failure. *Pacing and Clinical Electrophysiology*. 2006; 29:892–904. [PubMed: 16923007]
- Sapolsky RM, Krey LC, McEwen BS. The neuroendocrinology of stress and aging: The glucocorticoid cascade hypothesis. *Endocrinological Review*. 1986; 7:284–301.
- Seals DR, Dinneno FA. Collateral damage: cardiovascular consequences of chronic sympathetic activation with human aging. *American Journal of Physiology: Heart and Circulatory Physiology*. 2004; 287:1895–1905.
- Scheier MF, Carver CS. Self-focused attention and the experience of emotion: Attraction, repulsion, elation, and depression. *Journals of Personality and Social Psychology*. 1977; 35:625–636.
- Schieman S. Age and anger. *Journal of Health & Social Behavior*. 1999; 40:273–289. [PubMed: 10513148]
- Schulz R, Beach SR. Caregiving as a risk factor for mortality: The Caregiver Health Effects Study. *JAMA: The Journal of the American Medical Association*. 1999; 282:2215–2219. [PubMed: 10605972]
- Schulz R, Beach SR, Lind B, Martire LM, Zdaniuk B, Hirsch C, et al. Involvement in caregiving and adjustment to death of a spouse: Findings from the caregiver health effects study. *JAMA: Journal of the American Medical Association*. 2001; 285:3123–3129.
- Schulz R, O'Brien AT, Bookwala J, Fleissner K. Psychiatric and physical morbidity effects of Alzheimer's Disease caregiving: Prevalence, correlates, and causes. *The Gerontologist*. 1995; 35:771–791. [PubMed: 8557205]
- Seeman TE, Robbins RJ. Aging and hypothalamic-pituitary-adrenal response to challenge in humans. *Endocrine Review*. 1994; 15:233–260.
- Sheldon JP. Age and gender differences in the sources of self-evaluation valued by adult athletes. *Journal of Adult Development*. 2004; 11:47–54.
- Sheldon KM, Lyubomirsky S. Is it possible to become happier? (And, if so, how?). *Social and Personality Psychology Compass*. 2007; 1:129–145.
- Smith DP, Hillman CH, Duley AR. Influences of age on emotional reactivity during picture processing. *Journals of Gerontology: Series B: Psychological Sciences and Social Sciences*. 2005; 60:49–56.
- Smith TW, Berg CA, Florsheim P, Uchino BN, Pearce G, Hawkins M, Henry NJM, Beveridge R, Skinner M, Olsen-Cerny C. Conflict and collaboration in middle-aged and older married couples: I: Age differences in agency and communion during marital interaction. *Psychology and Aging*. 2009; 24:259–273. [PubMed: 19485646]
- Smith J, Borchelt M, Maier H, Jopp D. Health and well-being in the young old and oldest old. *Journal of Social Issues*. 2002; 58:715–732.
- Sorkin D, Rook KS. Dealing with negative social exchanges in later life: coping responses, goals, and effectiveness. *Psychology & Aging*. 2006; 21:715–725. [PubMed: 17201492]
- Spaniol J, Voss A, Grady CL. Aging and emotional memory: cognitive mechanisms underlying the positivity effect. *Psychology & Aging*. 2008; 23:859–872. [PubMed: 19140656]
- Stawski RS, Almeida DM, Lachman ME, Rosnick DB, Tun PA. Cognitive resources and exposure and emotional reactivity to daily stressors: Findings from the MIDUS study. *Psychology and Aging*. 2010; 25:330–342. [PubMed: 20545418]

- Stegge, H.; Terwogt, MM. Awareness and regulation of emotion in typical and atypical development. In: Gross, JJ., editor. *Handbook of Emotion Regulation*. New York: The Guilford Press; 2007. p. 269-286.
- Story TN, Berg CA, Smith TW, Beveridge R, Henry NJM, Pearce G. Age, marital satisfaction, and optimism as predictors of positive sentiment override in middle-aged and older married couples. *Psychology and Aging*. 2007; 24(4):719–727. [PubMed: 18179292]
- Taylor JA, Hayano J, Seals DR. Lesser vagal withdrawal during isometric exercise with age. *Journal of Applied Physiology*. 1995; 79:805–811. [PubMed: 8567521]
- Thase ME, Callan JA. The role of homework in cognitive behavior therapy of depression. *Journal of Psychotherapy Integration*. 2006; 16:162–177.
- Thompson, RA. Emotion regulation: A theme in search of definition. In: Fox, NA., editor. *The development of emotion regulation and dysregulation: Biological and behavioral aspects*. Monographs of the Society for Research in Child Development. Vol. 59. 1994. p. 25-52. (Serial no. 240)
- Thompson, RA.; Meyer, S. Socialization of emotion regulation in the family. In: Gross, JJ., editor. *Handbook of emotion regulation*. New York: The Guilford Press; 2007. p. 249-268.
- Traustadottir T, Bosch PR, Matt KS. The HPA axis response to stress in women: effects of aging and fitness. *Psychoneuroendocrinology*. 2005; 30:392–402. [PubMed: 15694119]
- Tsai JL. Cultural causes and behavioral consequences. *Perspectives on Psychological Science*. 2007; 2:242–259.
- Tsai JL, Levenson RW, Carstensen LL. Autonomic, subjective, and expressive responses to emotional films in older and younger Chinese Americans and European Americans. *Psychology & Aging*. 2000; 15:684–693. [PubMed: 11144327]
- Uchino BN, Birmingham W, Berg CA. Are older adults less or more physiologically reactive? A meta-analysis of age-related differences in cardiovascular reactivity to laboratory tasks. *Journal of Gerontology: Psychological Sciences*. 2010; 65:154–62.
- Uchino BN, Holt-Lunstad J, Bloor LE, Campo RA. Aging and cardiovascular reactivity to stress: Longitudinal evidence for changes in stress reactivity. *Psychology and Aging*. 2005; 20:134–143. [PubMed: 15769219]
- Uchino BN, Kiecolt-Glaser JK, Cacioppo JT. Age-related changes in cardiovascular response as a function of a chronic stressor and social support. *Journal of Personality & Social Psychology*. 1992; 63:839–846. [PubMed: 1447696]
- Uchino B, Berg CA, Smith TS, Pearce G, Skinner M. Age-related differences in ambulatory blood pressure during daily stress: Evidence for greater blood pressure reactions in older individuals. *Psychology and Aging*. 2006; 21:231–239. [PubMed: 16768571]
- Uchino BN, Uno D, Holt-Lunstad J, Flinders JB. Age-related differences in cardiovascular reactivity during acute psychological stress in men and women. *Journals of Gerontology: Series B: Psychological Sciences and Social Sciences*. 1999; 54:339–346.
- Wagner BM, Compas BE, Howell DC. Daily and major life events: A test of an integrative model of psychosocial stress. *American Journal of Community Psychology*. 1988; 16:189–205. [PubMed: 3407632]
- Watson TL, Blanchard-Fields F. Thinking with your head and your heart: Age differences in everyday problem-solving strategy preferences. *Aging, Neuropsychology, & Cognition*. 1998; 5:225–240.
- Wilkinson CW, Peskind ER, Raskind MA. Decreased hypothalamic-pituitary-adrenal axis sensitivity to cortisol feedback inhibition in human aging. *Neuroendocrinology*. 1997; 65:79–90. [PubMed: 9032777]
- Wilkinson CW, Petrie EC, Murray SR, Colasurdo EA, Raskind MA, Peskind ER. Human glucocorticoid feedback inhibition is reduced in older individuals: Evening study. *The Journal of Clinical Endocrinology & Metabolism*. 2001; 86:545–550. [PubMed: 11158007]
- Wirtz PH, Redwine LS, Baertschi C, Spillmann M, Ehlert U, von Kanel R. Coagulation activity before and after acute psychosocial stress increases with age. *Psychosomatic Medicine*. 2008; 70:476–481. [PubMed: 18480193]

- Young, J.E.; Beck, A.T.; Weinberger, A. Depression. In: Barlow, D.H., editor. *Clinical handbook of psychological disorders: a step-by-step treatment manual*. 2. New York: Guilford Press; 1993. p. 240-277.
- Zautra, A.J. *Emotions, Stress, and Health*. New York: Oxford University Press; 2003.
- Zisook S, Shuchter SR. Early psychological reaction to the stress of widowhood. *Psychiatry: Journal for the Study of Interpersonal Processes*. 1991; 54:320–333.





**Figure 1.**  
A model of strength and vulnerability integration (SAVI).