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Testing a Values-Based Approach to Healthcare Decision-Making in Older Adults

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TESTING A VALUES-BASED APPROACH TO HEALTHCARE DECISION-MAKING IN OLDER ADULTS

DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Arts and Sciences
at the University of Kentucky

By

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ABSTRACT OF DISSERTATION

TESTING A VALUES-BASED APPROACH TO HEALTHCARE DECISION-MAKING IN OLDER ADULTS

Despite natural declines in physical and cognitive function, older adults maintain good emotion regulation abilities, leading to emotional wellbeing and resilience. This phenomenon can partially be explained by socioemotional selectivity theory (SST), which posits that when time is perceived as a limited resource, older adults focus attention on positive environmental stimuli to regulate emotions. Although this positivity effect maintains emotional wellbeing, it may disrupt information processing related to healthcare decision-making. Older adults request less information from their doctors, are less likely to ask for a second opinion, make their decisions more quickly, and devote more attention to positive medical information, compared with younger adults. These age effects are temporarily reversible when older adults are primed to reduce their emotional focus or increase the amount of information they gather. However, this leads to reductions in positive affect and may reduce self-regulatory capacities required for emotion regulation. Personal values have been studied in the context of information processing and decision-making. Emphasizing personal values increases positive affect, counteracts self-regulatory fatigue, and reduces defensiveness when processing health information. Despite the relevance of personal values to older adults, the effects of personal values have not been studied in research on healthcare decision-making and aging.

The present study employed a laboratory-based healthcare decision-making task to examine the effects of three writing tasks (control, information-gathering, and values) on the decision-making process in older adults (n=90) compared to race/gender-matched younger adults (n=90). Participants also completed self-report questionnaires on physical and psychological wellbeing, a behavioral task measuring self-regulatory strength, and neuropsychological measures.

The present study found that older adults reviewed more positive information when selecting a health plan and physician, and recalled their physician choice more positively compared to younger adults. Older adults took significantly longer and reviewed more information when selecting a health plan and physician compared to younger adults. However, there were no significant effects for writing task condition. Significant age-related differences in information processing were partially accounted for

by baseline affect and future time perspective. These results offer support for the positivity effect in older adults when reviewing health-related information. Null findings associated with values-based writing task highlight experimental complexities when examining age-related differences and provide additional avenues for future research.

KEYWORDS: Emotion regulation, Information processing,
Decision-making, Aging,
Personal values.

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March, 1, 2017
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Chapter 1: Introduction

The United States is on the brink of a major demographic shift. By 2030, as baby boomers age, older adults will account for approximately 20% of the U.S. population. This shift has been called the "silver tsunami" and is viewed as a potential health crisis (CDC, 2013). Both researchers and laypeople have viewed aging as a progressive decline in mental and physical faculties, and rightly so. Natural aging is associated with decreases in visual, olfactory, auditory, and tactile abilities (see Nusbaum, 1999 for a review). Older adults deal with polypharmacy to manage a growing list of health problems (e.g., Hajjar et al., 2007). Cognitively, aging is associated with memory decline, forgetfulness, Alzheimer's disease, and other forms of dementia (Park et al., 2002). In the midst of these difficulties, older adults must also cope with a shrinking social network as friends and family pass away or move away (e.g., Arbuckle et al., 1992; Seeman et al., 2001). No wonder aging is viewed as such an unpleasant period of development, or rather regression, in the lifespan.

This stereotypically dismal portrayal of aging ignores a growing body of literature suggesting that older adults maintain and even improve emotional functioning compared with younger adults. In a sample of adults ranging from 18 to 85 years old, self-reported happiness was highest among individuals in their seventies (Stone et al., 2010). Older adults report experiencing more positive affect and less negative affect compared to younger adults (Stawski et al., 2008). Longitudinal studies have found that aging is related to increases in subjective well-being (Cacioppo et al., 2008). Clinically speaking, epidemiological studies have found that rates of depression and anxiety decline with age (Henderson et al., 1998). This sustained emotional wellbeing in spite of the physiological

declines of aging is known as the paradox of aging and is believed to be largely attributable to changes in emotion regulation strategies

Socioemotional Selectivity Theory

Multiple models have emerged to explain emotional functioning in older adults. A model that set the framework for future theories, called socioemotional selectivity theory (SST; Carstensen et al., 1999), incorporates time perception to understand goal prioritization and emotional functioning in older adults. Specifically, SST posits that two distinct types of goals are prioritized based on time perception. Information-based goals include acquiring knowledge for future use and are prioritized when time is perceived to be expansive. For example, a healthy older adult expecting to live another twenty years may be more likely to meet with a new financial advisor to discuss future investments. Emotion-based goals include valued actions with emotional significance, and are prioritized when time is perceived to be limited. An older adult with failing health may be less likely to meet with a financial advisor to discuss future investments because there may not be a long future remaining to him or her. Instead, time will more likely be spent with close family and friends who provide pleasure in the time that is guaranteed—the present moment. In general, older adults are more likely than younger adults to prioritize behavioral and cognitive emotion regulation strategies that serve emotion-based goals and wellbeing rather than information-based goals (Carstensen et al., 1999).

Emotion Regulation in Older Adulthood

Emotion regulation includes the processes of controlling and expressing emotions (Gross, 1998). The process model of emotion regulation identifies cognitive and behavioral strategies for changing one's emotions before, during, and after an event.

Older adults effectively utilize social, motivational, and cognitively based strategies to maintain emotional well-being and carry out emotion-focused goals.

For example, older adults are strategic in the way they select and interact with social partners. A series of studies found that older adults prefer emotionally meaningful interactions. A social preference card sorting task found that older participants preferred to interact with partners high in expected affective potential compared to partners high in expected (1) future contact or (2) acquisition of new information. Younger adults did not show a preference across these three dimensions. In an effort to show that this was not simply due to aging, a follow-up study compared preferences of young adult males who were HIV-negative, HIV-positive but asymptomatic, and HIV-positive and symptomatic. The symptomatic HIV-positive group preferred partners high in affective potential, mirroring the pattern of results seen in older adults (Carstensen & Frederickson, 1998). This supports the assertion that time perception, not just aging, drives the prioritization of emotion-focused relationships.

Similar patterns of findings emerge when participants are asked to imagine a limited or expansive future. When older adults are asked to imagine their future as more expansive (i.e., new medical advances will extend your life by twenty years), they no longer prefer high-affective-potential partners. When younger adults are asked to imagine an impending ending (i.e., leaving family and friends with a permanent cross country move), they prefer high-affective-potential partners (Fung et al., 1999; Segerstrom et al., 2016). Taken together, these findings emphasize the importance of emotionally relevant relationships to individuals with more limited future time perspective.

This reprioritization of emotionally meaningful social relationships impacts older adults' social networks and how they interact with partners in those networks. Older adults intentionally reduce the size of their social networks by focusing on relationships that provide the most meaning in life (e.g., Carstensen et al., 2003). Despite having smaller social networks than younger adults, older adults report greater satisfaction with their current social network compared to younger adults. In this way, older adults actively choose to engage in social events that bring pleasure and avoid social events that may be emotionally draining (Blanchard-Fields et al., 2004). Similarly, older adults avoid confrontation with others (including close relationships) more frequently compared to younger adults, leading to lower levels of negative affect (Birditt & Fingerman, 2005; Charles et al., 2009). Older adult couples report less severe conflict and greater enjoyment in their marriage compared to younger couples (Levenson et al., 1993).

From a motivational perspective, age-related differences have been found in the context of contra-hedonic (the desire to maintain negative affect and reduce positive affect) and prohedonic (the desire to maintain positive affect or reduce negative affect) motivation. It is easy to assume that everyone is prohedonically motivated in an effort to maximize well-being at all times (Larsen, 2000). However, there are times when an increase in negative affect is useful (e.g., Tamir et al., 2008). Anger toward social injustice may help fuel the passion necessary to seek out societal change. There are also times when a decrease in positive affect is effective (e.g., Gruber et al., 2011; Mauss et al., 2011). For example, reducing one's feelings of happiness may increase empathy and concern for a friend struggling with the loss of a loved one. Although there are advantages to both contra-hedonic and prohedonic motivations, prohedonic motivations

occured most frequently in older adults. On the other hand, contra-hedonic motivations occurred more frequently in adolescence (Riediger et al., 2009). Emotion-focused goals are particular important to older adults, as demonstrated by the shift to prohedonic motivations in later life.

From a cognitive perspective, older adults exhibit an attentional focus on positive information, known as the positivity effect (Kennedy et al., 2004; Knight et al., 2007; Isaacowitz et al., 2008; see Reed and Carstensen, 2012, for review). Examples include actively attending to and recalling positive information over negative information (e.g. Charles, Mather, & Carstensen, 2003), recalling consumer decisions more positively (Mather & Johnson, 2000), and recalling autobiographical memories as more positive, compared to younger adults. These strategies bolster present-moment emotional wellbeing (Gallo, Korthauer, McDonough, Teshale, and Johnson, 2011) and help to explain why older adults report greater day-to-day emotional wellbeing compared with younger individuals (Riediger et al., 2009).

Positivity Effect and Decision-Making

Despite older adults' ability to maintain emotional wellbeing, the aforementioned maintenance strategies may be maladaptive in some decision-making scenarios. In healthcare, patients are often required to make decisions based on negative information that has future-oriented implications (e.g., the discovery of an illness, general health decline, etc.). When making these decisions, it is important to process both positive and negative information with the future in mind in order to make the most informed decision possible. Given the tendency for older adults to focus on positive information and

emotion-focused, present-moment goals, they may be at a disadvantage when making healthcare decisions.

Before making a healthcare decision, it is critical to gather information and be well informed. However, older adults' focus on emotional wellbeing leads to a reduction in information gathering. When choosing hypothetical healthcare treatments in the lab, older adults requested less information and made their decisions more quickly than young adults (Meyer, Russo, & Talbot, 1995; Zwahr et al., 1999). Older adults also request less information from their doctors, are less likely to ask for a second opinion, and take less time to review medication labels, later leading to more errors (Cassileth, Zupkis, Sutton-Smith, and March, 1980; Deber, Kraetschmer, & Irvine, 1996; Morrell, Park, & Poon, 1989; Petrisek, Laliberte, Allen & Mor, 1997). Although no studies have determined whether this is a cohort effect, these well-documented patterns suggest that older adults are not making medical decisions with all relevant information, increasing the potential for error.

The positivity effect may further hamper older adults' ability to encode the necessary information before making a healthcare decision. When choosing between healthcare plans, older adults reviewed more positive information and remembered more positive aspects about their choice compared with young adults. However, this age effect was erased when older adults were asked to focus on information-gathering while making their decision (Lockenhoff & Carstensen, 2007). A similar result was found when older adults were asked to pick a health insurance plan for a younger individual. Older adults reduced their focus on positive information, but reported a less positive emotional

experience as a result (Lockenhoff & Carstensen, 2008). This suggests that older adults are able to modify decision-making strategies, but at an emotional cost.

Decision-Making and Self-Regulation

The link between decision-making and self-regulation may explain why employing new decision-making strategies may be costly for older adults. Decision-making draws on the general capacity for self-regulation, or the ability to control one's thoughts, impulses, behaviors, and emotions (Baumeister et al., 1998; Vohs et al., 2008). Research suggests that self-regulation is a fatigable resource. As with muscles, use will lead to fatigue: temporarily decreasing the ability to further self-regulate (strength model of self-control: e.g., Baumeister et al., 1998; Baumeister & Heatherton, 1996; Baumeister et al., 2007). Engaging in behaviors that are not habitual can particularly fatigue self-regulatory abilities, although some findings question the overall strength of this effect (Carter et al., 2015).

Although priming older adults to gather information results in more balanced processing, this is a strategy they are less apt to use in daily life. One study found that older adults actually made worse healthcare choices in an information-focused condition compared with an emotion-focused condition (Mikels et al., 2010). These results should come as no surprise, given that older adults do not habitually focus on information gathering. One strategy to stave off self-regulatory fatigue is to modify one's motivation. People who focused on the monetary reward for their performance on a difficult task were less fatigued compared to individuals focusing solely on the task itself (Baumeister et al., 2005). The effects of mental fatigue are negated when an individual's motivational state is high, particularly when the locus of control is internal (Hagger et al., 2010). In

other words, individuals who are intrinsically motivated during a difficult task are more resilient to self-regulatory fatigue. The question becomes, how can information-gathering also be an internally motivated and, therefore, less fatiguing process for older adults?

Personal Values and Decision-Making

The answer may be increasing an emphasis on personal values. Writing about personal values counteracts self-regulatory fatigue in depleting laboratory tasks (Schmeichel & Vohs, 2009) and fosters emotional wellbeing. Values, generally defined as personal choices about what is most important in life (such as being a good friend, a hard-worker, or a good parent), drive meaningful human behavior. Personal values are a linchpin of Acceptance and Commitment Therapy (ACT; Hayes, Strosahl & Wilson, 1999, 2011), an acceptance-based therapy designed to reduce avoidance and promote healthy behaviors (Hayes et al., 2004). Using values-based exercises reduces avoidance behaviors and promotes activities leading to a life that feels meaningful and satisfying. In a laboratory setting, expressing personal values results in self-affirmation, increased self worth, and bolstered feelings of integrity (Steele, 1988).

Personal values have been studied in the context of information processing and decision-making. Women explicitly identifying personal values in a hypothetical cancer treatment decision task reviewed more information, reviewed the information more frequently, reported less decisional conflict, and reported lower ambivalence levels about their choice (Abhyankar et al., 2010). Men with security (safety of society, relationships, and the self) as a high-ranking value were more likely to seek out screening tests for prostate cancer (Aavik et al., 2014). In the lab, writing tasks have been shown to be a powerful induction that is frequently used in values-based and self-affirmation literature

(Harris, 2011). In addition to increasing positive affect, values-based writing inductions have been shown to influence the way people process threatening health information and increase readiness to change health behaviors (Harris & Epton, 2009). Prior to reading an article about the ill effects of tobacco, a cohort of smokers was asked to write about personal values. Smokers who wrote about their most important personal value reported higher levels of positive affect and higher levels of acceptance of the tobacco-related information compared with the control group. Additionally, smokers in the values-based condition reported feeling more connected, less ashamed, and more proud after reading the article compared with the control condition (Crocker et al., 2008). A similar study found that writing about values prior to reading a pamphlet on the link between alcohol abuse and breast cancer changed the reaction of high-risk women. The values-based group reported acceptance and a greater desire to change their drinking behavior compared with the control group (Harris and Napper, 2005).

Self-affirmation theory explains non-acceptance of threatening information as a means to maintain an intact sense of self and maintain self-esteem (Steele, 1988). It is believed that values-based inductions redirect attention away from the self and onto deeply held values (Crocker et al., 2008). Writing about values promotes cognitions critical for behavior change (i.e., acceptance and greater desire to change). However, there is a difference in thinking about changing behavior and actual behavior change. Evidence for longer-term behavior change due to values-based writing tasks is mixed, with one study finding that participants improved their diet one week after a values lab induction (Epton & Harris, 2008). Nevertheless, a values-based approach is relevant, as it increases readiness to change, which must occur for future behavior change.

Values and values-based exercises impact the decision-making process. However, a recent meta-analysis of 59 laboratory studies examining individual components of ACT found only one with older adults (Levin, Hildebrandt, Lillis, & Hayes, 2012), even though older adults appear to be excellent candidates for such an intervention. Values have been repeatedly shown to be of importance to older adults. Family relationships were found to be a key factor in changing unhealthy drinking behaviors in aging adults (del Pino et al., 2013). Older adults had differing attitudes toward end of life treatment depending on their religious values (Ejaz, 2014). Additionally, older adults are more engaged in reviewing information when the topic is personally meaningful (Hess & Queen, 2013). When a topic is not personally meaningful, older adults use simpler decision-making strategies (Hess, Queen, & Ennis, 2013). Finally, older adults' general life satisfaction and purpose in life have been linked to engaging in personally meaningful activities (Eakman et al., 2010; Robinson, 2013).

Although accurate healthcare decision-making is self-relevant, SST posits that emotional wellbeing may be a higher priority for older adults but may not align with fully informed health choices. Despite the importance of values to older adults, the effects of personal values-based exercises have not been studied in research on healthcare decision-making in older adults. Integrating values into older adults' healthcare decision-making may increase emotional wellbeing, counteract self-regulatory depletion associated with making decisions, and improve information processing.

Purpose of the Present Study

The present study incorporates personal values to eliminate the positivity effect when reviewing health-related information while maintaining emotional wellbeing in

older adults. I hypothesize that older adults who focus on personal values before processing health-related information will experience more positive affect and process information in a more balanced way. The present study employed a laboratory-based healthcare decision-making task to examine the effects of three writing tasks (control, information-gathering, and values) on the decision-making process in older adults compared to race/gender-matched younger adults. Prior to the decision-making task, participants were asked to write about the importance of collecting information in their life, the importance of their top value in their life, or the importance of their lowest rated value in someone else's life (control). The following hypotheses were tested:

1. There will be a two-way interaction between condition and age group such that older adults will (1) make decisions more quickly, (2) review more positive information, (3) recall more positive information, and (4) be more satisfied with their choice compared with the younger group in the control but not the information-gathering or values conditions.

2. There will be a two-way interaction between condition and age group such that older adults will report decreased levels of emotional wellbeing compared with younger adults in the information-gathering condition but not the control or values condition. Additionally, the values-based condition will result in higher levels of emotional wellbeing for older adults compared with all other conditions among older adults.

3. There will be a two-way interaction between condition and age group such that older adults will show greater self-regulatory fatigue in the

information-gathering condition compared with younger adults, but not in the control condition. Despite attending to more information, the values-based condition will result in less self-regulatory fatigue compared with the information-gathering condition.

Chapter 2: Methods

Participants

Ninety community-dwelling older adults between 60 and 85 years of age and 90 younger adults between 18 and 25 years of age enrolled in the study. In order to be eligible, research participants could not have any neurological conditions (e.g. Alzheimer's Disease, dementia, or related forms of mild cognitive impairment). Prior to participating, interested individuals confirmed they did not have a formal diagnosis related to cognitive impairment. Older adults were recruited from multiple volunteer databases within the University of Kentucky and UK Healthcare system. The Sanders-Brown Center on Aging, a multidisciplinary research and clinical facility, maintains a database of older adults in Lexington, KY who have expressed interest in volunteering for research studies. UK Healthcare Women's Health Registry is a volunteer database for women in the state of Kentucky who have expressed interest in participating in research studies. Finally, the University of Kentucky's Osher Lifelong Learning Institute (OLLI) offers enrichment and educational learning opportunities for older adults. OLLI administrators included study details in a monthly email newsletter, directing interested parties to contact the researcher.

Younger adults were recruited from the student population at the University of Kentucky. At the beginning of each academic semester, psychology undergraduate students participate in a screening session for potential research involvement. Participants receive course credit for their involvement. The study was available to all students in a departmental participant pool. To reduce extraneous variance between groups, old and young participants were matched by race and gender.

Laboratory Procedure

The study took place take place in a small research room at the university. When participants arrived, the experimenter provided a written consent form as well as a verbal description of the study, study tasks, potential risks, and rights of a research subject. The participant was given as much time as necessary to read the consent form and ask any questions. After obtaining informed consent, participants were randomized into one of three conditions (values-based, information-gathering, or control). All participants completed a demographic questionnaire, a baseline measure of emotional wellbeing, and the Valued Living Questionnaire (VLQ; Wilson, 2010). At this point, the experimenter asked the participant to begin a questionnaire packet with additional measures of interest for five minutes. During this time, the experimenter scored the VLQ, which was incorporated in the subsequent writing task.

Depending on the assigned experimental condition, participants completed one of three 6-minute writing tasks: (1) the values-based condition asked participants to write about why their highest-rated value (as measured by the VLQ) is important in their life, (2) the information-based condition asked participants to write about why gathering information is important in their life, and (3) the control condition asked participants to explain why their lowest-rated value (as measured by the VLQ) is important to someone else's life. Writing about a lowest-rated value for others is often used as a control condition in research studying values and healthcare (i.e. Harris and Napper, 2005; Sherman et al., 2000).

Upon completing the writing task, participants were asked to keep what they wrote in mind while completing a computer task (e.g., *As you complete the computer*

task, please keep in mind the importance of family in your life). Participants completed two decision scenarios on a computer-based decision program (from Lockenhoff & Carstensen, 2007). Participants chose between four physicians (e.g. Physician A, Physician B, etc.) and four health plans (Plan A, Plan B. etc.), which were presented in a decision matrix (Figure 1). All choices were given an "average" overall rating on patient satisfaction. *Therefore, no choice was better than any other on average.* However, each choice varied in quality on four additional characteristics. For example, the physician characteristics included: continued education, medical school attended, interpersonal skills, and hospital connections. Each characteristic was given a patient-satisfaction rating of very poor, poor, good, or very good. This information was presented in a table, with only the plan/physician and characteristic categories visible. The cells with ratings were color-coded indicating different valenced information (white cells = positive information (good or very good), dark cells = negative information (poor or very poor), and grey cells = neutral information (average)). When a participant clicked on a respective cell, the specific rating information became visible. In this way, participants had the ability to obtain or avoid more detail about positive and negative information. In order to address the specific age differences discussed (older adults review more positive information compared to negative information, review less information overall, and spend less time making a decision), dependent variables included: number of positive, negative and total cells viewed, time spent making a decision, and a ratio of positive to negative information viewed (i.e., the positivity index score = (number of positive cells reviewed – number of negative cells reviewed) / total number of cells viewed; Lockenhoff & Carstensen, 2007).

Immediately after the decision-making task, participants completed a follow-up measure of emotional wellbeing. Next, participants were asked to work on a set of anagrams, the first of which was unsolvable. Persistence on this task (in seconds) was used as a measure of self-regulatory fatigue. Participants were instructed to solve the anagram mentally and call out the answer to the experimenter, who was in the room. Participants were told to take as much time as they need, but were free to stop at any time. The amount of time persisting on the unsolvable task was measured, up to 5 minutes. If the participant quit before 5 minutes, they were given additional index cards (up to five additional cards) with solvable anagrams. If they completed all anagrams before 5 minutes was up, they were asked to go back to the unsolvable anagram. In this way, all participants worked on the anagram task for 5 minutes (modified from Solberg Nes, Segerstrom, & Sephton, 2005). However, the persistence measure consisted only of the time spent on the first, unsolvable anagram.

After the anagram task, participants completed a memory test requiring them to recall information about the health plans and physicians they just reviewed. Upon completion of this memory test, participants completed three questions assessing their healthcare choices on a 1-7 Likert type scale. After completing the self-assessment of their choices, participants completed the self-report packet that they began prior to the writing task. Upon completion of the writing task, participants completed a series of neuropsychological measures that assessed verbal fluency, intellectual ability, short-term memory, and processing speed. The purpose of these measures was to ensure normal cognitive functioning across age groups. Each of the aforementioned areas of cognitive functioning impacts an individual's ability to process and recall information. Measuring

verbal fluency and intellectual ability ensured that the time spent completing the task was not a result of poor reading ability or inability to comprehend the task. Measuring short-term memory ensured that the results of the memory task were not due to memory impairment. Finally, measuring processing speed ensured that the time spent reading and collecting information was not a result of a cognitive delay. After completing the neuropsychological measures, participants were debriefed and provided compensation ($15 for the older adults and research credit for students).

Measures

Demographics: Participants reported age, years of education, gender, and race.

Affect Valuation Index (AVI; Tsai et al., 2006): The AVI is a 30-item, state-level, self-report measure that asks participants to rate the extent to which they feel a variety of emotions (e.g., happy, sad, fearful, calm) on a five point scale (1 = not at all; 5 = an extreme amount). This measure yields 8 scores that follow each octant of the affective circumplex, including a: high arousal state, high arousal positive state, positive state, low arousal positive state, low arousal state, low arousal negative state, negative state, and high arousal negative state). The AVI was administered before and after completing the healthcare decision task.

Valued Living Questionnaire (VLQ; Wilson, 2010): The VLQ is a 10-item self-report measure that asks participants to rate the importance of areas of life valued by some people (e.g., family, parenting, friends, spirituality, work) on a 10-point scale (1= not at all important; 10= extremely important. If more than one area of life was rated a 10, the highest rated areas were then ranked from most important to least important.

Memory of Healthcare Choice: A blank printout of the decision matrix was provided to participants. They were asked to circle their physician and plan choice and recall the characteristic ratings for their choice only (i.e., very good, poor, etc.). A score was calculated to operationalize how positively participants remembered their choice. A mean score was calculated by assigning a numerical value to each rating (very poor = -2, poor = -1, average = 0, good = 1, very good = 2). The original set of ratings evened out to a neutral score. Therefore a positive mean score indicated a positivity effect, whereas a negative mean score indicated remembering the choice as less favorable. This is a standard measure to assess reductions in the positivity effect.

Personal Assessment of Healthcare Choices: Three items assessed participants' view of their healthcare choices. These items included: (1) "How pleased are you with your decision?" (2) "How difficult did you find it to make this choice?" and (3) "If given the opportunity, how likely would you accept having a confidant make the choice for you?" All items will use a 7-point scale (1 = not at all; 7 = very much).

Big Five Inventory—10 item version (BFI-10; Rammstedt & John, 2007): The BFI-10 is a 10-item self-report measure that asks participants to rate statements that correspond to traits associated with each Big Five domain (e.g., I see myself as someone who is outgoing, sociable) on a five point scale (1= disagree strongly; 5= agree strongly). Personality facets were measured in this study because of their link to other variables of interest. For example, higher levels of conscientiousness are linked to healthier behaviors and better perceived health (e.g., Takahashi et al., 2013). In addition, high levels neuroticism are linked to more negative affect, higher daily stress, and reduced affective

differentiation (McCrae & Costa, 1987; Gunthert et al., 1999; Carstensen et al., 2000; Skalina et al., 2015).

Future Time Perspective Scale (FTP; Carstensen & Lang, 1996): The FTP is a 10-item self-report measure that asks participants to rate statements related to their perceived time remaining in life (e.g., My future seems infinite to me) on a seven point scale (1=very untrue; 7=very true). Higher scores on the FTP are associated with extended time perception.

Short Form 12-item Health Survey (SF-12; Hays et al., 1995): The SF-12 is a 12-item self-report measure that asks participants to answer various questions about their physical and mental health. Items are combined to calculate two composite scores: the physical composite score (PCS) and the mental composite score (MCS). Composite scores range from 0 to 100, with higher scores indicating better health. Composite scores have considerable variability across the lifespan, with the PCS decreasing with age and the MCS increasing with age (Ware et al., 2002). Age-specific mean differences scores are calculated by subtracting the age group mean's score from the individual score, such that a score of -10 is interpreted as scoring 10 points lower than the age-specific mean score (poorer health). The present study utilized the PCS and MCS, as well as the corresponding differences scores. Difference scores were included as a descriptive statistic for the sample of younger and older adults.

Trail Making Test Part A (TMT Part A; Tombaugh, 2004): The TMT Part A is a neuropsychological assessment that measures cognitive flexibility, scanning and visuomotor tracking, and processing speed (Lezak, Howeison, Bigler, & Tranel, 2012). The TMT Part A requires participants to connect the numbers 1-25 in ascending order on

a page. For this study, total time to complete Part A was used to assess individuals' motor speed (e.g., Misdraji & Gass, 2010).

Controlled Oral Word Association Test (COWA; Reitan & Wolfson, 1985*):* The COWA is a neuropsychological assessment that measures phonemic fluency. Participants are asked to verbally generate as many words as possible starting with a specific letter in one minute. The present study utilized three trials with the letters F, A, and S (Lezak et al., 2012).

Digit Span Test (Wechsler, 2008): Digit span is a neuropsychological assessment that measures memory and attention. The participant is read a series of numbers, and is asked to recall the numbers in the same order. The test becomes increasingly difficult, as the number sequence length increases by one with each trial. Each trial consists of two sequences of numbers. When a participant incorrectly recalls two sequences within the same trial, the test is discontinued. It is important to account for natural declines in memory across the lifespan when examining age-related differences in recall of health-related information. Digit Span raw scores were used to capture declines across age groups, to determine if changes in recall are due to natural changes in memory.

National Adult Reading Test (NART; Blair & Spreen, 1989): The NART is an assessment of word reading ability and pronunciation that estimates premorbid levels of intelligence. Participants are asked to read aloud a list of 61 words. Participants are encouraged to pronounce each word, even if the word is unfamiliar to them. The total number of correctly pronounced words is used to calculate a full-scale IQ estimate.

Manipulation Check: After the participants completed the study, two independent judges rated the writing samples, "To what extent did the participant stick to the task

assigned to them?" on a 7-point scale (1 = not at all; 7 = very). Previous research found scores greater than 5 to be acceptable (Harris & Napper, 2005). For the current study, the independent judges demonstrated good inter-rater reliability (α = .84), with ratings suggesting that participants completed the writing task correctly (M_{old} = 6.2; M_{young} = 6.6).

Data Analysis

For all data analyses, alpha was set at .05 (two-tailed). Independent-samples t-tests were used to examine age-related differences in education, personality, physical and mental health, future time perspective, baseline mood, and neuropsychological functioning. Analysis of variance (ANOVA) using a 2 (age group) X 3 (writing task) design was utilized to test the study's hypotheses. Prior to running inferential tests, descriptive statistics were run for all study variables. Scatter and boxplots were examined to ensure assumptions of ANOVA were met (lack of multicollinearity and normality of distribution). Variables with skewness/kurtosis values greater than 3 were reexamined to ensure there were no data entry errors or outliers in the data. If warranted, statistical transformation of variables was performed to reduce skew/kurtosis.

Power Analysis

A similar research design with the same computer-based decision program (Lockenhoff & Carstensen, 2007) found medium to large effects (*f*= .33**)** for age group and instructional condition on the type of information reviewed. A large effect (*f* = .45) was found for age group on recall of information and a medium effect size (*f*= .23) was found for instructional condition on recall of information. The interaction between age and condition was found to be a medium effect (*f* = .27). A medium to large effect was

found (f = .31) for instructional condition on emotional experiences. No studies have examined the fatiguing effects of completing the aforementioned healthcare choice task, but a recent meta-analysis found medium to large effect sizes for tasks involving affective regulation and cognitive regulation (Hagger et al., 2010). Given that most of the literature in the field has yielded between medium and large effect sizes, the proposed study will be powered for medium effect sizes. Power analyses concluded that a sample size of 180 individuals (30 per cell) would be adequate to detect a medium effect size (f= .25) with an alpha level set at .05 and a power of .80.

Chapter 3: Results

Distribution of Variables and Statistical Transformations

Descriptive statistics were computed on all study variables. Examination of skewness and kurtosis statistics in conjunction with scatterplots and histograms revealed normal distributions and no significant outliers for most variables. However, a few variables showed significant skew or kurtosis. The time spent reviewing the health plan had skew and kurtosis values greater than 3 when the skew value is divided by its standard error (positive skewness = 1.62, *SE* = .18; kurtosis = 2.63, *SE* = .36). To address this non-normal distribution, the log transformation was used and reduced skew and kurtosis to within normal limits. The total number of boxes clicked when reviewing the health plan had skew and kurtosis values greater than 3 (positive skewness = 1.61, *SE* = .18; kurtosis = 4.32, *SE* = .36). Due to the high kurtosis statistics, the data were carefully assessed for outliers. Three outliers were identified with a value greater/less than 3 SDs from the mean, and were removed. The removal of these outliers decreased the kurtosis statistic (1.34, *SE* = .36), but significant positive skew remained. To address this skew, the log transformation was used and reduced skew and kurtosis statistics to within normal limits.

The total time spent reviewing physician choices had skew and kurtosis values greater than 3 (positive skewness = 1.35, *SE* = .18; kurtosis = redo, *SE* = .36). Two outliers were identified with a value greater/less than 3 SDs from the mean, and were removed. Additionally, the log transformation was used and reduced skew and kurtosis to within normal limits. The total number of boxes clicked when reviewing physician choices showed significant positive skew (skewness = 1.86, *SE* = .18; kurtosis = 5.12, *SE*

= .36). Given the large kurtosis statistic, data were carefully examined for outliers. Three outliers were identified that were greater than 3 SDs from the mean, and were removed. This reduced kurtosis (1.27, *SE* = .36), but significant positive skew remained. The log transformation was used to reduced skew and kurtosis to within normal limits. For all of the above variables, outliers were removed because excessive time spent on the task may be indicative of failure to fully comprehend the task itself.

The memory scores for both the health plan and physician showed non-normal distributions (health plan skewness = 1.66, *SE* = .18; kurtosis = 4.77, *SE* = .36; physician skewness = 1.65, *SE* = .18; kurtosis = 5.12, *SE* = .36). One outlier was found (> 3 SDs from the mean) who gave memory of the health plan choice the highest possible rating (+6). The raw data were examined, and it was concluded that the participant completed the task correctly and recalled that choice as more positive compared to other individuals. Instead of removing this participant, the score was windsorized (given the score of the next highest value in the distribution (+4)). Four outliers (> 3 SDs from the mean) were found who rated the memory of their physician choice as very positive (3 subjects) or very negative (1 subject). The raw data were examined, and it was concluded that the participants completed the task correctly, but recalled their choices as particularly positive or negative. Instead of removing these participants, scores were windsorized. Additional log transformations were required in order to reduce skew and kurtosis statistics to within normal limits. However, despite this transformation, the memory score for the health plan still had a kurtosis statistic greater than 3. Because skew was within normal limits, it was decided that the memory score for the health plan would still be analyzed using ANOVA, with the caveat that non-normality may reduce power.

Therefore, a lack of age or condition differences in memory scores related to health plan may be due to a lack of statistical power.

Measures of baseline and post-healthcare task negative affect (NA) showed non-normal distributions (baseline NA skewness = 2.13, *SE* = .18; kurtosis = 6.84, *SE* = .36; post-task NA skewness = 2.17, *SE* = .18; kurtosis = 8.36, *SE* = .36). One outlier was identified (> 3 SDs from the mean), who reported the highest possible level of negative affect for both pre and post assessments. As a result, this participant was removed from analyses. Log transformation was required in order to achieve a normal distribution of negative affect scores.

If a participant was identified as an outlier in the aforementioned screening of distributions, their entire set of data was reviewed to determine whether the participant should be excluded from all analyses on the basis of failure to understand the study as a whole or intentional random responding. Outlier data appeared to be isolated to the analyses above. As a result, no participants were dropped from data analyses.

For each set of analyses, less than 5% of data was missing. Particular variables were not consistently missing data, nor were the same subjects missing data in each set of analyses. Based on these observations, it was concluded that data was missing at random. For self-report questionnaire data, the mean of the corresponding age group was used to replace missing values. For data associated with the laboratory task, the mean of the corresponding age X condition group was used to replace missing values.

Sample Characteristics

Table 1 shows age group differences in education, personality, future time perspective, physical and mental health, neurocognitive abilities, and baseline affect.

Compared to younger adults, older adults reported significantly lower levels of neuroticism and significantly higher levels of openness and conscientiousness. Age groups did not differ on measures of extraversion or agreeableness. Compared to younger adults, older adults reported significantly more years of education. This is to be expected, as the young adults were primarily first and second year undergraduate students. As expected, compared to older adults, younger adults reported significantly higher future time perspective.

Consistent with previous findings using the SF-12, older adults reported poorer physical health but better mental health compared to younger adults (Ware et al., 2002). PCS-12 and MCS-12 difference scores were also examined to determine how the current sample of younger and older adults compare to the population within their age groups. Both the young and older groups reported higher PCS-12 and MCS-12 scores compared to norms for their respective age groups. Consistent with emotion-based research on aging (e.g., Riediger et al., 2009), older adults reported significantly higher positive affect and lower negative affect at baseline compared to younger adults.

Consistent with cognitive research on aging (Park et al., 2002), older adults scored lower on measures assessing processing speed (TRAILS A) and short-term memory (digit span). However, older adults scored higher on the COWA, which assesses phonetic fluency and general brain function. Compared to younger adults, older adults also scored significantly higher on an assessment measuring full scale IQ (NART).

Taken together, the age-related differences in the current sample are consistent with typical aging. Compared to younger adults, older adults were more emotionally stable (lower neuroticism, higher openness and conscientiousness, higher mental health,

and a more positive (and less negative) mood at baseline), had reduced physical and cognitive function (lower physical health score, longer processing speed, and reduced short-term memory capacity), and perceived future time as more limited.

Differences in Review Strategies

Total Time to Review Information: A 2 (age group) X 3(condition) ANOVA was conducted to assess for differences in total time to review information. When reviewing the health plans, there was a main effect of age group ($F(1,174) = 32.97$, $p < .001$, $\eta^2 = .16$). Older adults took significantly longer ($M = 88.79$ seconds; $M_{log} = 4.86$; $SD_{log} = .29$) to review health plans compared to younger adults ($M = 50.64$ seconds; $M_{log} = 4.64$; $SD_{log} = .23$). Effects of condition and age X condition interaction were not statistically significant. When reviewing the physicians, there was a main effect of age group ($F(1,172) = 78.11$, $p < .001$, $\eta^2 = .31$). Again, older adults took significantly longer ($M = 98.40$ seconds; $M_{log} = 4.92$; $SD_{log} = .23$) to review physicians compared to younger adults ($M = 47.03$ seconds; $M_{log} = 4.62$; $SD_{log} = .23$). There was a nonsignificant main effect of condition ($F(1,170) = 2.51$, $p = .08$, $\eta^2 = .03$). Bonferroni post-hoc tests suggested that participants in the information gathering condition took longer (($M = 79.38$ seconds; $M_{log} = 4.83$; $SD_{log} = .26$) than the control ($M = 70.09$ seconds; $M_{log} = 4.76$; $SD_{log} = .28$, p = .34) or values ($M = 68.28$ seconds; $M_{log} = 4.74$; $SD_{log} = .31$, $p = .14$) conditions.

Amount of Information Reviewed: A 2 (age group) X 3 (condition) ANOVA was conducted to assess for differences in amount of information reviewed (total number of boxes clicked). When reviewing the health plans, there was a main effect of age group ($F(1,171) = 4.45$, $p = .04$, $\eta^2 = .03$). Older adults looked at more information ($M = 35.15$ boxes clicked; $M_{log} = 1.44$; $SD_{log} = .30$) when reviewing health plans compared to

younger adults (M = 25.85 boxes clicked; M_{log} = 1.36; SD_{log} = .23). Effects of condition and age X condition interaction were not statistically significant. When reviewing physicians, there was a main effect of age group ($F(1,174) = 12.21$, $p = .001$, $\eta^2 = .07$). Older adults looked at more information (M = 39.79 boxes clicked; M_{log} = 1.51; SD_{log} = .31) when reviewing physicians compared to younger adults (M = 26.72 boxes clicked; M_{log} = 1.36; SD_{log} = .25). Effects of condition and age X condition interaction were not statistically significant.

Valence of Information Reviewed: A 2 (age group) X 3(condition) ANOVA was conducted to assess for age differences in the valence of information reviewed (positivity index). When reviewing the health plans, there was a main effect of age group ($F(1,174) = 14.69$, $p < .001$, $\eta^2 = .08$). Older adults viewed more positive information (M = -.001 positivity index; SD = .38) when reviewing health plans compared to younger adults (M = -.22 positivity index; SD = .36). Effects of condition and age X condition interaction were not statistically significant. When reviewing physicians, there was a main effect of age group ($F(1,174) = 6.45$, $p = .01$, $\eta^2 = .04$). Older adults viewed more positive information (M = .06 positivity index; SD = .35) when reviewing physicians compared to younger adults (M = -.06 positivity index; SD = .31). Effects of condition and age X condition interaction were not statistically significant.

Valence of Plan and Physician Recall: A 2 (age group) X 3(condition) ANOVA was conducted to assess for age differences in how positively participants recalled their choices. When recalling the health plan, there were no significant main or interaction effects for how positively or negatively participants remembered their choice. However, there was a main effect of age group when recalling the physician choice ($F(1,174)$ =

7.26, $p = .008$, $\eta^2 = .04$). Older adults recalled their physician choice more positively ($M_{log} = .41$; $SD_{log} = .19$) compared to younger adults ($M_{log} = .34$; $SD_{log} = .12$). Effects of condition and age X condition interaction were not statistically significant.

Summary of Review Strategy Findings

Contrary to hypotheses, older adults spent more time reviewing and reviewed more information compared to younger adults. Consistent with previous research on the positivity effect, older adults did review more positive information and recalled one of their decisions (physician choice) more positively compared to younger adults. No significant main effects for condition were found, suggesting that the conditions did not significantly impact behavior related to information gathering. Additionally, the lack of any significant interactions suggests that the effect of condition did not change between age groups.

Differences in Emotional Well-Being

A 2 (age group) X 3 (condition) repeated measures ANOVA was conducted to assess for changes in emotional well being after completing the writing task and decision-making program. There were no significant group, condition, or interaction effects when examining changes in negative and positive affect. A one-way ANOVA was conducted to assess the effects of condition on the older group only. There was not a significant change in positive affect between conditions, but there was a nonsignificant difference in negative affect between conditions ($F(2,87) = 2.90$, $p = .06$). Post-hoc comparisons using the Bonferroni correction found the information gathering condition led to an increase in negative affect ($M = .02$, $SD = .08$) compared to decreases seen in the control ($M = -.01$, $SD = .05$, $p = .24$) and values-based condition ($M = -.02$, $SD = .06$, $p = .07$).

Taken together, the effects of age and condition on emotional-well being were not statistically significant. Contrary to expectations, in older adults, the values-based induction did not improve emotional well-being (increases in positive affect and/or decreases in negative affect) compared to the other conditions. Interestingly, older adults did show a trend toward increased negative affect after completing the information gathering condition, compared to the control, but not values-based, condition.

Differences in Self-Regulatory Strength

A 2 (age group) X 3 (condition) ANOVA was conducted to assess for differences in self-regulatory strength after completing the health decision-making task. When examining the amount of time spent on the anagram task, there was a main effect for age group ($F(1,162) = 8.16$, $p = .005$, $\eta^2 = .05$). Older adults spent less time on the anagram task ($M = 62.62$ seconds; $SD = 55.30$) compared to younger adults ($M = 88.93$ seconds; $SD = 61.97$). Effects of condition and age X condition interactions were not statistically significant.

Taken together, the effects of condition did not have a significant effect on persistence. As expected, younger adults persisted longer on the anagram task compared to older adults.

Differences in Self-Assessment of Health Choices

A 2 (age group) X 3 (condition) ANOVA was conducted to assess for differences in retrospective self-reported satisfaction with the health decisions. When examining a self-assessment score regarding how pleased the participant was with their decisions, there was a main effect for condition, but not group ($F(2,174) = 2.66$, $p = .07$, $\eta^2 = .03$). Post-hoc comparisons using Bonferroni correction found that participants in the

information-gathering condition reported less satisfaction (M= 4.15; $M_{sqrt\ (8-x)}$ = 1.92, $SD_{sqrt\ (8-x)}$ = .40) compared to the control condition (M = 4.75; $M_{sqrt\ (8-x)}$ = 1.77, $SD_{sqrt\ (8-x)}$ = .33). However, the values-based condition did not significantly differ from the control or information-gathering condition. There was a significant age group X condition interaction ($F(2,174) = 6.43$, $p = .002$, $\eta^2 = .07$) suggesting that differences in self-reported satisfaction between the information gathering and control condition depended on age group (see Figure 1 below). Although not significant, the control group showed that older adults reported greater satisfaction in their choice compared to younger adults. However, older adults in the information-gathering condition reported significantly *less* satisfaction in their choice ($M = 3.6$; $SD = 1.73$, $p = .001$) compared to younger adults ($M = 4.7$; $SD = 1.24$).

Age-Related Differences in Personal Values

A series of ANOVA's were conducted to assess for age-related differences in the importance of personal values. Across all conditions, younger adults reported valuing parenting ($M = 8.21$, $SD = 2.42$; $F(2,178) = 7.06$, $p = .01$), work ($M = 7.20$, $SD = 1.96$; $F(2,178) = 38.99$, $p < .001$), and education/training ($M = 8.41$, $SD = 1.76$; $F(2,178) = 35.07$, $p < .001$) significantly more than older adults ($M_{parenting} = 8.21$, $SD_{parenting} = 2.42$; $M_{work} = 8.21$, $SD_{work} = 2.42$; $M_{education/training} = 8.21$, $SD_{education/training} = 2.42$). Older adults reported valuing citizenship/community life ($M = 7.59$, $SD = 1.98$; $F(2,178) = 29.29$, $p < .001$) and physical self-care ($M = 9.01$, $SD = 1.41$; $F(2,178) = 15.98$, $p < .001$) significantly more than younger adults ($M_{citizenship} = 5.96$, $SD_{citizenship} = 2.05$; $M_{physical\ self-care} = 8.04$, $SD_{physical\ self-care} = 1.77$). In the values condition, the top three values for older

adults included family, physical self-care, and marriage/couples compared to family, education, and spirituality for younger adults.

Predictors of Age-Related Differences in Review and Recall Strategies

A series of additional analyses were conducted to better understand the significant age group effects on review and recall strategies. A subset of variables with significant age differences (see Table 1) and theoretical rationale for explaining age differences were used in a series of hierarchical regression analyses. These regression analyses examined whether significant relationships between age group and outcome variables could be statistically accounted for by physical health, cognitive, and psychological variables. These analyses also examined whether physical health, cognitive, and psychological variables showed incremental validity over age in predicting outcome variables. Prior to running regression analyses, all predictor variables were mean centered. For all analyses, tolerance and variance inflation factor (VIF) statistics were within normal limits, suggesting multicollinearity was not a problem. A set-wise additions approach (e.g., adding all cognitive variables as a set) was used when entering variables. Age group was entered in Step 1, physical health variables (PCS-12) were entered in Step 2, cognitive variables (TRAILS, COWA, and Digit span) were entered in Step 3, and psychological variables (MCS-12, Future Time Perspective, baseline negative affect, baseline positive affect, and conscientiousness) were entered in Step 4.

Table 2a – 2c show results of hierarchical regression models predicting outcome variables associated with selecting a health plan. When predicting time spent selecting a plan, age group was a significant predictor ($R^2 = .17$, $\beta = .55$, $p < .001$) when entered in

Step 1, and remained a significant predictor through Step 4 ($\beta = .42$, $p < .001$). No other set of variables yielded a significant increase in R^2.

When predicting amount of information reviewed while selecting a health plan, age group was a significant predictor ($R^2 = .03$, $\beta = .16$, $p = .04$) when entered in Step 1. Age group remained significant after entering physical health in Step 2. Physical health was not a significant predictor. Age group's beta weight remained the same when cognitive variables were entered in Step 3, but was reduced (from $\beta = .16$ to .10) when psychological variables were entered in Step 4. However, age group remained the strongest predictor after the inclusion of all other variables. Age group's reduction in statistical significance is likely due to inclusion of multiple, albeit, nonsignificant predictors.

When predicting health plan positivity index, age group was a significant predictor when entered in Step 1 ($R^2 = .07$, $\beta = .27$, $p < .001$) and remained a significant predictor through the inclusion of cognitive variables in Step 3 ($\beta = .22$, $p = .02$). The inclusion of physical health and cognitive variables yielded non-significant increases in R^2. Psychological variables entered in Step 4 yielded a non-significant increase in R^2, but the predictive power of age group was significantly diminished ($\beta = .01$, $p = .96$). To further examine the large reduction in age group's beta weight, each psychological variable was examined. Shorter future time perspective ($\beta = -.20$, $p = .06$) and higher positive affect at baseline ($\beta = .19$, $p = .06$) emerged as nearly significant predictors of higher health plan positivity scores. These predictors may have been partially responsible for the beta weight reduction seen in age group.

Table 3a – 3d show results of hierarchical regression models predicting outcome variables associated with selecting a physician. When predicting time spent selecting a physician, age group was a significant predictor (R^2 = .31, β = .55, p < .001) when entered in Step 1 and remained a significant predictor through Step 4 (β = .47, p < .001). No other set of variables yielded a significant increase in R^2.

When predicting the amount of information reviewed when selecting a physician, age group was a significant predictor when entered in Step 1 (R^2 = .07, β = .26, p < .001) and remained a significant predictor through the inclusion of cognitive variables in Step 3 (β = .23, p = .01). Physical health and cognitive variables did not yield significant increases in R^2. The inclusion of psychological variables in Step 4 did not yield a significant increase in R^2. From Step 1 to 4, age groups beta weight decreased from .26 to .23. Because no set of variables accounted for a significant increase in explaining the variance, age group's decline in statistical significance is likely due to the inclusion of a large number of predictors.

When predicting physician positivity index, age group was a significant predictor when entered in Step 1 (R^2 = .03, β = .16, p = .03) and remained a significant predictor through the inclusion of cognitive variables in Step 3 (β = .21, p = .03). The inclusion of physical health in Step 2 yielded a non-significant increase in R^2. However, the inclusion of cognitive variables in Step 3 was statistically significant (R^2 = .06, ΔR^2 =.03, p = .04). Within the set of cognitive variables, higher digit span significantly predicted (β = .21, p = .01) higher physician positivity scores. Psychological variables entered in Step 4 yielded a non-significant increase in R^2, but the predictive power of age group was reduced (β = .14, p = .26). To further examine the reduction in age group's beta weight,

each psychological variable was examined. Similar to regressions related to health plan positivity effect, shorter future time perspective (β = -.15, p = .16) was the strongest psychological predictor of higher physician positivity scores. This predictor may have been partially responsible for the beta weight reduction seen in age group. In addition, digit span remained a significant predictor (β = .19, p = .02) in the final step.

Lastly, when predicting physician recall, age group was a significant predictor (R^2 = .04, β = .20, p = .01) when entered in Step 1 and remained a significant predictor through Step 4 (β = .27, p = .03). Physical health and cognitive variables entered in Steps 2 and 3 respectively, did not significantly improve the model. However, psychological variables entered in Step 4 did significantly improve the model (R^2 = .12, ΔR^2 = .07, p = .03). Among the psychological variables, lower negative affect at baseline (β = -.25, p = .02) and lower conscientiousness (β = -.22, p = .01) emerged as significant predictors of higher physician positivity recall scores.

Chapter 4: Discussion

The purpose of the present study was to replicate previous findings showing age-related differences in the review and recall of health information and to apply a values-based intervention to reduce these age-related differences. Previous studies have shown that older adults take less time to make a decision and review less information compared to younger adults (Meyer, Russo, & Talbot, 1995; Zwahr et al., 1999). Older adults also review more positive information and recall their choices as more positive compared to younger adults (Kennedy et al., 2004; Knight et al., 2007; Isaacowitz et al., 2008; see Reed and Carstensen, 2012, for review). These strategies are used in an effort to maintain emotional wellbeing, which is prioritized in older adulthood, but at the expense of a thorough review of information necessary to make future decisions. A values-based approach to reviewing health information increases the amount of information processed while maintaining emotional well-being (Harris & Epton, 2009; Harris, 2011), however, this has never been applied to older adults. The current study sought to fill this gap in the literature.

Evidence for the Positivity Effect

The present study found that older adults reviewed more positive information when selecting a health plan and physician compared to younger adults. In addition, older adults recalled their physician choice as significantly more positive than did younger adults. Taken together, these results replicate previous research findings and support the claim that the positivity effect is an important age-related factor influencing information processing related to health information (Lockenhoff et al., 2007). Even after accounting for other variables that change with age (physical, cognitive, and psychological), age

remained one of the more robust predictors, only losing its predictive power in models that included many nonsignificant predictors. Interestingly, digit span score emerged as a significant predictor of physician positivity index score (higher digit span scores predicted higher positivity index score), but not health plan positivity index score. This lack of converging evidence suggests that this relationship may be due to chance. On the other hand, future time perspective emerged as a trending predictor in both physician and health plan positivity indices (more expansive time perspective is related to lower positivity index scores). No other predictor, other than age, was as strong as future time perspective across both physician and health plan positivity index scores. This supports socioemotional selectivity theory's explanation that future time perspective helps explain age-related differences in emotion regulation strategies like the positivity effect (e.g., Carstensen et al., 1999; Carstensen & Mikels, 2005).

The present study also found that older adults recalled their physician choice as more positive compared to younger adults. Even after taking into account other age-related variables of interest, age group significantly predicted a more positive recall of the physician choice. Two psychological variables emerged as significant predictors. Conscientiousness significantly predicted physician recall, such that individuals with higher levels of conscientiousness had a less positive, and therefore more accurate recall of the physician. Higher levels of conscientiousness have been linked to better executive functioning (Fleming et al., 2016), which may help explain the relationship between conscientiousness and more accurate physician recall.

Additionally, individuals with higher levels of negative affect at baseline had a less positive recall of the physician choice. Negative affectivity influences information

processing, such that individuals higher in negative affect attend to more negative information and recall memories more negatively than individuals lower in negative affect (e.g., De Raedt & Koster, 2010; Gotlib & Joorman, 2010). It is possible that baseline negative affect could have influenced both the processing and recall of physician information. However, baseline negative affect was not a significant predictor of physician positivity effect. Taken together, this suggests baseline negative affect may have had a greater influence on recall in this particular sample.

Evidence for the positivity effect was also seen when measuring self-reported satisfaction with their health choices. Although non-significant, older adults in the control condition reported greater satisfaction with their choice than younger adults. However, older adults in the information gathering condition reported significantly less self-reported satisfaction with their choice compared to younger adults.

Explanations for Unexpected Age Differences in Information Reviewed

The present study found that older adults reviewed significantly *more* information and took significantly *longer* to make a decision compared to younger adults. This is contrary to previous findings that have shown older adults review less information and are more quick to make a decision compared to younger adults. Several factors may help to explain these unexpected findings. First, older adults in the present study are younger (M = 71.23) compared to previous studies that yielded different results (e.g., M = 79.78; Lockenhoff & Carstensen, 2007). In addition, 41% of the older adults in the current sample were baby boomers. This is important because previous research suggests that the baby boomer cohort differs in several ways from the cohorts that came before them. For example, compared to older old adults, baby boomers are more concerned with financial

resources and employment (Adams-Price & Turner, 2015). These concerns are reflected in recent changes in retirement trends that show significant increases in individuals expecting to remain full-time employees past the age of 65 (Mermin et al., 2007). One possible explanation for older adults reviewing more health-related information is the link between healthcare services and out-of-pocket financial expenses. Therefore, the current findings may be partially explained as a cohort effect, driven by baby boomers' interest and concern with financial stability.

Another possible explanation for these unexpected findings is the unique, personal values of the individuals who participated in this study. Secondary analyses used the VLQ to determine if there were significant age-related differences regarding the value of physical self-care (sleep, diet, exercise). In the present study, older adults reported valuing physical self-care significantly more (M = 9.01; SD = 1.41) than younger adults *(*M = 8.04; SD = 1.77; $p < .001$*).* The high value placed on physical self-care in the current sample of older adults may help explain why so much time was spent reviewing health-related information. Unfortunately, differences in values are an understudied topic in the aging literature, so there is little precedent to determine if this sample of older adults differs from others in their value preferences.

Explanations for Null Findings Related to Writing Condition

Contrary to study hypotheses and previous findings, writing condition did not have an effect on age-related differences in review strategies. In addition, there were no significant condition effects within age groups, except for a trending relationship that showed information-gathering led to increases in negative affect in older adults compared to the control and values-based condition. So why did the writing task appear to have no

effect on information processing? One possibility is that a baby boomer cohort effect coupled with a sample of older adults who place high value on physical self-care had such a strong effect on information processing that the writing task was rendered ineffective. An alternative hypothesis to explain a general lack of findings is that the control and values-based conditions were not as dissimilar as originally thought among older adults.

Writing about why a personally low-ranked value might be important for someone else is a standard control condition used in the values-based writing and self-affirmation literature (see Harris, 2011 for review). However, this has never been used in older adults. In the current study, half of the older adults in the control condition rated work as the least important, and wrote about why it would be valued by somebody else. On the one hand, it makes sense that work would be a lower rated value for older adults who are no longer working or at the later stages of their career. On the other hand, most of the older adults rating work as a lower value in the present day would have rated it much higher at some point earlier in their life. An 18-year old student writing about why parenting would be important to someone else does not have personal experiences to access (assuming they have never had children). This seems to achieve a task worthy of a "control" condition—writing about the importance of a value for someone else, that isn't *and has never been* important to the writer. For over half of the older adults in the control condition, it is possible that they reminisced about their work experiences to infer why it would be important to someone else. As a result, this is no longer a control condition for the older adults, but a reminiscence-based condition. Reminiscence-based interventions have been applied to older adults, with therapeutic effects on depressive symptoms

(Brinker, 2013; Moral et al., 2015), dementia (Gonzalez et al., 2015), and overall psychological well-being (e.g., O'Rourke et al., 2011, Korte et al., 2011). With this in mind, the present study may have inadvertently used two values-based conditions for older adults, rather than a values-based and a control condition. In addition, the information gathering condition may have also tapped into the values of older adults in this sample: a focus on information-gathering of health information is in line with their high ratings of physical self-care. However, the information-gathering condition appeared to have an affective impact on older adults. Older adults in the information-gathering condition reported an increase in negative affect and less satisfaction in their health-related choices compared to younger adults. However, it did not influence older adults' review strategies. These findings support the possibility that telling older adults to focus on information gathering is not optimal for influencing review strategies while maintaining positive affect.

These explanations still do not address why the information-gathering condition (at the very least) did not replicate previous studies' results showing a reduction in the positivity effect in older adults. One possible explanation may lie in differences in study design. Studies finding a reduction in the positivity effect related to the information-gathering condition (e.g., Lockenhoff & Carstensen, 2007) prompted participants to gather information before beginning the task (similar to the present study) *and* during the task. After the participants began the task, the computer interrupted them, reminding them the directions of their assigned condition. The present study utilized the writing task in lieu of the mid-experiment reminder.

Study Limitations

The present study had several limitations including, (1) poor generalizability to diverse populations of older and younger adults and (2) different age-group motivations for study enrollment and completion.

The older adult sample used in this study is not a representative sample of community dwelling older adults in the Lexington, KY area. The present study was predominantly white (99%), female, well-educated, high SES, and in excellent health. A large number of high SES and well-educated individuals in the sample are largely due to recruitment methods. The Kentucky Women's Health Registry and Osher Lifelong Learning Institute (OLLI) are most accessible to individuals who have retired from careers in higher education or medicine. A second factor influencing the homogeneity of the present sample is procedural requirement to complete the study on-site. All older adult participants drove their personal vehicle to and from the laboratory. As a result, the older adults in this study were all financially stable enough to own a vehicle and healthy enough to drive themselves to and from an appointment. The student sample is not representative of the larger population of adults, particularly with their experience navigating healthcare issues. Adults often gain experience selecting physician or health plans after accepting a full-time job or when navigating insurance coverage for their family. Undergraduate students likely have little to no experience selecting their own physician or healthcare plan as a result of being on a parents' plan until the age of 26 or on a university-sponsored insurance plan. Therefore, the healthcare decision-making task may have been far less meaningful to the younger adults compared to the older adults. Some of the "age-related" differences may be attributable to different levels of real world exposure to healthcare decision-making.

Younger and older adults were compensated for their time, but the motivating factors behind the decision to enroll in the study may have been substantially different. Younger adults were likely driven by more external factors compared to older adults driven by more internal factors. Young adults volunteered to participate in order to satisfy course credit research requirements. On the other hand, older adults expressed interest in participating, oftentimes before they knew of the $15 incentive. Even after learning about the monetary compensation, older adults frequently asked, "Do you have to pay me?" or "Can I donate the money to a charity?" Instead, older adults appeared intrinsically motivated to participate, citing the need to "give back" and "contribute to science." Based on the VLQ, older adults value citizenship/community life significantly more than younger adults. Therefore, the research study itself could be its own value induction for older, but not younger adults. Motivating factors such as these may have impacted study related behaviors, including decision-making behavior and emotional functioning.

Conclusions and Future Directions

The current study successfully replicated previous work on the positivity effect in older adults, further solidifying this effect as an age-related phenomenon that warrants additional scientific inquiry. For example, an interesting question that has never been studied is whether the positivity effect influences the *quality* of older adults' healthcare decisions. To date, the forced-choice computer programs do not provide a range of quality in the possible choices, as all the health plans and physicians received an average overall rating. If this paradigm were modified to include greater discrepancy in product quality, researchers may better understand whether the positivity effect has a negative influence on making the most effective decision.

The current study did not find evidence to suggest that a values-based writing induction reduces age-related differences in information processing when reviewing health information. However, this should not discourage future research on values in older adulthood. To the contrary, the findings of this study suggest that values-based writing tasks that have been widely used in younger samples may be problematic in older samples. These complexities must be considered in future research on values-based writing tasks in older adults.

Post-hoc observations also identified avenues for future research. Older adults rated physical self-care as significantly more important compared to younger adults. Understanding how specific values change across the lifespan is critical for understanding motivation and behavior change in older adulthood. By knowing what people truly value, healthcare practitioners can work to strike a balance of meaningful intrinsic motivation with external pressure to enact meaningful behavior change.

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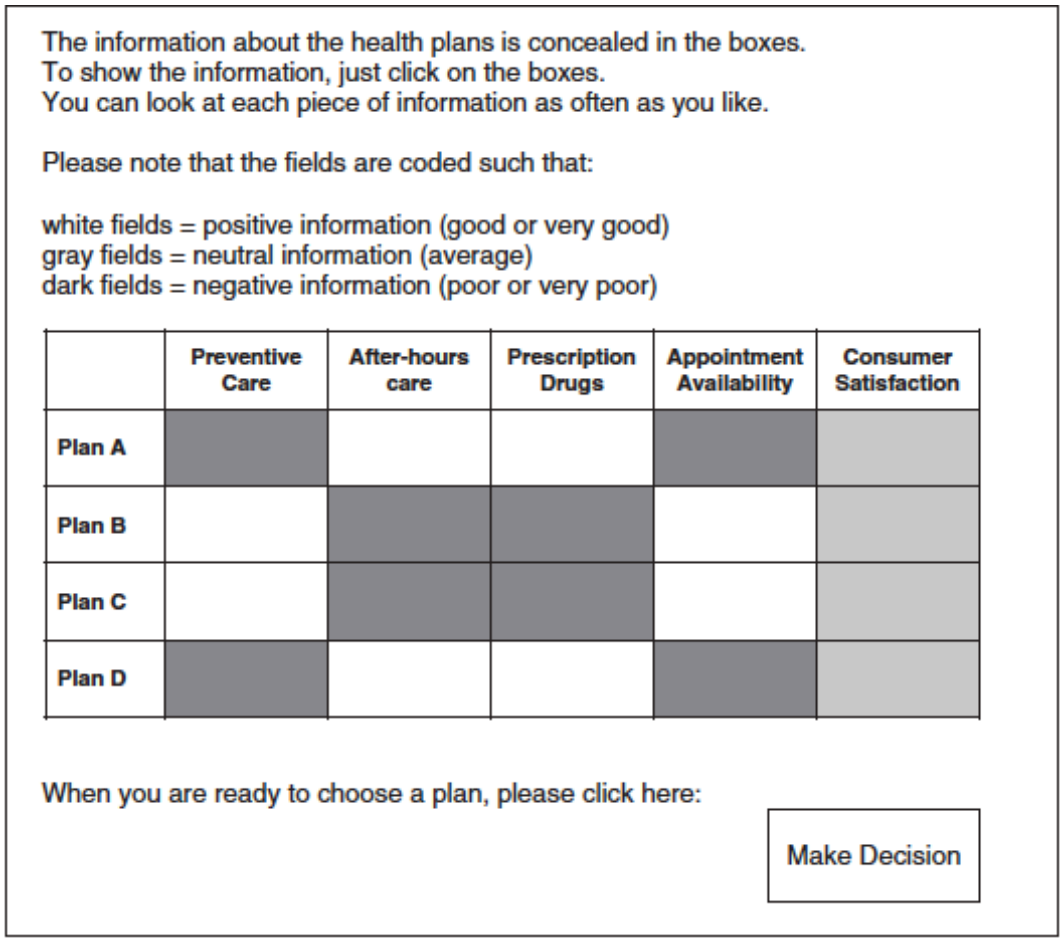
Figure 1. Decision Matrix used in the Computer-Based Decision Program


The information about the health plans is concealed in the boxes.
To show the information, just click on the boxes.
You can look at each piece of information as often as you like.

Please note that the fields are coded such that:

white fields = positive information (good or very good)
gray fields = neutral information (average)
dark fields = negative information (poor or very poor)

	Preventive Care	After-hours care	Prescription Drugs	Appointment Availability	Consumer Satisfaction
Plan A					
Plan B					
Plan C					
Plan D					

When you are ready to choose a plan, please click here:

Make Decision

Table 1. *Mean Scores on Sample Characteristics for Older and Younger Adults*

	Young		Older			
Variable	M	SD	M	SD	T(178)	p
Education (in years)	14.04	.79	17.20	2.09	-13.36	<.001
BFI-10 N	6.30	2.19	4.76	1.91	5.02	<.001
BFI-10 E	6.61	1.99	6.28	1.96	1.13	.26
BFI-10 O	6.62	1.97	8.10	1.58	-5.55	<.001
BFI-10 C	7.61	1.52	8.82	1.41	-5.52	<.001
BFI-10 A	7.72	1.72	7.53	1.65	.75	.45
FTP total score	55.70	8.66	42.30	12.76	8.25	<.001
PCS-12	54.93	5.51	49.91	8.07	4.82	<.001
MCS-12	47.02	9.51	54.91	6.97	-6.16	<.001
TRAILS A	24.43	8.12	30.46	8.75	-4.79	<.001
Digit span	10.98	2.26	10.10	2.14	2.67	.008
COWA	35.53	8.98	43.72	11.04	-5.46	<.001
NART	103.97	6.56	115.03	6.58	-11.29	<.001
Positive affect BL	35.48	7.09	41.74	8.14	-5.03	<.001
Negative affect BL	14.74	4.99	10.50	1.86	7.56	<.001

Note. BFI-10 N = neuroticism, E = extraversion, O = openness, C = conscientiousness, A = agreeableness; FTP = future time perspective total score; PCS = SF-12 physical composite score; MCS = SF-12 mental composite score; TRAILS A = trails making test part A; NART = national adult reading test; COWA = controlled oral word association test; BL = baseline.

Figure 2. Age group X condition results for self-reported satisfaction with healthcare choice.

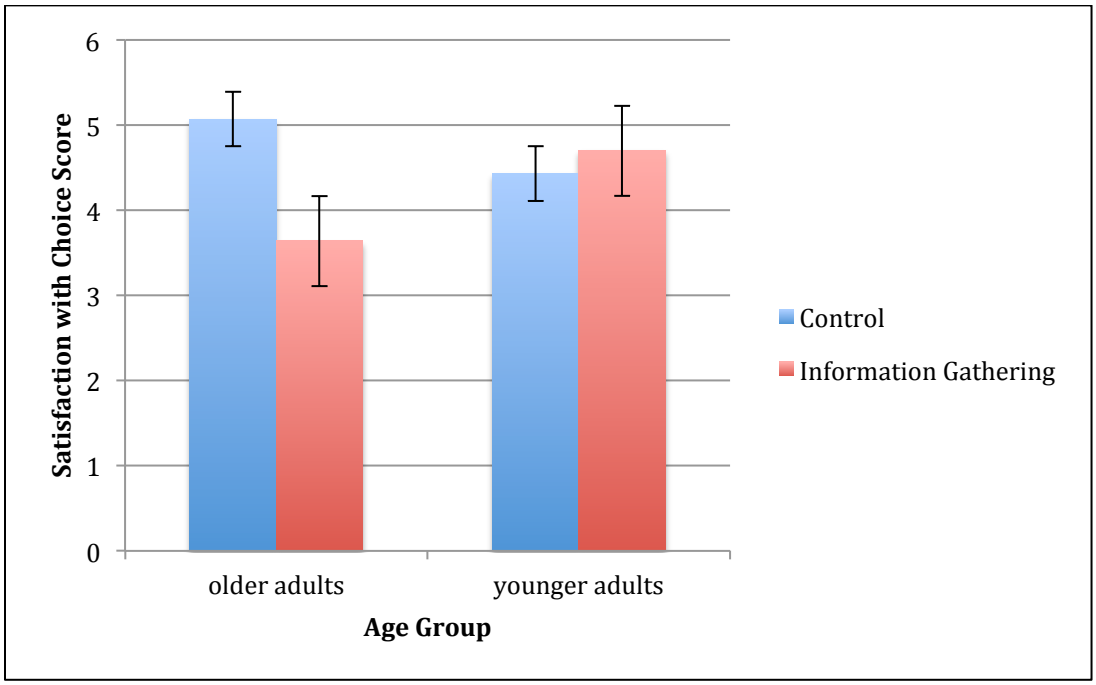


Table 2a. Results of Hierarchical Regression Model Predicting Time Spent Selecting a Health Plan from Age Group, Physical Health, and Cognitive and Psychological Functioning.

	Step 1			Step 2			Step 3			Step 4		
Predictor	ΔR^2	R^2	β	ΔR^2	R^2	β	ΔR^2	R^2	β	ΔR^2	R^2	β
1. Age (group)	**.17*** **	**.17*** **	**.55*** **			.42***			.46***			.42***
2. **Physical Health (PCS-12)**				**.00**	**.17*** **	**.002**			.01			-.02
3. Cognitive Function							**.01**	**.18*** **				
TRAILS									-.01			-.004
COWA									-.11			-.12
Digit Span									-.01			-.02
4. Psychological Function										**.02**	**.20*** **	
MCS-12												-.08
FTP												-.06
Negative affect BL												.06
Positive affect BL												.11
Conscientiousness												.08

Note. *p < .05, **p < .01, ***p < .001; FTP = Future Time Perspective Scale; BL = baseline.

Table 2b. Results of Hierarchical Regression Model Predicting Information Reviewed when Selecting a Health Plan from Age Group, Physical Health, and Cognitive and Psychological Functioning.

	Step 1			Step 2			Step 3			Step 4		
Predictor	ΔR^2	R^2	β	ΔR^2	R^2	β	ΔR^2	R^2	β	ΔR^2	R^2	β
1. Age (group)	**.03***	**.03***	**.16***			**.**16*			.16			.10
2. Physical Health (PCS-12)				**.00**	**.03**	**-.001**			.001			-.01
3. Cognitive Function							**.00**	**.03**				
TRAILS									-.05			-.05
COWA									.004			.003
Digit Span									-.09			-.09
4. Psychological Function										**.01**	**.04**	
MCS-12												.02
FTP												-.03
Negative affect BL												.04
Positive affect BL												.08
Conscientiousness												.05

Note. *p < .05, **p < .01, ***p < .001; FTP = Future Time Perspective Scale; BL = baseline.

Table 2c. Results of Hierarchical Regression Model Predicting Health Plan Positivity Index from Age Group, Physical Health, and Cognitive and Psychological Functioning.

	Step 1			Step 2			Step 3			Step 4		
Predictor	ΔR^2	R^2	β	ΔR^2	R^2	β	ΔR^2	R^2	β	ΔR^2	R^2	β
1. Age (group)	**.07*** **	**.07*** **	**.27*** **			.28*** **			.22*			.01
2. **Physical Health (PCS-12)**				**.00**	**.07***	**.02**			.004			.02
3. Cognitive Function							**.02**	**.09***				
TRAILS									.01			.03
COWA									.02			.09
Digit Span									.21*			.01
4. Psychological Function										**.04**	**.13***	
MCS-12												.10
FTP												-.20
Negative affect BL												.004
Positive affect BL												.19
Conscientiousness												.05

Note. *p < .05, **p < .01, ***p < .001; FTP = Future Time Perspective Scale; BL = baseline.

Table 3a. Results of Hierarchical Regression Model Predicting Time Spent Selecting a Physician from Age Group, Physical Health, and Cognitive and Psychological Functioning.

	Step 1			Step 2			Step 3			Step 4		
Predictor	ΔR^2	R^2	β	ΔR^2	R^2	β	ΔR^2	R^2	β	ΔR^2	R^2	β
1. Age (group)	**.31*** **	**.31*** **	**.55*** **			.52***			.55***			.47***
2. **Physical Health (PCS-12)**				**.01**	**.32**	**-.11**			-.10			-.19*
3. Cognitive Function							**.01**	**.33**				
TRAILS									-.01			-.001
COWA									-.09			-.11
Digit Span									-.05			-.05
4. Psychological Function										**.03**	**.36**	
MCS-12												.09
FTP												-.001
Negative affect BL												-.06
Positive affect BL												.17*
Conscientiousness												.09

Note. *p < .05, **p < .01, ***p < .001; FTP = Future Time Perspective Scale; BL = baseline.

Table 3b. Results of Hierarchical Regression Model Predicting Information Reviewed when Selecting a Physician from Age Group, Physical Health, and Cognitive and Psychological Functioning.

	Step 1			Step 2			Step 3			Step 4		
Predictor	ΔR^2	R^2	β	ΔR^2	R^2	β	ΔR^2	R^2	β	ΔR^2	R^2	β
1. Age (group)	**.07*** **	**.07*** **	**.26*** **			**.**22**			.23*			.23
2. Physical Health (PCS-12)				**.01**	**.08** **	**-.12**			-.12			-.22*
3. Cognitive Function							**.01**	**.09** **				
TRAILS									-.05			-.04
COWA									.003			-.01
Digit Span									-.06			-.04
4. Psychological Function										**.03**	**.12***	
MCS-12												-.21
FTP												.09
Negative affect BL												-.07
Positive affect BL												.12
Conscientiousness												.04

Note. *p < .05, **p < .01, ***p < .001; FTP = Future Time Perspective Scale; BL = baseline.

Table 3c. Results of Hierarchical Regression Model Predicting Physician Positivity Index from Age Group, Physical Health, and Cognitive and Psychological Functioning.

	Step 1			Step 2			Step 3			Step 4		
Predictor	ΔR^2	R^2	β	ΔR^2	R^2	β	ΔR^2	R^2	β	ΔR^2	R^2	β
1. Age (group)	**.03***	**.03***	**.16***			.17*			.21*			.14
2. **Physical Health (PCS-12)**				**.00**	**.03**	**.02**			.004			.01
3. Cognitive Function							**.03**	**.06***				
TRAILS									.01			-.001
COWA									.02			-.03
Digit Span									.21*			.19*
4. Psychological Function										**.02**	**.08**	
MCS-12												-.01
FTP												-.15
Negative affect BL												.07
Positive affect BL												.12
Conscientiousness												-.04

Note. *p < .05, **p < .01, ***p < .001; FTP = Future Time Perspective Scale; BL = baseline.

Table 3d. Results of Hierarchical Regression Model Predicting Physician Recall from Age Group, Physical Health, and Cognitive and Psychological Functioning.

	Step 1			Step 2			Step 3			Step 4		
Predictor	ΔR^2	R^2	β	ΔR^2	R^2	β	ΔR^2	R^2	β	ΔR^2	R^2	β
1. Age (group)	**.04***	**.04***	**.20***			.18*			.22*			.27*
2. **Physical Health (PCS-12)**				**.00**	**.04***	**-.04**			-.03			-.06
3. Cognitive Function							**.01**	**.05**				
TRAILS									-.02			-.03
COWA									-.09			-.07
Digit Span									-.04			-.02
4. Psychological Function										**.07***	**.12***	
MCS-12												.01
FTP												.12
Negative affect BL												-.25*
Positive affect BL												-.10
Conscientiousness												-.22*

Note. *p < .05, **p < .01, ***p < .001; FTP = Future Time Perspective Scale; BL = baseline.

Paul J. Geiger, M.S.

EDUCATION

Graduate Certificate in Gerontology (anticipated) 2017
University of Kentucky; Lexington, KY
College of Public Health

M.S. in Clinical Psychology 2012
University of Kentucky; Lexington, KY
Thesis: Using the Scrambled Sentences Test to Examine Relationships between Cognitive Bias, Thought Suppression, and Borderline Personality Features
Chair: Ruth A. Baer, Ph.D.

B.A. in Psychology, *Graduated with Distinction* 2008
Duke University; Durham, NC
Honors Thesis: The Effects of a Single Mindfulness Induction on Positive Affect

HONORS & AWARDS

University of Kentucky

American Psychological Association Dissertation Research Award ($1000)	2015-2016
Douglas Marshall Williams Make A Difference Award	2015
Dissertation Year Fellowship (research-based Graduate School award; full tuition/stipend)	2014–2015
Orofacial Pain Center Psychology Training Program Certificate of Completion	2014
Excellence in Clinical Performance Award	2014
Outstanding Teaching Assistant Award	2011
Daniel R. Reedy Quality Achievement Fellowship ($3000 per year)	2010–2013

Duke University/Duke University Medical Center

Clark M. Rivinoja Award	2010
Graduated with Distinction in Psychology	2008
Dean's List	2005-2007
Undergraduate Research Support (URS) Grant	2006

RESEARCH GRANT ACTIVITY

National Research Service Award, National Institute on Aging 2015-2017
Title: "Testing a Values-Based Approach to Healthcare Decision-Making in Older Adults"
#F31AG048697 (PI: Geiger, P.)
Role: Principal Investigator
Direct Costs: $85,776

National Institute on Aging 2011-2014
Title: "Repetitive Thought, Stress, and Immunity in Older Adults"
#AG026307-RO1 (PI: Segerstrom, S.)
Role: Graduate Research Assistant

PUBLICATIONS

1. **Geiger, P.J.**, Morey, J.N., & Segerstrom, S.C. (in press). Beliefs about savoring in older adulthood: Aging and perceived health affect temporal components of perceived savoring ability. *Personality and Individual Differences.*

2. Segerstrom, S.C., **Geiger, P.J.**, Combs, H.L., & Boggero, I.A. (in press). Time perspective and social preference in younger and older adults: Effects of self-regulatory fatigue. *Psychology and Aging.*

3. Peters, J.R., & **Geiger, P.J.** (in press). Borderline personality disorder and self-conscious affects: Too much shame but not enough guilt? *Personality Disorders: Theory, Research, and Treatment.*

4. Rosenthal, M.Z., Neacsiu, A.D., **Geiger, P.J.**, Fang, C., Ahn, R., & Laraurri, J. (2016). Emotional reactivity to personally relevant and standardized sounds in borderline personality disorder. *Cognitive Therapy and Research, 40(3),* 314-327.

5. **Geiger, P.J.,** Boggero, I.A., Brake, C.A., Caldera, C.A., Combs, H.L., Peters, J.R., & Baer, R.A. (2016). Mindfulness-based interventions for older adults: A review of the effects on physical and emotional wellbeing. *Mindfulness, 7(2),* 296-307.

6. Segerstrom, S.C., **Geiger, P.J.**, Boggero, I.A., Sephton, S., & Schmitt, F.A. (2016). Endogenous cortisol exposure and declarative verbal memory: A longitudinal study of healthy older adults. *Psychosomatic Medicine*, *78(2),* 182-191.

7. **Geiger, P.J.**, Peters, J.R., & Baer, R.A. (2015). Cognitive distortions under cognitive load mediate the relationship between severity of borderline features and goal-interfering emotion dysregulation. *Journal of Experimental Psychopathology*, *6(4),* 389-397.

8. Peters, J.R., Smart, L.M., Eisenlohr-Moul, T.A., **Geiger, P.J**., Smith, G.T., & Baer, R.A. (2015). Anger rumination as a mediator of the relationship between mindfulness and aggression: The utility of a multidimensional mindfulness model. *Journal of Clinical Psychology, 71(9),* 871-884.

9. Boggero, I.A., **Geiger, P.J.**, Segerstrom, S.C., & Carlson, C.R. (2015). Age moderates the relationship between pain severity and interference in chronic orofacial pain patients. *Experimental Aging Research, 41(4),* 463-474.

10. **Geiger, P.J.**, Peters, J.R., & Baer, R.A. (2014). Using a measure of cognitive distortion to examine the relationship between thought suppression and borderline personality disorder features: A multi-method investigation. *Personality and Individual Differences, 59,* 54-59.

11. Peters, J.R., **Geiger, P.J.**, Smart, L.M., & Baer, R.A. (2014). Shame and borderline personality features: The potential mediating roles of anger and anger rumination. *Personality Disorders: Theory, Research & Treatment, 5*, 1-9.

12. Baer, R.A. & **Geiger, P.J.** (2013). Mindfulness: Connecting with your life: A review of the DVD mindfulness for life: An interview with Jon Kabat-Zinn. *PsycCRITIQUES, 58 (50).*

13. **Geiger, P.J.**, Peters, J.R., Sauer, S.E., & Baer, R.A. (2013). Relationships among maladaptive cognitive content, dysfunctional cognitive processes, and borderline personality features. *Journal of Personality Disorders, 27(4),* 457-464.

14. Sauer, S.E., **Geiger, P.J.**, & Baer, R.A. (2013). The effects of anger rumination in the relationship between borderline personality disorder and its precursors. *Journal of Personality Disorders, 27(4),* 465-472.

15. Herr, N.R., Rosenthal, M.Z., **Geiger, P.J.**, & Erikson, K. (2013). Difficulties with emotion regulation mediate the relationship between borderline personality disorder symptom severity and interpersonal problems. *Personality and Mental Health, 7,* 191-202.

16. Baer, R.A, Peters, J.R., Eisenlohr-Moul, T.A., **Geiger, P.J.**, & Sauer, S.E. (2012). Emotion-related cognitive processes in borderline personality disorder: A review of the empirical literature. *Clinical Psychology Review*, 32*,* 359-369.

17. Rosenthal, M.Z., Ahn, R., & **Geiger, P.J.** (2011). Reactivity to sensations in BPD: A preliminary study. *Journal of Personality Disorders, 25(5),* 715-721.

MANUSCRIPTS UNDER PEER-REVIEW

1. **Geiger, P.J.,** Reed, R.G., Combs, H.L., Boggero, I.A., & Segerstrom, S.C. (in preparation) Subjective Cognitive Complaints and Neuropsychological Testing Performance: The Role of Affective Distress in a Longitudinal Sample of Older Adults.

MANUSCRIPTS IN PREPARATION

- **Geiger, P.J.,** Judge, S., & Segerstrom, S.C. (in preparation). The accuracy of retrospective self-reported physical activity: The role of psychosocial functioning in a longitudinal sample of older adults.

PRESENTATIONS

1. **Geiger, P.J.,** Morey, J.N., & Segerstrom, S.C. (2015, November). *Present moment savoring remains constant over time and predicts future perceived health in a sample of older adults.* Poster presented at the annual meeting of the Gerontological Society of America, Orlando, FL.
2. **Geiger, P.J. (Chair),** Chapman, A.L., Fruzzetti, A.E., Gratz, K.L., Ritschel, L.A., & Rosenthal, M.Z. (2015, November). *How to Effectively Balance Irreverence and Validation to Reduce Therapy-Interfering Behavior.* Symposium presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, Chicago, Ill.
3. **Geiger, P.J.,** Peters, J.R., & Baer, R.A. (2015, November). *Differential Relationships between BPD Features and Forms of Self-Conscious Affect*. Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, Chicago, Ill.
4. **Geiger, P.J.**, Morey, J.N., & Segerstrom, S.C. (2014, November). *Present moment savoring remains constant over time and predicts future perceived health in a sample of older adults*. Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, Philadelphia, PA.
5. Segerstrom, S.C., **Geiger, P.J.**, Boggero, I.A., & Sephton, S. (2014, February). *Persistent but not phasic cortisol elevations correlate with poorer verbal memory in older adults.* Presented at the annual meeting of the International Neuropsychological Society.
6. **Geiger, P.J.**, Peters, J.R., Baer, R.A. (2013, November). *Evidence for the role of thought suppression in borderline personality disorder: Using the Scrambled Sentences Test to predict symptom severity.* Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, Nashville, TN.
7. Peters, J.R., **Geiger, P.J.**, Smart, L.M., & Baer, R.A. (2012, November). *Nonjudgment as a Moderator of the Effect of Awareness on Borderline Personality Features: Do Interactions Add Validity to Mindfulness Assessment?* Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, National Harbor, MD.
8. **Geiger, P.J.**, Peters, J.R., & Baer, R.A. (2012, November). *The Utility of a Cognitive Processing Task to Predict Borderline Personality Disorder Symptom Severity.* Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, National Harbor, MD.
9. **Geiger, P.**J., Rountree, K., Herr, N.R., & Rosenthal, M.Z. (2011, November). *Shame is higher in BPD than in Clinical and Nonclinical Controls, and Predicts BPD Features and Suicidal Ideation*. Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, Toronto, ON.

10. **Geiger, P.J.**, Peters, J.R., & Baer, R.A. (2011, November). *Relationships between Cognitive Content, Cognitive Processes, and Borderline Personality Features.* Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, Toronto, ON.
11. Fang, C.M., **Geiger, P.J.**, Herr, N.R., & Rosenthal, M.Z. (2011, November). *Dimensions of Emotion Dysregulation Predict BPD Features.* Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, Toronto, ON.
12. Feldblum, J.T., Fang, C.M., **Geiger, P.J.**, Herr, N.R., & Rosenthal, M.Z. (2011, November). *Emotional Dysfunction in BPD With and Without PTSD.* Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, Toronto, ON.
13. Herr, N.R., Rosenthal, M.Z., **Geiger, P.J.**, & Erikson, K. (2011, November). *Difficulties with Emotion Regulation Mediate the Relationship between BPD Symptom Severity and Interpersonal Problems.* Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, Toronto, ON.
14. Peters, J.R., **Geiger P.J.**, & Baer, R.A. (2011, November). *Differential Relationships Between Meta-Cognitive Beliefs About Rumination and Forms of Rumination.* Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, Toronto, ON.
15. **Geiger, P.J.**, Herr, N.R., Ahn, R., & Rosenthal, M.Z. (2010, November). *Emotional Sensitivity to Personally Relevant Sounds in Borderline Personality Disorder.* Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, San Francisco, CA.
16. **Geiger, P.J.**, Ahn, R., & Rosenthal, M.Z. (2010, November). *Differential Sensory Over-Responsivity in BPD.* Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, San Francisco, CA.
17. **Geiger, P.J.**, Morris-Jones, M., Ahn, R., & Rosenthal, M.Z. (2010, November). *Differential Physiological Responses to Personally Relevant Sounds in BPD.* Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, San Francisco, CA.
18. Kim, K., **Geiger, P.J.**, Herr, N.R., & Rosenthal M.Z. (2010, November). *The Virtual Reality Emotion Sensitivity Test (V-REST): Development and Construct Validity.* Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, San Francisco, CA.
19. **Geiger, P.J.**, Rivinoja, C.M., Perdomo, R.M., Bagwell, J., Ahn, R., & Rosenthal, M.Z. (2009, November). *Emotional Reactivity to Sounds in Borderline Personality Disorder.* Poster presented at the annual meeting of the Association for Behavioral and Cognitive Therapies, New York, NY.
20. **Geiger, P.J.** (2008, May). *The Effects of a Single Mindfulness Induction on Positive Affect.* Paper, poster, and talk presented to Duke University's Psychology Graduation with Distinction Committee, Durham, NC.

INVITED TALKS AND PRESENTATIONS

1. Mindfulness Skills to Combat Stress in Law School (Geiger, P.J.). August 11-12, 2015. Intro to Legal Reasoning: University of Kentucky School of Law. Lexington, KY.
2. Strengthening Resilience Through Mindfulness (Geiger, P.J.). June 17-19,2015. Kentucky Bar Association Annual Convention. Lexington, KY.
3. Understanding Mindfulness in the Context of Healthy Aging. (Geiger, P.J.). October 14, 2014. Osher Lifelong Learning Institute at the University of Kentucky. Lexington, KY.

4. Delving Deeper into Mindfulness. (Geiger, P.J.). April 4, 2014. Osher Lifelong Learning Institute at the University of Kentucky. Lexington, KY.

RESEARCH EXPERIENCE

Graduate Student Researcher 2011–Present
Psychoneuroimmunology Lab; University of Kentucky, Lexington, KY
Lab Director: Suzanne Segerstrom, PhD

Graduate Student Researcher 2010–Present
Baer Mindfulness Lab; University of Kentucky, Lexington, KY
Lab Director: Ruth Baer, PhD

Research Coordinator 2008–2010
Duke University Medical Center; Durham, NC
Cognitive Behavioral Research and Treatment Program (CBRTP)
Lab Director: M. Zachary Rosenthal, PhD

Research Assistant 2007–2008
Cognitive Behavioral Research and Treatment Program; Duke University Medical Center
Lab Director: M. Zachary Rosenthal, PhD

CLINICAL EXPERIENCE

Specialized Clinical Training: Cognitive Behavioral Therapy (CBT), Dialectical Behavior Therapy (DBT), Mindfulness-Based Stress Reduction (MBSR), Cognitive Processing Therapy (CPT), Acceptance and Commitment Therapy (ACT)

Practicum Therapist, Mental Health Clinic (MHC) 2015–present
Lexington VA Medical Center
Therapy: Lead DBT group; individual therapy (DBT, ACT, CBT)

Peer Supervisor 2014–2015
University of Kentucky Clinical Psychology Program
Description: Assisted with supervision of CBT-based therapy and leading a didactic seminar for beginning therapists

Student Clinician, Orofacial Pain Clinic 2013–2014
University of Kentucky Medical Center
Description: psychological assessments for chronic pain patients

Graduate Student Therapist; Clinic Assistant Coordinator 2011–2015
Jesse G. Harris Psychological Services Center
Therapy: Led adult DBT and parenting groups; individual therapy (DBT, ACT, CBT, CPT)
Assessments: Diagnostic clarification, ADHD evaluations, pre-employment (Fire Department)

Practicum Therapist 2011–2012
University of Kentucky Counseling Center
Therapy: Lead adult MBSR and interpersonal process therapy groups; individual therapy (CBT, ACT)

TEACHING & MENTORING EXPERIENCE

Laboratory Instructor, University of Kentucky
Graduate Level
Clinical Assessment 2015-2016
Undergraduate Level
Introduction to Psychology 2010

Application of Statistics in Psychology 2011
Community Based Education at the Harris Psychological Services Center 2012-2013
Research Methods in Psychology 2014

Curriculum Development, University of Kentucky
Curriculum development for an online Introductory Psychology course 2011

PROFESSIONAL AFFILIATIONS

Association for Behavioral and Cognitive Therapies (ABCT) 2009–present
American Psychological Association (APA) 2014–present
Gerontological Society of America (GSA) 2015–present

PROFESSIONAL ACTIVITIES

Member: ABCT Research Facilitation Committee 2015–present

Ad Hoc Reviewer: *Anxiety, Stress, and Coping; Psychiatry Research; Mindfulness.*

Representative: Harris Psychological Services Center
Clinical Psychology applicant interview presentation and Q&A 2012–2013

PROFESSIONAL DEVELOPMENT

Curran-Bauer Analytics, Chapel Hill, NC
Multilevel Modeling Workshop 2016

Mind and Life Summer Research Institute 2014

Mindware Technologies Ltd.: Heart-Rate Variability Workshop 2012

Association for Behavioral and Cognitive Therapies Clinical Intervention Training
Acceptance and Commitment Therapy 2014
Mastering the Art of Behavioral Chain Analyses in DBT 2013