# MEMORY SELF-EFFICACY AND STEREOTYPE EFFECTS IN AGING

By

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To my Grandmother

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Stereotypes are oversimplified generalizations about people that are taken to be veridical. Psychologists have explored their influence on behavior, including task performance. Recently, this research has incorporated aging stereotypes (e.g., wise, frail). Regarding behavior, several stereotype theories (e.g., Steele, 1997; Levy, 2003) have explicated this belief-performance link. Empirically, scholars have induced or emphasized stereotypes and examined subsequent effects on performance, demonstrating such emphasis can threaten and lead to poorer performance by older adults.

Another set of beliefs, self-efficacy (Bandura, 1997), has also been examined in relation to performance across various task domains, including cognitive aging. This work has focused on memory, given its increasing personal relevance as people age, and memory self-efficacy (MSE). As in other domains, results have shown that MSE can have a determining impact on memory performance. Further, research has consistently shown significant age differences, both in memory performance and MSE, favoring the young.

Surprisingly, stereotypes and self-efficacy, although both linked to performance outcomes, have rarely been examined together. The present investigation attempted to

fill this void by simultaneously examining aging stereotypes, MSE, and memory performance. Older and younger adults were exposed to aging stereotypes (positive or negative) or a control condition, asked to rate their MSE, and then performed memory tasks. Memory-related anxiety, perceived memory importance, and several other participant demographics were also captured.

In analyses of variance examining the impact of stereotype condition and aging, aging showed significant effects on MSE and memory performance, with older adults obtaining lower scores. Unexpectedly, stereotype condition did not affect MSE or performance. Recall scores were comparable across negative stereotype, positive stereotype, and control conditions. Structural equation models revealed only weak relationships among these variables for younger adults. For older adults, however, MSE predicted memory performance, and anxiety exerted an indirect effect on performance by influencing MSE. For both young and old, anxiety was comparable at baseline and increased significantly during the study. This effect was stronger for older adults. Cumulatively, these results illustrate that memory has increasing personal relevance as people age, and underscore the key roles of memory-specific anxiety and self-confidence (e.g., MSE) in predicting memory performance.

# CHAPTER 1
# INTRODUCTION

## Background

The tendency to adopt a “miserly” cognitive style may be inherently human. That is, people categorizing themselves and/or others into groups, often via stereotyping (e.g., Fisk & Taylor, 1991), is an economic and efficient way to organize a complex world. One such category for grouping individuals is age. Throughout the modern world, societies in which youth is emphasized or even glamorized, such as the United States, are fraught with age-related biases (Kite & Johnson, 1988; Kite et al., 2005). Ageism, a term originally coined nearly three decades ago by Butler (1969), refers to evaluation of someone based solely on age. Focusing on the potentially negative implications of such judgments, Nelson (2002) has concluded “age prejudice is one of the most condoned, institutionalized forms of prejudice in the world—especially in the United States—today” (p. ix). As the following paper indicates, there may also be heavy costs to such heuristics. Levy (2009) has posited ageism may be qualitatively different from other forms of discrimination. In essence, other forms of prejudice, such as racist or sexist messages, may target someone from birth, thus allowing for or perhaps necessitating coping strategies, often adopted from other in-group members, as a way to defend against them given their perceived self-relevance. Because people do not enter “old” age until later in life, they may be relatively unprepared to resist the effects of ageist stereotypes, which may make such messages more easily internalized, and all the more powerful.

Interestingly, empirical results do reflect the existence of multiple stereotypes of the elderly, including those pertaining to memory (i.e., ‘forgetful’), however data on

stereotype valence appears mixed (e.g., Hummert, 1990; Hummert et al., 1995). In other words, such stereotypes may not be exclusively negative. Both young and old endorse positive (i.e., nurturing) and negative (i.e., forgetful) traits as typical of older adults. Though this balance of stereotypes may appear comforting, age-based negative stereotypes are dominant in many youth-focused nations (e.g., Wentura & Brandstädter, 2003; Desrichard & Kopetz, 2005).

The past two decades have witnessed mounting empirical interest in the relationship between stereotyped beliefs and subsequent behavior. Theoretically, it stands to reason that negative stereotypes about older adult memory could inhibit or be detrimental to performance (e.g., Steele, 1997; Hess et al., 2003), but empirical findings in support of this relationship have been mixed (e.g., O'Brien & Hummert, 2006). As discussed later in this paper, some possible reasons for these mixed results may include inconsistent operationalization and conceptualization of precisely how stereotypes should be activated, what influence they exert on subsequent cognitive performance, mechanisms through which this impact occurs, and what determines whether or not stereotype activation leads to an effect at all.

To address this complexity, researchers have developed theoretical models to explain the impact of stereotypes on performance. Arguably, the two foremost theoretical explanations for the stereotype-performance link are self-stereotyping theory (e.g., Levy, 2003) and the concept of stereotype threat (e.g., Steele, 1997). A self-stereotype is internalized, can be activated either with or without conscious awareness, and occurs in response to both positive and negative stereotypes. Stereotype threat is not internalized, occurs only with awareness (i.e., consciously) and in response to

negative stereotypes, and exerts its effect by increasing anxiety. For purposes of this discussion, the impact of stereotypes on performance, from either perspective, will be called a stereotype effect. Both theories will now be considered in greater detail.

## Self-Stereotyping Theory

Early research focusing on stereotypes aimed to explicate their influence on people's views and judgments of others as opposed to how they might affect self-perception (Jost & Banaji, 1994). More recently, however, increased scientific attention has focused on the latter. One of the most consistent and methodologically diverse programs of research aimed at self-perception in aging has been that of Levy (1996; 2000; 2003) and colleagues (e.g., Levy & Langer, 1994, Levy et al., 2000). According to Levy (2003), aging self-stereotypes are distinguished by three characteristic elements:

- They originate in the form of aging stereotypes as early as childhood and are reinforced in adulthood.
- Aging self-stereotypes, as well as aging stereotypes, can operate below awareness (unconsciously).
- In old age, aging stereotypes become aging self-stereotypes

Given memory's heightened salience among the aged (e.g., Poon, 1985; Dark-Freudeman, West, & Viverito, 2006), recent research has examined the impact of aging stereotypes on older adult memory performance (e.g., Levy, 2003; Hess et al., 2007; O'Brien & Hummert, 2006). In one of the earlier studies within the domain of older adult memory, Levy and Langer (1994) compared aging attitudes and memory performance in three cultures presumed to have contrasting valenced views of aging-- American (negative view), American deaf (more neutral view), and Chinese (positive view). Four types of memory performance were measured; immediate, learned, delayed, and

probed recall. When recruited, participants were not told that the study consisted of memory tests. Consistent with their hypotheses (and Levy's theory), the Chinese older adults were found to hold the most favorable views of aging followed by the American deaf and then American hearing participants. Recall performance mirrored this order, that is, Chinese performed best, followed by deaf and then hearing Americans. This result was true across all four recall tasks. Though an impressive result, the precise mechanisms through which this occurred were not elucidated, a recurrent theme in stereotype literature. The authors posited that internalization of differential beliefs in the two cultures explained their results (Levy & Langer, 1994).

Consistent with other work examining the potential malleability of stereotypes (e.g., Blair, 2002; Guo, Erber, & Szuchman, 1999), Levy (1996) attempted to clarify these cross cultural findings (Levy & Langer, 1994) and more directly illustrate the possibility of performance benefits for positive stereotypes. She measured performance both before and after the use of either negative (e.g., Alzheimer's, senile) or positive (e.g., wise, sage) primes. Priming occurred via both explicit and implicit manipulations and results showed that only the latter affected memory performance. Consistent with her hypotheses, overall, negative primes reduced, whereas positive primes increased subsequent memory recall among the sample's older (but not younger) adults. The fact that younger adults' performance was not affected supports Levy's (1996) theoretical emphasis on personal relevance. To the young participants, the aging stereotypes were not considered personally relevant and therefore did not lead to self-stereotyping.

In a similar vein, Yoon et al. (2000) utilized a sample of English-speaking Canadians and recent Chinese Canadian immigrants. Across age, Chinese immigrants

showed more favorable views toward the aged than the Anglophone non-immigrant Canadians. Among younger adults, both groups (Chinese immigrant and non-immigrant) showed comparable memory performance. Chinese older adults, however, performed significantly better than non-immigrant older adults, and both groups of older adults performed worse than their younger counterparts on most of the memory tasks, consistent with Levy and Langer (1994). The more positive views toward aging and smaller age differences in performance among those of Chinese origin, suggest a potentially important impact of cultural or societal views on performance. However, this apparently more "positive" view did not significantly mediate these performance differences, nor were such differences consistent across all the memory tests. This study, therefore, only partially supported Levy and Langer's (1994) earlier work (Yoon et al., 2000).

In a replication and extension of Levy's (1996) study, Stein, Blanchard-Fields, and Hertzog (2002) included a neutral prime condition in addition to the positive and negative age stereotypes. Consistent with Levy's earlier work, negative primes led to decreased performance among older adult participants and there were no significant priming effects on young adult performance. Contrary to Levy's findings, however, priming a positive age stereotype did not increase older adults' memory performance. The authors attributed this to their small sample size and limited statistical power (Stein et al., 2002). Other empirical work has in fact shown the potential performance boost of positive stereotype effects, in some cases removing significant age differences in memory performance among young and older adults (e.g., Hess et al., 2003).

Perhaps the most convincing support for self-stereotyping has been its broad reach across various functional domains beyond memory (e.g. Levy, 2003). Some of this work has examined and empirically supported the relationships between older adult negative self-stereotyping and increased physiological response to stress (Levy et al., 2000), poorer handwriting (Levy, 2000), and slowed gait speed (Hausdorff, Levy, & Wei, 1999).

## Stereotype Threat

An alternative to self-stereotyping theory is Steele's approach to stereotype effects (e.g., Steele & Aronson, 1995; Steele, 1997). Like self-stereotyping, this theory emphasizes the personal- or self-relevance of the negative stereotype. However, this approach emphasizes negative stereotypes only and frames stereotype effects in terms of stereotype threat. For threat to occur and actually impact performance, according to Steele (1997), the assessment context must be perceived as diagnostic of the stereotyped ability, and the individual must also attach high importance to this ability (e.g., domain identification; Steele, 1997). Theoretically, these conditions are both necessary and sufficient for performance to be affected. Some empirical evidence has also illustrated such a pattern (e.g., Hess et al., 2003). Less clear, however, has been empirical support for the theoretically relevant mechanisms (e.g., anxiety, motivation) through which "threat" reduces subsequent performance.

As referenced above, crucial to Steele's (1997) theory is the extent to which the individual identifies with the given functional domain. Threat is "cued by the mere recognition that a negative group stereotype could apply to oneself in a given situation…How threatening this recognition becomes depends on the person's identification with the stereotype relevant domain" (p. 617). In sum, people who identify

most with a particular domain are most likely to consider that domain self-definitional and consequently are most vulnerable to threat.

Further, the theory speculates that increases in perceived threat may relate to anxiety and motivation which in turn can impair performance. In fact, Steele and colleagues (e.g., Steele, 1997; Spencer et al., 1999; Steele & Aronson, 1995) have demonstrated this empirically with gender-related stereotypes and math performance, and racial stereotypes and academic achievement. I now consider empirical studies in aging conducted in accordance with the stereotype threat theoretical framework.

In a study manipulating task-instructions, Chasteen et al. (2005) attempted to both elicit and then directly measure stereotype threat. The authors compared two tasks, one memorization and the other impression formation. Participants in the memorization condition were instructed to “remember exact wording” while those in the impression formation group were asked to “form an overall impression.” The authors hypothesized that for older adult participants, the memorization condition would induce threat, consistent with aging stereotypes about memory decline, and lead to age-related differences in recall performance. Measures of perceived threat, anxiety, and self-efficacy were also included in this study. Consistent with their hypotheses, the authors did find age differences in recall, and stereotype threat did mediate the relationship between age and memory performance, with older adults perceiving greater aging and memory-related stereotype threat than the younger participants. In addition, anxiety was higher for those in the memorization condition across all ages, but it did not mediate the relation between instruction type and performance. Self-efficacy did not

mediate the link between instruction type and memory performance although those in the memorization condition reported lower self-efficacy (Chasteen et al., 2005).

Desrichard and Kopetz (2005) employed a similar design and obtained a comparable pattern of results. Tasks were described as either orientation or memory based. Older adult memory performance was significantly worse when instructions emphasized the memorial component. Although the authors did not measure anxiety, they did offer the possibility that their memory emphasis condition may have induced a high level of anxiety related to memory stereotypes of the elderly. Such anxiety, the authors speculated, may have impacted those lowest in memory self-efficacy, and mediated the decrease in observed task performance (Desrichard & Kopetz, 2005). Perhaps most prolific in conducting empirical tests of stereotype threat's theoretical premise have been Hess and colleagues (e.g., Hess et al., 2003; 2004; 2007).

Hess et al. (2003) elicited stereotype effects through the use of four fictitious "newspaper-type" reports that they created and had participants read prior to recall. Two reports discussed findings demonstrating older adults' inferior memory ability as compared to young adults, highlighting older adults' inevitable need to become dependent on others due to diminishing skills. This was the negative stereotype condition. The other two analogous reports illustrated more positive discoveries about the relationship between memory and aging. To then measure and confirm that stereotypes were activated, participants viewed word pairs on a computer monitor each consisting of a prime (young or old) and a trait. They were then told to ignore the first word (prime) and rate as good or bad the second word in each pair. Participant responses were timed. Faster judgments of negative traits, and slower judgments of

positive traits, immediately following the “old” rather than “young” prime, were considered evidence of automatic (implicit) activation of stereotypes. The authors concluded that activation of the “old” prime simultaneously activated semantically consistent words, which served as stereotype relevant cues, thus facilitating more rapid retrieval.

In addition, prior to entering the test environment, Hess et al. (2003) had participants complete the Metamemory in Adulthood -Achievement (MIA-Ach; Dixon & Hultsch, 1984) subscale which assesses value that individuals place on their memory ability, and the Metamemory in Adulthood-Anxiety (MIA-Anx; Dixon & Hultsch, 1984) subscale, an explicit measure of anxiety associated with memory performance. Memory performance was subsequently assessed via a free-recall task using a 30-item list of moderate to high frequency words from six semantic categories. Strategy use was measured by clustering at recall. What did the authors find? Older adults who read negative reports about aging and memory had poorer recall while those who read positive reports had better recall, a finding illustrative of the typical impact of threat. Also consistent with stereotype threat theory (Steele, 1997), performance was most negatively affected for older adults in the negative condition who also expressed investment in their memory ability. No significant effects were observed for anxiety, contrary to Steele’s theoretical view (Hess et al., 2003).

In another study, Hess et al. (2004) provided participants with sets of five words and asked them to complete a scrambled sentence task. For each set, participants had to construct a sentence with four of the five words. To activate stereotypes, the words were organized according to stereotypicality (age-stereotype relevant) and valence

(positive or negative). Aging negative (e.g., cranky), positive (e.g., distinguished), and neutral (e.g., book) words were printed on index cards. In addition to condition assignment based on these words, participants were further divided into aware and unaware conditions. Index cards in the aware condition contained words highlighted in yellow, and participants were told that two thirds of these words contained a trait often associated with views of older people, and they were instructed to use and underline these words in forming their sentences. Participants in the unaware condition did not receive such instructions nor were their index cards highlighted. After this task, all participants were given a memory recall test.

What did the authors find? As hypothesized, older adults performed worse when exposed to negative than to positive stereotype primes. This finding was strongest for those in the unaware condition. Performance of participants in the aware condition was not significantly affected by prime valence (positive vs. negative). Among participants exposed to positive stereotypes, performance was comparable across age. Younger adult performance was not significantly affected by exposure to aging stereotypes (Hess et al., 2004).

In a study utilizing an exclusively older adult sample, Hess et al. (2007) divided participants into two groups, young-old (ages 60 to 70 years) and old-old (71 to 82 years). All participants were informed that the study was examining predictors of memory performance. However, the authors then manipulated task instructions such that half the participants (“threat” condition) were told the study’s purpose was to better understand why younger participants had outperformed older adults in prior research, while the other half (“non-threat” condition) were told they’d be taking a test that was

free from age-related bias, as evidenced by comparable scores between younger and older adults on this type of test in the past. In addition, only those in the “threat” condition were also asked to indicate their age on a piece of paper. Using their previous memory recall task (Hess et al., 2003), the authors again found significant stereotype threat effects on performance. Interestingly, the most negative impact occurred for younger members of the sample (aged 60 to 70) and those with higher education levels (Hess et al., 2007).

In a mixed age sample divided into young, middle-aged, and older adults, Andreoletti and Lachman (2004) assigned participants to one of three experimental groups and then informed them about a memory test. One group (aging-stereotype) was told that prior research had shown that young adults generally outperform older adults on the test. The other group (counterstereotype) was told that prior research had shown no age differences on test performance and that all ages could remember the same number of words. In addition, participants in both groups were told to pay attention to which test they were taking as they would be asked to let the researcher know later in the session. A third group received no information about performance and served as a control condition. After recall, as a manipulation check, the authors assessed how accurate participants were in recalling the information given to them at session onset. The majority (91%) of participants correctly identified whether they had been given stereotype or counterstereotype information. Perhaps more importantly, and consistent with the studies above, performance was lower for those in the stereotype than the counterstereotype condition across all ages, for those with higher education. Participants lowest in education, across both stereotype and

counterstereotype conditions, showed lower recall than the control group (Andreoletti & Lachman, 2004). This apparent moderating role of education will be discussed in more detail later.

Considering the above literature, it is apparent that although self-stereotyping (e.g., Levy, 2003) and stereotype threat (Steele, 1997) theories share some overlapping characteristics, they are nonetheless distinct. Both theories attempt to account for the potentially negative impact of stereotypes on performance, and are applicable to older adults and cognitive performance (e.g., memory). They differ, however, in that self-stereotyping theory (e.g., Levy, 2003) posits both positive and negative stereotypes can have an impact, and this can occur consciously and/or unconsciously, whereas stereotype threat, as the name suggests, focuses primarily on the negative (threatening) impact of negative stereotypes. In addition, stereotype threat posits such effects are activated via conscious awareness, and will impact performance via increased anxiety, though it is clear from the articles reviewed above that empirical support for this has been mixed.

In light of the differences between these two views, one study attempted to directly compare the two theoretical approaches vis-à-vis older adult memory performance (O'Brien & Hummert, 2006). The study's goals were "to contrast stereotype threat and self-stereotyping accounts of behavioral assimilation to age stereotypes and to investigate the role of identity in that process" (p. 338). Behavioral assimilation, in this case, referred to actions or performance conforming to or consistent with a particular stereotype. In their sample of late middle-aged adults (48-62 years; *M* = 54), the

authors focused on the extent to which participants identified with the particular age group (i.e., middle-aged vs. older adult).

What did the authors find? Most relevant, and consistent with self-stereotyping theory (Levy, 2003), participants who believed their performance was being compared to an “old” group performed significantly worse on word recall than those who were informed they’d be compared to a young (<25 yrs.) group or those to whom no mention of a comparison group was made at all (i.e., control group). The authors interpreted this finding as evidence that comparison to “old” individuals actually primed negative stereotypes about elders and memory loss, thus contributing to diminished performance. Additionally, those in the “old” comparison condition reported feeling more anxious while engaging in the recall tests. Though increased anxiety is addressed more directly by stereotype threat (e.g., Steele, 1997), the fact that this was purportedly induced by the “old” prime is more consistent with self-stereotyping. Therefore, the authors concluded that their results yielded support for self-stereotyping but not stereotype threat (O’Brien & Hummert, 2006). Beyond the battle for theoretical supremacy between self-stereotyping and stereotype threat concepts, the authors suggested a third perspective, specifically in reference to the posited importance of stereotyped group membership. Activation of any stereotype, they asserted, can potentially lead to behavior consistent with that stereotype, regardless of group identification. In fact, though a bit less popular than the other two theories, some empirical evidence does support this idea (e.g., Bargh, Chen, & Burroughs, 1996; Wheeler & Petty, 2001).

Similar to Steele's (1997) theoretical focus on domain identification, the key issue may be differential vulnerability, that is, those who actually identify with or feel they belong to the stereotyped group are most susceptible to the stereotype effects. Presumably, those for whom the stereotyped group is more personally relevant may have a lower threshold for threat, and thus are more likely to be powerfully affected by stereotype activation. It follows that older adults, who identify as "old," and for whom memory performance appears to be highly salient (Dark-Freudeman, West, & Viverito, 2006), should constitute a group particularly susceptible to the impact of age-related memory stereotypes and the concomitant anxiety associated with activities they perceive as diagnostic of memory ability. Barring some exceptions, this theoretical link between memory salience and concomitant vulnerability to aging stereotypes and their subsequent impact on memory performance, has been confirmed empirically as well (e.g., Levy, 1996; Stein, Blanchard-Fields, & Hertzog, 2002).

## Mediators and Moderators

The literature reviewed thus far suggests consensus is lacking, both theoretically and empirically, regarding the impact of stereotype effects on performance. It seems safe to conclude that positive, negative, conscious, and unconscious stereotype effects can have an impact on individuals and their subsequent performance. But is this impact direct or are other variables equally or even more relevant for explaining stereotype effects? Attempts to identify the precise mechanisms through which stereotypes exert their impact on performance have also proven inconclusive.

Consistent with Steele's (1997) conceptualization described earlier, not everyone from a stereotyped group will be affected by or susceptible to "threat" to the same degree. Rather, most relevant are the individual differences in salience of a particular

domain, or more precisely in Steele's (1997) terms, domain identification. "For the domain identified, the situational relevance of the stereotype is threatening because it threatens diminishment in a domain that is self-definitional...For the less domain identified, this recognition is less threatening or not threatening at all, because it threatens something that is less self-definitional" (p. 617). In spite of the intuitive appeal of this view, empirical support for the importance of domain identification has been mixed (e.g. O'Brien & Hummert, 2006; Hess et al., 2003).

Among those who are most domain-identified, Steele (1997) theorizes their performance may be compromised by situational, threat-induced "interfering anxiety" (p. 168). Though he has found some empirical support for this theoretical claim in his own work focusing on gender and racial differences in achievement test scores (e.g., Spencer et al., 1999; Steele & Aronson, 1995), evidence for the relevance of anxiety in aging literature has been mixed (e.g., Hess et al., 2007), with some studies even showing higher anxiety levels among younger adults (e.g., Chasteen et al., 2005).

In terms of cognitive aging, investigators have become increasingly aware of the need to empirically investigate these and other possible mediators and moderators relevant to the stereotype-performance link (e.g., Chasteen et al., 2005; Shapiro & Neuberg, 2007). Recent empirical attempts to identify such mechanisms will be considered now.

Adhering to Steele's (1997) conception of stereotype threat, Hess et al. (2007) explored the potential moderating impact of age, anxiety, education, and concerns about being stigmatized ("stigma consciousness") on stereotype effects and memory performance. The authors utilized an exclusively older adult sample which they

dichotomized into young-old (60 – 70 yrs.) and old-old (71 - 82 yrs.). Those in the threat condition were informed that the primary purpose of the study was to explain why young and old perform so differently on memory tests, and were then asked to indicate their age on a piece of paper. Those in the non-threat condition were told the test they were taking was free of age-related bias, so as to avoid any contaminating factors, and that adults of all ages had performed similarly in the past (Hess et al., 2007).

Results showed that age, education, and stigma consciousness all moderated the impact of threat on performance. Consistent with other cognitive aging studies (e.g., Neupert et al., 2006), those highest in education were most susceptible to threat. In addition, the impact of the other moderating variables was particularly evident in the younger part of their exclusively older adult sample. There are several plausible explanations for why this would be the case for the young-old participants. Perhaps the transition from middle to adult life is a particularly sensitive time period. Perhaps those on the cusp of older adulthood place greater importance on their cognitive (memory, in this case) abilities and interpret any consciously perceived lapses as indicative of "decline." Additionally, recall predictions/expectations were found to mediate threat's impact. Those who were exposed to threat made more cautious, conservative predictions of their performance. Why? Perhaps they were bracing themselves for potentially poor performance, which may be a testament to the degree of perceived threat they felt. The authors attempted to explain this result in terms of motivation and its influence on task approach (Hess et al., 2007). Specifically, positive stereotypes were posited to elicit a promotion focus, that is, an attempt by participants to maximize performance even at the risk of errors. Conversely, negative stereotypes were thought

to lead to prevention focus, a more cautious approach that may sacrifice peak performance in favor of minimizing errors.

Though this promotion/prevention dichotomy seems feasible and is rooted in prior literature (e.g., Seibt & Förster, 2004), in terms of motivation, an alternative explanation seems plausible. Among those exposed to negative stereotypes, increased perceived threat may lead to increased motivation for high performance. That is, participants who feel particularly threatened and by extension, challenged, can respond in one of two ways. They may be motivated to exert extra effort to succeed in spite of the challenge, or, they may feel unmotivated, if they feel that additional effort would be futile given such challenging (threatening) conditions. In the authors' language, negative stereotypes might lead to promotion. It is puzzling that this possibility was not addressed, especially given Hess et al.'s (2003) earlier findings that strategy use (a possible indication of motivated effort) was determined to account for approximately 58% of the variance associated with stereotype threat effects in recall.

Considering the theoretical importance Steele (1997) ascribes to anxiety, Hess et al.'s (2007) finding that state anxiety was not significantly related to performance is important. The authors attributed this to their methodology. Specifically, Hess et al. (2007) concluded that given the broad (non-memory-related) anxiety measure used, and it's high intercorrelation with measures of affect (e.g., PANAS), it may not have accurately captured responses to the working memory task.

As cited earlier, in a study of young, middle-aged, and older adults, Andreoletti and Lachman (2004) also considered the moderating impact of education. Specifically, the authors examined its potential influence on resilience and susceptibility to effects of

memory aging stereotypes. Consistent with prior studies examining possible performance benefits of positive stereotypes (e.g., Levy, 2003), the authors hypothesized that memory recall would be higher among those who received counterstereotype information than those receiving either stereotype or unrelated information. The authors' results, in fact, did support this hypothesis across all ages. However, their findings for the role of education directly contrasted those of Hess et al (2007). Among those lowest in education, recall performance was weaker for both stereotype and counterstereotype information conditions, as compared to the control group.

How did the authors interpret these results? They argued that the more highly educated participants were not susceptible to negative stereotypes and were most able to benefit from positive (counter) stereotypes. Conversely, those with less education did not carefully process the distinguishing information presented by experimenters. Taken together, the authors concluded, mere exposure to age-based stereotype information, regardless of its valence (i.e., positive vs. negative), is sufficient to activate threat and diminished performance (Andreoletti & Lachman, 2004).

Data cited from the above studies demonstrates that in addition to effects of the stereotypes themselves, other variables may be important in determining their influence, positive and/or negative, on performance. The preponderance of evidence suggests older adult memory may be increasingly susceptible over time to stereotype effects, but is this applicable to all older adults? Is performance affected equally? What role, if any, might individual differences play? Why may some individuals be more easily influenced by stereotype effects than others? These questions seem to lack empirical answers. In

fact, much of the theoretical work on stereotypes and cognition seems to address these nuances only peripherally. Aside from a few exceptions (e.g., Chasteen et al., 2005; Desrichard & Kopetz, 2005), another form of beliefs, self-efficacy, has received minimal consideration in the extant literature examining stereotypes and cognitive aging. The relevance of memory self-efficacy (MSE) to aging stereotype effects and memory performance will now be considered in detail.

## Memory Self-Efficacy

According to Bandura's theory of social cognition, self-efficacy is defined as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p.3). Implicit in this definition is the notion that people are active, agentic contributors, rather than solely determiners or recipients of what actually happens to them. People are simultaneously *agents* and *objects*, at once acting on the environment and reflecting and acting on themselves. Self-efficacy is one's sense of competence and confidence for a given task in a given domain. It is neither a global self-evaluation nor a static, fixed entity. "It is dynamic and malleable, subject to changes in task demands, situational determinants, social context, and individual development" (Berry & West, 1993, p.353). In terms of behavior, this construct is theoretically conceptualized and most empirically valid and measurable at the domain level (e.g., memory self-efficacy; MSE). Self-efficacy levels in one domain of function, such as public speaking, would not be expected to significantly correlate with performance in a different domain (e. g., physical exercise).

Does MSE vary by age? Indeed, the empirical data suggest that the answer is yes. In their comprehensive review of the literature, Berry & West (1993) found strong converging evidence for a poorer sense of MSE in older adults relative to young adults.

This has been observed across several different types of measures, including MSE factor scores derived from the Metamemory in Adulthood questionnaire (Cavanaugh & Poon, 1989; Hertzog, Dixon, & Hultsch, 1990; Hultsch, Hertzog, Dixon, & Davidson, 1988), single item self-efficacy predictions for memory tasks (Hertzog et al., 1990; Rebok & Balcerak, 1989), and multilevel, task-specific measures of MSE strength & level (Berry et al., 1989; West et al., 2002; West & Yassuda, 2004; West et al., 2005).

What about the relationship between MSE and performance? Perhaps the most compelling and consistent evidence among older adults has been found by West and her colleagues (e.g., West et al., 1984; Berry et al., 1989; West et al., 1992; Berry & West, 1993; Welch & West, 1995; West et al., 1996; West et al., 2001; West et al., 2003; West & Yassuda, 2004; West et. al., 2005; Bensadon et al., 2007; West et. al., 2007; West et al., 2008). Studies exploring the impact of goal-setting and feedback on memory have often found that older adults exhibit lower MSE and poorer memory performance than their younger counterparts. But which comes first? Though some data have been correlational in nature, Bandura (1993) explains the beliefs-performance relationship in terms of reciprocal causation, that is, a bidirectional chain whose links include individuals, their environment, and their behavior. Others (e.g., Berry & West, 1993) have referred to this as a feedback loop where performances influence future judgments of self-efficacy that, in turn, influence future performance.

In spite of this bidirectionality, self-efficacy theory tends to emphasize the preeminence of beliefs. Initially, it is posited, individuals hold beliefs about their capacity in particular domains, even prior to performing relevant behaviors (Bandura, 1993). Such beliefs derive from four main sources; enactive mastery experiences,

which serve as indicators of capability; vicarious experience, which alters efficacy beliefs via transmission of competence and comparison with attainments of others; verbal persuasion and social influences (including stereotypes) that communicate to the individual that he or she has certain capabilities; and physiological and affective states, from which individuals judge their own capability, strength, and vulnerability to dysfunction (Bandura, 1997). These beliefs are theorized to then have a direct impact on performance. Cervone and others (e.g., Cervone et al., 2001) have offered empirical support for this concept, demonstrating the unique contribution of self-efficacy to performance, independent of ability and past performance accomplishments.

This emphasis on beliefs is also somewhat consistent with memory training literature. Surprisingly few memory interventions have focused on enhancing self-efficacy, opting instead to target performance and related strategies directly (Floyd & Scogin, 1997). Though they have had success in improving memory performance, such interventions have rarely been able to elicit accompanying (and enduring) changes in beliefs (e.g., Rapp et al., 2002; Woolverton et al., 2001). Guided by Bandura's (1997) theoretical principles, West, Bagwell, and Dark-Freudeman (2008) were successful in developing a multifactorial training program designed to improve both memory self-efficacy and performance. The program achieved these goals and the increased MSE levels were found to predict memory performance post-intervention.

As stated above, it seems that efficacy beliefs may be more predictive of performance than vice versa. Similar directional patterns have been evidenced in the memory stereotype literature. Older participants tend to display lower baseline memory performance than their younger counterparts (e.g., Stein, Blanchard-Fields, & Hertzog,

2002). Further, virtually all of the memory-stereotype literature cited thus far that has utilized mixed age samples (i.e., both young and older adults), has found that activation of age-based stereotypes affects older adults' performance but not that of younger adults (e.g., Levy, 1996; Chasteen et al., 2005). Though there are several theoretical explanations as to why this may occur, the MSE literature reviewed above suggests that memory as a domain is more salient for older adults, who often have lower levels of MSE (e.g., West & Yassuda, 2004). Similarly, the stereotype literature reviewed above (e.g., Steele, 1997; Levy, 2003) suggests that the impact of stereotyping is greatest for those who identify with the stereotyped group and view the stereotyped domain as personally relevant. Taken together, it seems curious that most research examining the relationship between stereotypes and memory performance, and MSE and memory performance, has been conducted separately. The preponderance of evidence suggests that both types of beliefs, MSE and stereotypes, are relevant to subsequent performance. What appears unclear, however, is which of these sets of beliefs, if either, carries more weight and is more influential vis-à-vis memory performance. Strangely, the interplay of these constructs, at least by name, has rarely been investigated. This may be a result of the fact that work explicitly addressing stereotype effects on memory performance is still relatively nascent.

Prior cognitive aging literature, both theoretical and empirical, that has addressed memory beliefs and their impact on performance, may have been examining stereotypes without necessarily identifying them as such. Studies by Dixon and Hultsch (1983) and Cavanaugh et al. (1983), have found that older adults say that memory is important to them, rate themselves as having an adequate memory, but still report more

instances of memory failure than do younger adults. It seems reasonable that although these studies did not explicitly refer to (or measure) them by name, memory and aging stereotypes may have contributed to older adults' formulation of beliefs, particularly regarding their own memory self-assessment and performance expectations.

An everyday example of this seems illustrative. An elderly woman meets someone she knows at a restaurant and is unable to recall that person's name. Aside from being embarrassed, she may become exceedingly discouraged and unsure of herself, and perhaps due to stereotype threat, she may become anxious that she is "losing it." Attributing this memory lapse to an overall deficit in memory capability, rather than an isolated instance of forgetfulness, the older adult may suffer a reduction in self-efficacy, which, in turn, may decrease the likelihood of attending that or any restaurant in the future, due to fear of similar embarrassment. As Bandura (1997) points out, scenarios such as these, "in which individuals happen to perform poorly, can, in themselves, come to activate a sense of incompetence that impairs future performance in those particular contexts" (p.18). But where do so such belief-systems and expectations come from? What is guiding them? Certainly actual decrement may occur, especially over time (e.g., Baltes, 1997; Freund & Ebner, 2005). Objective decline aside, stereotypes may also be contributing to these expectations of both self and others.

Because of the stereotypical expectation across ages that memory inevitably declines in late life, older adults may interpret each memory lapse as further evidence of age-related cognitive decline (self-stereotyping) while younger individuals free of such expectations can and do attribute the same lapses to other phenomena unrelated to

decline, such as low interest, stress, or distraction. Gerontologists have referred to this as an “age-based double standard,” and have noted its influence on memory in particular (Zarit et al., 1981; Erber, 1999; Erber et al., 1996; Erber et al., 1992; Erber & Rothberg, 1991; Erber et al., 1990). This coincides with most of the stereotype literature, both theoretical and empirical, which has consistently described and demonstrated differential effects on performance across age.

In spite of the potential theoretical relevance of self-efficacy, surprisingly few studies of stereotype effects and memory aging have incorporated MSE (e.g., Chasteen et al., 2005). Of these, only one measured MSE in a manner consistent with Bandura’s (1997) theoretical conceptualization (e.g., Desrichard & Kopetz, 2005). In their 2005 study, Desrichard and Kopetz manipulated task-instructions and compared the subsequent memory performance of young and older adults. Tasks were explicitly presented as either memory-related or non-memory related. When instructions emphasized the memory component of the task, older adult performance decreased along with MSE. This did not occur for younger adults. In addition, when instructions did not emphasize memory, this relationship was not significant. Further, the authors found that older adult performance expectations, a construct accounted for by Bandura’s (1997) broader self-efficacy theory, were sensitive to task-instructions and acted as a partial mediator of the link between stereotype effects and performance. Once again, this was not significant for younger adults. In fact, for one memory task, explicit mention of the memory component was associated with increased performance expectations for the young. Overall, the authors interpreted their results as evidence for stereotype threat, though they did not explicitly attempt to measure degree of threat.

These results provide solid empirical support for MSE's role in the link between aging stereotypes and memory performance.

Chasteen et al.'s (2005) study manipulating task instructions also sought to examine self-efficacy as a potential mediator of stereotype threat effects on performance. As mentioned earlier, the authors did not utilize a specific, comprehensive MSE measure (e.g., MSEQ-4). Rather, a brief, general scale was created, on which participants' indicated agreement with five statements (e.g., I am unsure if I have the ability to do well on this task). Unlike much of the MSE literature cited above, there were no significant age differences in self-efficacy, which calls into question the validity of their scale.

# CHAPTER 2
# CURRENT STUDY

In spite of progress in understanding and disentangling the interrelationships among aging stereotypes, memory beliefs and performance, several gaps in the extant literature remain, particularly regarding variables that influence stereotype effects. The current research, patterned in part after Hess et al. (2004), attempted to fill some of these gaps. The study had several primary aims. First, this study simultaneously examined the effects of stereotypes on older adult memory self-efficacy and memory performance. To the author's knowledge, this is among the first empirical attempts to do so. In addition, activation of both positive and negative stereotypes allowed for the direct test of self-efficacy's role, including its potential to buffer any negative impact of stereotype effects on performance. As mentioned earlier, self-efficacy theory postulates that poor performance in a specific domain results from low self-efficacy. Stereotype threat theory, however, posits other variables such as domain identification and anxiety as factors determining extent of threat and resulting performance decrement. The current study empirically tested both theories. To reiterate, although recent articles investigating aging stereotype effects have begun to consider the self-efficacy construct (e.g., Chasteen et al., 2005), only one (see Desrichard & Kopetz, 2005) has used a comprehensive measure of domain-specific memory self-efficacy in accordance with Bandura's (1997) theory.

This research also offered the chance to empirically test some of Steele's (1997) assertions, based on stereotype threat theory, which have yielded mixed empirical results (e.g., Hess et al., 2003; Hess, Hinson, & Statham, 2004; Bargh, Chen, & Burrows, 1996). According to Steele's theory, identification with the stereotyped group,

value placed on the domain, and resulting anxiety, all contribute to the occurrence of threat and can impact performance (Steele, 1997). In addition to explicitly measuring anxiety, the current study used both young and older adult participants, for whom memory and related stereotypes are posited to be differentially salient, as well as explicit measures of domain identification.

Another strength of this research pertains to methodology. At present, consensus is lacking as to which type of stereotype activation is most effective and meaningful. Extant research has attempted to activate stereotypes both implicitly (e.g., Levy, 2003) and explicitly (e.g., Chasteen et al., 2002). Given the current lack of a methodological "gold standard," the current study employed both approaches so as to enhance the activation process. Furthermore, a manipulation check was utilized to assess whether stereotype effects were, in fact, actually perceived by study participants. This is a step that has not been universally employed in the extant literature (e.g., Desrichard & Kopetz, 2005).

Finally, other potentially relevant variables were assessed, so as to gain as comprehensive a picture as possible when accounting for factors that contribute to the stereotype-performance relationship. Figure 2-1 provides a model of the hypothesized interrelations among the respective constructs when positive or negative stereotypes are activated. The model includes the three latent factors--MSE, memory performance, and memory anxiety—as well as two predictor variables, age and stereotype condition. Specific hypotheses follow.

## Hypothesis 1

Consistent with Levy (2003), it was hypothesized that older adult memory performance would be lowered by negative stereotype activation and increased by

positive stereotype activation. Specifically, in comparison to older adults in a control group, memory recall performance would be lower among those exposed to negative stereotype activation, and higher among those exposed to positive stereotype activation. Conversely, memory performance of younger adults would not be significantly altered by stereotype activation such that recall scores across all conditions--positive stereotype, negative stereotype, and control--would not be significantly different. This was predicted to be evidenced by a 2-way interaction between age group and stereotype condition, with memory performance as the dependent variable.

### Hypothesis 2a

It was also expected that stereotype condition would have a similar impact on MSE. A 2-way interaction between age group and stereotype condition was hypothesized with MSE serving as the dependent variable. Compared to older adult participants in a control condition, those exposed to negative stereotypes were expected to display lower levels of MSE and those exposed to positive stereotypes were expected to show higher levels of MSE. This effect was not anticipated to occur for younger adults.

### Hypothesis 2b

As an extension of the first two hypotheses, it was also expected that MSE would mediate the stereotype-performance relationship with both negative and positive stereotypes, for older adults only. Consistent with Baron and Kenny's (1986) criteria for mediation, the univariate relationships between stereotype condition and memory performance, and MSE and performance were each expected to be significant. However, once variance attributable to MSE was statistically controlled, stereotype

condition effects were predicted to be attenuated, such that their relationship to older adult memory performance would no longer be statistically significant. The association between MSE and performance, however, was expected to remain significant, irrespective of stereotype condition (i.e., positive, negative, control).

### Hypothesis 3

As cited earlier, in spite of its posited theoretical importance, empirical support for the relevance of stereotype-related anxiety and its impact on performance has been mixed (e.g., Steele, 1997; O'Brien & Hummert, 2006). Further, physiological arousal and other self-regulatory factors, including anxiety, are theorized to be one of the four sources from which self-efficacy beliefs are derived (Bandura, 1993). These empirical data and theoretical claim led to the following predictions. First, stereotype effects were hypothesized to have a significant impact on older adult anxiety (MIA-Anx) score, as evidenced by a 2-way interaction between age and stereotype condition on anxiety. Specifically, among older adults, those exposed to negative stereotype effects were expected to display increased anxiety. It was unknown if positive stereotypes would lead to a corresponding decrease in anxiety as compared to participants' baseline levels.

### Hypothesis 4

To comprehensively test the interrelationships proposed in the above hypotheses, a structural equation model of the aforementioned variables was tested. Memory performance was expected to be predicted by age and MSE. MSE, itself, was also expected to be predicted by age, with lower MSE levels expected among older adults. Additionally, although stereotypes have been shown to impact performance, as illustrated by the current model, this is believed to occur via their impact on MSE. MSE

was therefore hypothesized to mediate the link between stereotype condition and memory performance; that is, the addition of condition assignment and/or anxiety into the model as a predictor of performance was not expected to improve model fit because MSE was expected to be the critical predictor of performance. Anxiety was expected to occur in response to different conditions but was not expected to have a significant impact on memory performance.

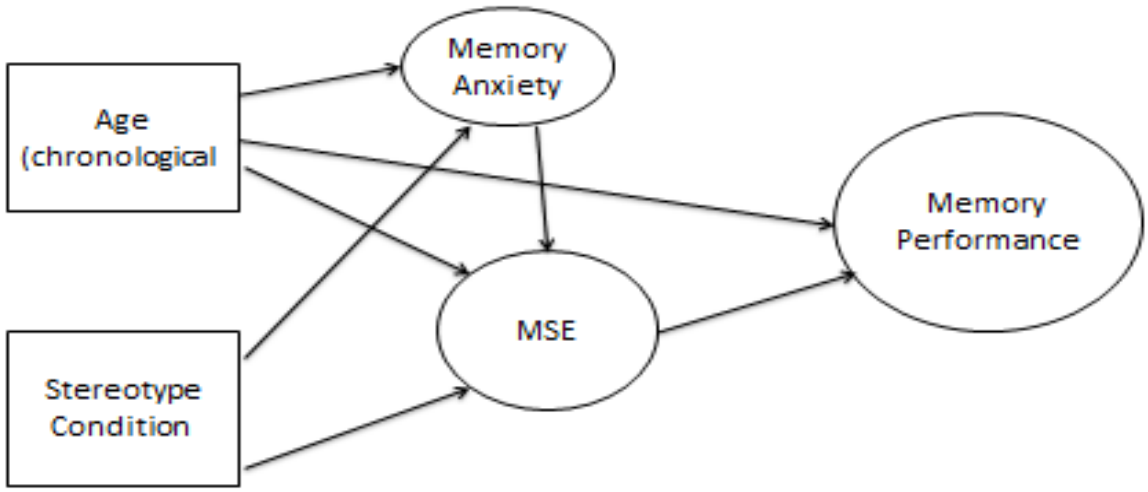


Figure 2-1. Model of hypothesized interrelations among variables when positive or negative stereotypes are activated

# CHAPTER 3
# METHODS AND PROCEDURES

## Overall Design

Initially, prospective participants were mailed a demographic questionnaire and a measure of self-reported memory anxiety for completion at home. Eligible participants from both age groups were then randomly assigned to one of three groups; negative stereotype, positive stereotype, or control. All participants were informed they would need to participate in a follow-up telephone survey consisting of remembering and making judgments about words (see appendix D). During the telephone survey, participants were administered a second wave of demographic questions including the two exploratory items (domain identification and subjective age), and then completed the first memory recall task. Participants then completed the memory self-efficacy measure and depending on group assignment, age-based stereotypes (positive or negative) were activated prior to the final recall performance. Memory-related anxiety of all participants was measured again after the second recall task and a manipulation check was employed to test whether stereotypes were induced.

## Participant Information

A total of 196 participants (68 male, 128 female) completed the written survey administered as the initial part of the study. This sample was comprised of both young and older adult participants. The young adults were University of Florida undergraduate students (*N* = 101; 75 female, 26 male) ranging in age from 18 – 25 years old. The older adults were community dwellers (*N* = 94; 52 female, 42 male), mostly from the state of Florida, ranging in age from 60 – 80 years old. Both age ranges are consistent with prior literature. Younger adult participation partially satisfied academic

requirements at the University of Florida and older adults were compensated with a $10 gift card. All participants were recruited for a study on attitudes and performance so as to disguise the memorial component.

Approximately 17% of participants did not complete the telephone interview. The results reported here are based on the remaining participants for whom we have complete survey and phone interview data (*N* = 161). Traditional demographic information was captured including gender, race, education level, chronological age, and subjective health (1 = excellent health, 10 = very poor health). Older adults constituted approximately 58% of the sample. Data were included from four older adults falling outside of the designated age range, ages 55, 57, 59, and 81 respectively. Overall, participants were predominantly female (64%, *N* = 104) and Caucasian (71%, *N* = 114). Among young adults (*N* = 67), approximately 51% (*N* = 34) were Caucasian, 28% (*N* = 19) Black, 9% (*N* = 6) Latino, 6% (*N* = 4) Asian, and 6% (*N* = 4) categorized themselves as "other." Older adults (*N* = 93) were predominantly Caucasian (87%, *N* = 80) and Black (10%, *N* =10). Sample characteristics are reported in Table 3-1.

**Cognitive Function**

Any older adult participant whose ability to complete the telephone survey seemed compromised in any way was administered the Telephone Interview of Cognitive Status (Brandt et al., 1988; *TICS*). The TICS is an 11-item, standardized testing instrument (maximum score = 41 points) originally designed to assess cognitive functioning of Alzheimer's patients in situations where in-person cognitive screening is impractical or inefficient. The test covers domains including memory, attention, and language (e.g., "Count backwards from 20 to 1"; "What do you call the prickly green plant that lives in the desert?") and correlates highly (*r* = .94) with the Mini-Mental State Examination

(*MMSE;* Folstein et al., 1975). The TICS has been validated in various languages in both its original and modified versions, and has shown high sensitivity (94%), specificity (100%), and test-retest reliability ($r$ = .965), with regard to the diagnosis of Alzheimer's disease (Brandt et al., 1998; Dal Forno et al., 2006). Published cutoff score criteria (<25; Desmond et al., 1994) were applied to the current sample. One participant was administered the test and obtained a score of 30. Adhering to these criteria, the participant was deemed competent and subsequently completed the remainder of the telephone survey. No participant was excluded due to cognitive impairment.

**Memory Anxiety**

To assess baseline memory-related anxiety, all participants completed a modified version of the Memory Anxiety (MIA-Anx) subscale of the Metamemory in Adulthood (MIA) questionnaire (Dixon & Hultsch, 1983, 1984). The MIA is comprised of seven subscales, all of which have shown good internal consistency reliability ($\alpha$ = .74 to .93; Hultsch et al., 1988). The current modified version of the MIA anxiety subscale consisted of 14 memory-related items (e.g., "I get upset when I cannot remember something") from the original instrument, interspersed with 14 distractor items (e.g., "I worry when I have to climb stairs"; "I'm not at all nervous when speaking in front of a large group") so as to de-emphasize the memorial component. All items were rated on a 1-5 Likert scale (1 = "Agree strongly", 5 = "Disagree strongly") and showed good internal consistency ($\alpha$ = .76). The average score across items was the dependent measure, with higher scores indicative of higher anxiety levels (range = 1-5). Results were examined across all three conditions to ensure there were no significant differences among baseline anxiety levels. A second administration of the MIA anxiety

subscale was conducted immediately following the final wave of memory recall. This consisted of the 14 memory-related items from the original version only, and was used as the dependent measure of memory anxiety following testing. As in prior studies, the instrument showed good reliability ($\alpha$ = .77) with the current sample.

### Memory Self-Efficacy

Immediately after the second stereotype manipulation, participants were administered the Memory Self-Efficacy Questionnaire-4 (MSEQ-4; West et al., 2003). The MSEQ-4 is a 20-item self-report measure of memory self-efficacy for distinct memory tasks. These tasks include remembering names (e.g., "If someone showed me the photographs of X people and told me their names once, I could identify Y persons by name if I saw the pictures again a few minutes later"), remembering items from a grocery list (e.g., "If I heard it twice, I could remember X items from a friend's grocery list of Y items, without taking any list with me to the store"), remembering main points from a story, and remembering the locations of household items. Individuals indicate their confidence level for performing each of these tasks at varying difficulty levels, responding on a scale from 0 ("I cannot do it") to 10 ("100% sure I can do it"). The dependent measure was self-efficacy strength, calculated as the average confidence rating across all items, ranging from 0-100 in each case. The MSEQ-4 is a valid and reliable measure of self-efficacy strength (Berry et al., 1989) and showed excellent internal consistency reliability ($\alpha$ = .91) in this sample.

### Stereotype Effects

The stereotype literature indicates that two methodological approaches have been used for stereotype activation—implicit and explicit. Most implicit activation (e.g., Levy

2003; Banaji, Hardin, & Rothman, 1993) has involved some form of exposure to positively (i.e., wisdom) or negatively (i.e., decrepit) valenced stereotype primes on a computer monitor at sub-threshold speeds. This approach is posited to activate stereotypes quickly enough to occur below conscious awareness. Other researchers (e.g., Hess & Hinson, 2006; Desrichard & Kopetz, 2005) have also utilized more explicit approaches, such as manipulating task instructions to either emphasize or de-emphasize age differences in performance and/or memorial components. Some feel this distinction between explicit and implicit stereotype activation is important, given that assessing an individual's conscious and unconscious attitudes in the same functional area may yield inconsistent results (e.g., Devine, 1989; Levy, 1996). Given the lack of evidence favoring one methodological approach over another, the current study employed both types of activation to ensure maximal effect.

**Implicit Activation**

Initially, participants were asked to complete a short (20-word) recall task that required them to memorize words that were read to them on the phone. Consistent with earlier work, the memorial component, by itself, was hypothesized to activate older adults' anxiety and stereotypes associated with mere engagement in such a task. In addition, using an implicit priming format and depending on group assignment, stereotyped aging (positive or negative) or non aging-related (control) primes were embedded in these lists. This was an implicit activation as the semantic properties of the words were not alluded to in any way.

Participants heard the words, then were given two minutes to recall as many as they could from memory, in any order they could remember them. Words were categorized based on stereotypicality (e.g., age-related or neutral) and valence (positive

or negative), and were adapted from prior studies related to aging, stereotypes, and memory (e.g., Hess et al., 2004; Hess et al., 2003; Bargh et al., 1996; Howard, 1979). Items in the positive aging stereotype condition included dignified, insightful, kind, respected, wise (see appendix A). Items in the negative aging stereotype condition included brittle, complaining, confused, forgetful, senile (see appendix B). Items in the neutral condition included large, flat, green, costly, metallic (see appendix C). To reiterate, the primary purpose of this initial recall task was to implicitly activate age-related stereotypes. Considering that prior studies have found mere engagement in recall tasks to be sufficient to activate such beliefs, particularly among older participants (e.g., Desrichard & Kopetz, 2005), inclusion of stereotypical terms on these lists was theorized to only further increase the likelihood that such activation would occur.

**Explicit Activation**

Participants were also subjected to an explicit stereotype activation patterned after Hess and Emery (2008). Each person was assigned to the same condition that was assigned for the first activation task (positive, negative, control). Memory stereotypes were activated via a task-instructions manipulation, prior to the second memory recall task. Participants in the positive and negative stereotype conditions heard one of the following two explanatory statements below, while for those in the neutral/control condition, the phone survey continued uninterrupted with no “explanation” given.

- Positive Condition – “Shortly, I am going to examine your ability to process verbal information. In an effort to reduce potential biases, we will be using a task that has been shown to be appropriate for individuals of all ages. Interestingly, older adults have been shown to shown to do quite well on this task.”
- Negative Condition – “Shortly, I am going to examine your memory ability using a test that has been used extensively by researchers to study aging effects on memory. Younger adults typically do much better than older adults on this test.”

The MSEQ-4 was administered right after this manipulation. In light of the time that elapsed during MSEQ-4 administration, upon its completion, and immediately prior to the second wave of memory recall, participants in the positive and negative stereotype conditions were given an abridged, one-sentence "reminder" version of these instructions (e.g., "Ok, as I mentioned earlier, you're now going to perform a memory task on which participants of all ages generally perform well.")

This "refresher" approach has successfully reactivated stereotypes in prior studies (e.g., Chasteen et al, 2005) and should have compensated for any time lag between stereotype activation and performance task. Neutral/control condition participants did not receive any reminder. Overall, this sequence of events allowed for maximum impact of stereotype effects on both MSE and performance, as a function of condition.

**Memory Performance**

Patterned after West, Welch, & Thorn (2001), two versions of a 20-item categorized shopping list were constructed from a pool of over 1,000 items (see West et al., 2003). To maximize uniformity, each list was recorded on computer by an advanced doctoral student, reading the items at 1-second intervals. Participants were randomly assigned to hear one of these two lists. After the word lists were played by the experimenter, participants were then given up to two minutes to recall as many items as they could from memory, in any order. The number of items recalled correctly was used as the dependent measure. Because of potential variance due to differential sound quality of participant telephone connections, two separate scores were calculated; lenient and strict. The primary difference in scoring pertained to those words mentioned by participants that were phonologically similar to those on the recorded list (e.g., lips instead of clips). Lenient scoring included these as correct while strict scoring did not.

Recalled words identical to those on the lists, as well as singular and plural derivatives (e.g., *beans* for *bean*), were accepted as correct by both scoring criteria.

## Exploratory Measures

In addition to the hypotheses listed earlier, the roles of several other variables of interest were investigated in an exploratory fashion. These included domain identification and age (subjective and chronological).

As alluded to earlier, stereotype threat theory has posited domain identification to be theoretically relevant (Steele & Aronson, 1995; Steele, 1997). Specifically, the theory argues that the more people identify with a particular domain, the more vulnerable they are to the debilitating effects (i.e., "threat") of domain-specific stereotypes. Empirical confirmation of this concept, however, has been elusive (e.g., Hess et al., 2007-*in press*). Given the increased importance older adults seem to ascribe to the memory domain (e.g., Dark-Freudeman, West, & Viverito, 2006), this theoretical tenet seems worthy of further exploration, especially in light of the mixed empirical results. To explore domain identification empirically, participants were asked to rate the domain of memory in terms of personal importance (e.g., "On the following scale, please indicate how important memory performance is to you"). This item was part of the preliminary questionnaire completed at home prior to the phone survey, and responses were given on a 10-point Likert scale (1 = "Not at all important", 10 = "Very important").

Related to the issue of domain identification is age identification. That is, do participants identify themselves as a member of a group or class of people called "older adults?" Not all individuals born in the same year will perceive themselves, or be perceived by others, in the same or even similar fashion. Some may "feel" or be

perceived as older than their chronological age, while others may “feel” or be perceived as younger. Since self-efficacy and stereotypes are first and foremost beliefs, it is surprising that this distinction is rarely addressed in the respective literature, and adults aged 50 or older tend to be grouped together as “older” adults. Some work, consistent with self-stereotyping theory (e.g., Levy, 2003), has found that when participants are aware that their performance is being compared to that of an “older” group, participants usually “feel” older (e.g., O’Brien & Hummert, 2006).

How does this pertain to the current research? According to the various stereotype theories (e.g., Levy, 2003; Hess, 1997), people belonging to the stereotyped group will be susceptible to related stereotype effects. But if a 46-year-old man perceives himself as “old,” is this sufficient for him to be influenced by aging stereotype effects? Conversely, if a woman is 70-years-old but considers herself much younger, is she any less susceptible to the impact of aging stereotypes? Further, does subjective age generally coincide with or deviate from chronological age? The current study addressed this distinction between chronological and subjective age, by examining and comparing them. Specifically, in addition to asking participants to indicate their chronological age, an additional questionnaire item (“When you think about how well you are doing overall, how old do you feel?”) measured participants’ subjective age on a 10-point Likert scale (1 = “young”; 10 = “very old”).

To ensure reliability, these exploratory subjective age and domain identification items were administered twice – in the survey items completed at home before the telephone interview and a second time during the telephone interview. The dependent measure for each item was the average of responses at times 1 and 2, with higher

scores indicating older subjective age and greater memory identification, respectively. For both variables, the responses at times 1 and 2 were significantly correlated with each other (Domain Identification r = .45, $p$ <.01; Subjective Age r = .48, $p$ < .01), however test-retest analyses revealed only moderate reliability as evidenced by a Guttman Split-Half coefficient of .614 for Domain Identification and .652 for Subjective Age (see data for these measures in Table 3-2). This was likely influenced by the fact that, on each occasion, only one item was used to measure the respective constructs. It should also be noted that due to experimenter error, these items were not included in all of the follow up phone interviews. Most of the interviews that did include these measures were conducted with older adults. Therefore, these data were captured disproportionately at time 1 ($N$ = 159) and of those participants completing both pre and post measures ($N$ = 87), most were older adults ($N$ = 79).

**Manipulation Check**

To confirm that stereotypes were indeed activated, a manipulation check was conducted after the second recall test. Four items measured agreement (1 = “strongly agree”; 5 = “strongly disagree”) with statements consistent with the task-instructions. Two items coincided with the negative stereotype condition (e.g., “It is likely that my age had an impact on my performance”; “On the test you took earlier, people generally tend to perform differently depending on their age”) and two items coincided with the positive stereotype condition (e.g., “On the memory test today, participants of all ages are supposed to perform at about the same level”; “Your age did not play a strong role in your performance on the test today”). These items were summed, with a possible cumulative score range of 4 – 20. As needed, items were reversed so that a high score indicated a strong belief that age was a factor leading to poor memory performance.

Table 3-1. Sample Characteristics

| Variable | N | M | SD |
|---|---|---|---|
| Chronological Age | | | |
| Younger Adults | 67 | 19.25 | 1.13 |
| Older Adults | 92 | 67.10 | 5.23 |
| Total | 159 | 46.94 | 24.04 |
| Years of Education | | | |
| Younger Adults | 67 | 13.13 | 1.21 |
| Older Adults | 91 | 15.80 | 3.20 |
| Total | 158 | 14.70 | 2.90 |
| Subjective Health | | | |
| Younger Adults | 67 | 3.40 | 1.84 |
| Older Adults | 92 | 3.33 | 1.80 |
| Total | 159 | 3.40 | 1.80 |

Table 3-2. Exploratory Items

| Variable | N | M | SD |
|---|---|---|---|
| Domain ID | | | |
| Time I | 87 | 9.10 | 1.20 |
| Time II | 87 | 8.93 | 1.43 |
| Average | 87 | 8.99 | 1.10 |
| Subjective Age | | | |
| Time I | 87 | 6.14 | 1.95 |
| Time II | 87 | 6.34 | 1.85 |
| Average | 87 | 6.24 | 1.64 |

# CHAPTER 4
# RESULTS

## Overview

Preliminary analyses were conducted to ensure that counterbalanced assignment to conditions resulted in an equitable distribution of key sample characteristics across the three experimental conditions. Preliminary analyses were also utilized to examine the manipulation check results. Primary hypotheses were then tested with univariate analyses of variance (ANOVA) and structural equation analyses. Due to potential variability in phone connections and subsequent sound quality of the conversations and recorded telephone interviews, lenient and strict recall scores were assessed for each memory recall task. Final scoring criteria for each list were developed and confirmed by the principal investigator to ensure uniformity. Separate analyses were run for both the lenient and strict recall scores. These results were essentially the same, as evidenced by the near perfect correlation ($r = .98$, $p < .001$) between lenient and strict recall scores; only strict recall data are reported in detail here.

Preliminary Analyses

Analyses of potential baseline condition differences were conducted, using an age (younger, older) x condition (control, positive, negative) design, on the following variables: subjective age, years of education, domain identification, and anxiety. Although participants were assigned to the three stereotype conditions via unbiased counterbalancing (control $N$=55, positive $N$=54, negative $N$=51), baseline univariate analyses of variance (ANOVA) revealed significant condition differences in subjective age [$F(2, 154) = 3.90$, $p = .022$, $\eta p^2 = .05$], with those in the negative stereotype condition feeling oldest, those in the positive stereotype condition feeling youngest, and

control participants falling in between (see Table 4-1). The Condition x Age interaction was not significant [$F(2, 154) = .50$, $p = .61$, $\eta p^2 = .01$]. Not surprisingly, significant baseline differences between younger and older adult participants were also found in education [$F(1, 153) = 41.32$, $p < .001$, $\eta p^2 = .21$], as shown in Table 3-1, and domain identification [$F(1, 154) = 8.50$, $p = .004$, $\eta p^2 = .05$]. As evidenced in Table 4-2, across conditions, older adults rated memory as a more personally relevant domain than their younger counterparts. Condition x Age interactions were non-significant for both education [$F(2, 153) = .13$, $p = .88$, $\eta p^2 = .002$] and domain identification [$F(2,154) = .30$, $p = .75$, $\eta p^2 = .004$]

Perhaps the most important baseline difference was found in anxiety level, given its pertinence to several of the hypotheses. Across age, baseline anxiety differences were found as a function of stereotype condition [$F(2, 154) = 4.34$, $p = .02$, $\eta p^2 = .05$], and Bonferroni adjusted pairwise comparisons determined that the baseline anxiety difference between positive and negative conditions was significant ($p < .01$), with higher baseline anxiety in the positive condition than the negative condition (see Table 4-3 below). The Condition x Age interaction was not significant [$F(2, 154) = .23$, $p = .80$, $\eta p^2 = .003$]. In light of the observed condition differences in anxiety, hypotheses were tested in two waves of analyses. After all analyses were run initially, they were then rerun with baseline anxiety as a covariate.

The manipulation check items were examined in a 3 (condition) x 2 (age) analysis of variance. Results showed no significant differences based on condition [$F(2,150) = .45$, $p = .64$, $\eta p^2 = .01$] and approached significance for age [$F(1,150) = 2.87$, $p = .09$, $\eta p^2 = .02$], with older adults displaying stronger beliefs in a memory performance-aging link

($N$ = 92, $M$ = 14.62, $SD$ = 2.64) as compared to their younger counterparts ($N$ = 63, $M$ = 13.84, $SD$ = 2.78). The Condition x Age interaction was also non-significant [$F(2, 150) = .30$, $p = .76$, $\eta p^2 = .004$]. These age differences were further explored in relation to two of the key outcome variables, self-efficacy and memory performance, to ensure that aging effects on those measures were not due to the manipulation check results. Variance due to the manipulation check was covaried out and a significant main effect for age emerged on MSE [$F(1,148) = 12.70$, $p = .001$, $\eta p^2 = .08$] and memory recall performance [$F(1,149) = 13.54$, $p < .001$, $\eta p^2 = .08$]. This suggests that even when basic beliefs about memory aging are held constant, significant age differences still remain for self-efficacy and memory performance.

**Hypothesis 1**

Consistent with earlier studies of memory and aging stereotypes, the author's first hypothesis predicted that stereotype condition would have an impact on older adult memory performance (either increase or decrease), and that the direction of this impact would vary by stereotype valence (positive, negative). It was also predicted that this would not occur for the younger adults, for whom memory is not particularly salient. Evidence for this would be a 2-way interaction between age group and stereotype condition, with memory performance as the dependent variable.

To test this, univariate analyses of variance (ANOVA) were conducted with memory performance as the dependent variable and age group and stereotype condition as between-subjects factors.

Original analyses showed best performance by participants in the control condition, followed by the negative and positive conditions respectively. The main effect

of age was significant for recall performance [$F(1, 150) = 13.20$, $p < .001$, $\eta p^2 = .08$]. Across conditions, older adult memory performance was significantly worse than that of younger adults. However, contrary to the author's hypothesis, no significant main effect emerged for stereotype condition on memory recall [$F(2, 150) = .001$, $p = .99$, $\eta p^2 = .000$]. The Condition x Age group interaction was also non-significant [$F(2, 150) = 1.80$, $p = .17$, $\eta p^2 = .02$]. Memory performance data are reported in Table 5-5.

Baseline anxiety was incorporated into the analysis as a covariate, due to baseline condition differences in anxiety. Stereotype condition remained non-significant [$F(2, 149) = .05$, $p = .95$, , $\eta p^2 = .001$]. The main effect of baseline anxiety was not significant. The Condition x Age interaction was not significant [$F(2,149) = 1.74$, $p = .18$, $\eta p^2 = .02$]. Taken together, these findings show that differences in memory performance were affected by age but not stereotype condition.

**Hypothesis 2a**

Hypothesis 2a predicted stereotype condition would exert a similar impact on older adult MSE, lowering it in the negative stereotype condition, boosting it in the positive stereotype condition. Statistically this would be supported by a 2-way interaction between age group and stereotype condition with MSE serving as the dependent variable. This hypothesis was tested in a similar fashion to hypothesis 1. ANOVA revealed a significant main effect of age [$F(1, 150) = 13.50$, $p < .001$, $\eta p^2 = .08$] but not condition [$F(2, 150) = 1.08$, $p = .34$, $\eta p^2 = .01$]. The Condition x Age interaction was not - significant [$F(2, 150) = .40$, $p = .67$, $\eta p^2 = .01$]. See Table 5-6.

Similar to hypothesis 1, baseline anxiety was covaried out to determine what impact this might have in accounting for the memory self-efficacy differences. The main

effect of age on MSE remained significant [$F(1, 149) = 15.15$, $p<.001$, $\eta p^2 = .09$], and memory self-efficacy scores increased slightly across conditions, the biggest boost occurring for participants in the positive stereotype condition. Stereotype condition remained non-significant [$F(2, 149) = .40$, $p = .67$, $\eta p^2 = .01$] and in terms of MSE, the order remained the same with control group participants showing the highest level followed by negative and positive conditions respectively. The stereotype Condition x Age interaction also remained non-significant [$F(2, 149) = .36$, $p = .70$, , $\eta p^2 = .01$].

**Hypothesis 2b**

For this hypothesis, the author predicted that self-efficacy would mediate the impact of stereotypes, both positive and negative, on performance. Tests of mediation require significant correlations between the key dependent variables, in this case memory performance and MSE, and the predictor (stereotypes), as a basic assumption of a mediation analysis. The univariate relationships between stereotype condition and memory performance, and MSE and memory performance were each expected to be significant. Analyses revealed that only the latter was significant. Therefore, mediation could not be tested.

**Hypothesis 3**

Consistent with Steele's (1997) stereotype threat theory, hypothesis 3 examined the impact of stereotype effects on older adult anxiety. Compared to baseline levels, increased anxiety was expected among older adults exposed to negative stereotypes while it was unknown if positive stereotypes would lead to a corresponding anxiety decrease. Statistically, this would be evidenced by a 2-way interaction between age and stereotype condition on MIA anxiety subscale scores.

To test this hypothesis, a repeated measures ANOVA was conducted with age and stereotype condition as predictors, with the two anxiety assessments as a repeated factor. Participant anxiety levels were highest in the positive stereotype condition followed by control and negative stereotype conditions respectively (see Table 4-7), and the main effect of condition on anxiety approached significance [$F(2, 149) = 2.87$, $p = .06$, $\eta p^2 = .04$] due to the fact that anxiety overall was higher in the positive condition than negative condition ($p < .05$) and somewhat higher in the positive condition than control condition ($p = .09$). This result was likely due to baseline differences in anxiety, as explained above. Follow-up anxiety measured during the phone interview was significantly higher than baseline anxiety [$F(1,149) = 52.3$, $p < 0001$, $\eta p^2 = .26$], and time of assessment significantly interacted with age [$F(1,149) = 4.28$, $p < .05$, $\eta p^2 = .03$]. This was due to a larger change from baseline to follow-up assessment for older adults than younger adults, although both groups showed a significant increase in anxiety ($p < .001$). This change in anxiety across time did not interact with condition [$F(2,149) = 1.0$, $p = .37$, $\eta p^2 = .013$], nor was there a significant three-way interaction between time, age, and condition [$F(2,149) = .12$, $p = .89$ $\eta p^2 = .002$]. Taken together, these findings suggest that memory testing, itself, created greater anxiety in older adults than younger adults, regardless of condition.

**Hypothesis 4 (Structural Equation Model)**

To examine the predicted relationships among the variables of focus in this paper, a structural equation model was analyzed using AMOS 16.0. Age was used as a dichotomous variable to reflect the categorical nature of the age groups in the current

sample. According to Hu & Bentler (1999), the following criteria represent adequate fit: non-significant Model $X^2$, CFI ≥ .95, and RMSEA ≤ .06.

A measurement model was developed and included three latent factors (see Figure 4-1). Four memory subdomain measures – object location, story recall, name recall, and shopping list recall – were used to construct a latent factor for memory self-efficacy. Each of these indicators significantly contributed to the latent factor (loadings were .67, .48, .61, and .80, respectively, all $p$ <.0001). Baseline and follow-up measures of memory anxiety were used to construct a latent factor for anxiety. Both indicators significantly contributed to the latent factor (loadings for baseline and follow-up anxiety were .78 and .92 respectively, all $p$ < .0001). A final latent factor of memory performance was constructed with two memory recall tests. These two factors significantly contributed to the latent factor (loadings for the first and second test were .74 and .81 respectively, both $p$ <.0001).

Based on the conventions for model fit noted above, the predicted model (see Figure 6-2) showed poor fit to the data, $X^2$ (29)=55.51, $p$=.002, CFI=.900, RMSEA=.095, suggesting that the overall pattern of relationships represented in this model was not supported in this sample. The model did show significant individual paths from condition to anxiety (β =.22, $p$ < .05), anxiety to MSE (β= -.39, $p$ < .0001), age to MSE (β= -.26, $p$ < .02), age to performance (β= -.36, $p$ < .005), and MSE to performance (β= .28, $p$ < .05). Paths from age to anxiety and condition to MSE were both non-significant ($p$s = .26 and .58 respectively). These two paths were trimmed, yet this did not improve model fit overall, $X^2$ (31) = 56.78, $p$<.005, CFI=.903, RMSEA=.090. Alternative models were thus developed and will be discussed later (see exploratory analyses).

## Exploratory Analyses

Subjective Age and Domain Identification

Neither of the two exploratory items yielded significant results when analyzed as predictors of the primary outcome variables (anxiety, age, self-efficacy, performance). Regarding domain identification, there are different ways to measure this construct, and no agreed-upon method in the literature. The author's approach to utilize a single item at baseline, and then repeat that item again during the phone interview, seemed acceptable as the two were significantly correlated with each other ($r = .45$, $p < .001$). When the two items were averaged, domain identification was not significantly correlated with any of the relevant variables.

Subjective age, however, was significantly correlated with health and both baseline and follow-up measures of memory-related anxiety. Correlations with all other relevant variables, including chronological age, were not significant (See Table 5-8 for all correlations).

Structural Equation Models

As mentioned above, the analyses of the predicted model revealed poor fit to the data. A series of alternative models were then constructed in an exploratory fashion, using the full sample, to account for the predicted interrelationships among the key variables highlighted in this paper, starting with the measurement model described above.

The model with the best fit for the full sample still did not have excellent fit to the data due to a significant chi-square and low CFI, although the RMSEA value was acceptable $X^2$ (96)=129.6, $p$=.013, *CFI*=.922., *RMSEA*=.047. Interestingly, this model fit was achieved with gender included as a predictor (see Figure 4-3). Though not a

primary focus of the current study, gender's impact on performance has been theoretically and empirically established within both stereotype (e.g., O'Brien & Crandall, 2003) and memory self-efficacy (West, Welch, & Knabb, 2002) literatures, respectively. Path estimates for older and younger participants are provided in Table 4-9. As evidenced by these data, relationships among variables were stronger for older adults. Given the relatively poor fit of the aforementioned models combining participants of all ages, and considering that all hypotheses in the current study predicted differential salience for older adults, these relationships were examined in a comparable model with older adults only.

Using older participants only, a model (see Figure 4-4) with age (continuous variable), education, health, anxiety, and memory self-efficacy as predictors showed good fit to the data, $X^2(38) = 50.085$, $p$=.091, CFI=.946, RMSEA=.059. Significant predictive paths emerged from memory anxiety to MSE (β= -.45, $p$ <.01), MSE to memory performance (β= .30, $p$ =.02), age to memory performance (β= -.15, $p$ >.10), education to memory performance (β= .33, $p$ = .003), and health to memory anxiety (β= .32, $p$ = .005). A Sobel test was conducted and also revealed a significant indirect effect for anxiety on performance via MSE (Sobel test statistic = -1.98, $p$<.05).

Trimming the age variable (no significant prediction) slightly degraded model fit overall, $X^2(31) = 45.313$, $p$ =.047, CFI=.937, RMSEA=.071, though individual loadings were comparable and remained significant; health to anxiety (β= .32, $p$ < .005), anxiety to MSE (β= -.45, $p$ < .0001), education to performance (β= .34, $p$ < .005), and MSE to performance (β= .31, $p$ < .02).

One way to statistically identify a “best” model is by conducting a nested chi-square test of two separate models, one nested in the other. This comparison statistically tests the null hypothesis of no significant difference in fit by evaluating whether the chi-square difference between models is significant, for the given degrees of freedom and a chosen significance level. In the current study, the two “best” models (Figures 4-3 & 4-4) were identical except for the exogenous gender variable in the combined age model (Figure 4-3), hereby satisfying the criterion of being nested one within the other. The test did reveal a significant difference, $\Delta X^2(58) = 79.51$, $p < .05$, offering statistical evidence of the final model’s (Figure 4-4) superiority. This model will be considered in the discussion in greater detail.

Table 4-1. Baseline Subjective Age as a Function of Condition and Age

| Group | N | M | SD |
|---|---|---|---|
| Control | | | |
| Younger | 23 | 6.4 | 1.6 |
| Older | 32 | 5.9 | 1.8 |
| Total | 55 | 6.1 | 1.8 |
| Positive | | | |
| Younger | 22 | 5.6 | 1.7 |
| Older | 32 | 5.8 | 1.8 |
| Total | 54 | 5.7 | 1.7 |
| Negative | | | |
| Younger | 22 | 6.7 | 1.9 |
| Older | 29 | 6.7 | 2.2 |
| Total | 51 | 6.7 | 2.0 |
| Total | | | |
| Younger | 67 | 6.2 | 1.8 |
| Older | 93 | 6.1 | 1.9 |
| Total | 160 | 6.2 | 1.9 |

Table 4-2. Baseline Memory Domain Identification as a function of Condition and Age

| Group | N | M | SD |
|---|---|---|---|
| Control | | | |
| Younger | 23 | 8.2 | 1.6 |
| Older | 32 | 8.9 | 1.9 |
| Total | 55 | 8.6 | 1.8 |
| Positive | | | |
| Younger | 22 | 8.2 | 1.6 |
| Older | 32 | 9.0 | 1.4 |
| Total | 54 | 8.7 | 1.5 |
| Negative | | | |
| Younger | 22 | 8.6 | 1.1 |
| Older | 29 | 9.1 | 0.9 |
| Total | 51 | 8.9 | 1.0 |
| Total | | | |
| Younger | 67 | 8.3 | 1.5 |
| Older | 93 | 9.0 | 1.4 |
| Total | 160 | 8.7 | 1.5 |

Table 4-3. Baseline Anxiety as a Function of Condition and Age

| Group | N | M | SD |
|---|---|---|---|
| Control | | | |
| Younger | 23 | 2.7 | .61 |
| Older | 32 | 2.6 | .68 |
| Total | 55 | 2.7 | .65 |
| | | | |
| Positive | | | |
| Younger | 22 | 2.9 | .50 |
| Older | 32 | 3.0 | .83 |
| Total | 54 | 2.9 | .70 |
| | | | |
| Negative | | | |
| Younger | 22 | 2.6 | .50 |
| Older | 29 | 2.5 | .70 |
| Total | 51 | 2.5 | .60 |
| | | | |
| Total | | | |
| Younger | 67 | 2.7 | .54 |
| Older | 93 | 2.7 | .80 |
| Total | 160 | 2.7 | .67 |

Table 4-4. Memory Performance as a Function of Condition and Age

| Group | N | M | SD |
|---|---|---|---|
| Control | | | |
| Younger | 23 | 9.9 | 3.6 |
| Older | 31 | 9.3 | 2.1 |
| Total | 54 | 9.6 | 2.8 |
| | | | |
| Positive | | | |
| Younger | 22 | 10.9 | 3.2 |
| Older | 32 | 8.2 | 3.5 |
| Total | 54 | 9.3 | 3.6 |
| | | | |
| Negative | | | |
| Younger | 19 | 10.7 | 3 |
| Older | 29 | 8.5 | 3.4 |
| Total | 48 | 9.4 | 3.2 |

Table 4-5. Self-efficacy as a Function of Condition and Age

| Group | N | M | SD |
|---|---|---|---|
| Control | | | |
| Younger | 23 | 77.1 | 9.7 |
| Older | 31 | 72.1 | 12.9 |
| Total | 54 | 74.2 | 11.8 |
| | | | |
| Positive | | | |
| Younger | 22 | 76.0 | 9.5 |
| Older | 31 | 66.9 | 15.1 |
| Total | 53 | 70.7 | 13.7 |
| | | | |
| Negative | | | |
| Younger | 20 | 78.3 | 11.2 |
| Older | 29 | 70.5 | 12.5 |
| Total | 49 | 73.7 | 12.5 |

Table 4-6. Anxiety as a Function of Condition and Age

| | Baseline trial | | | Follow-up Phone Interview | | |
|---|---|---|---|---|---|---|
| Group | N | M | SD | N | M | SD |
| Control | | | | | | |
| Younger | 23 | 2.7 | 0.6 | 23 | 3.0 | 0.5 |
| Older | 31 | 2.6 | 0.7 | 31 | 3.0 | 0.6 |
| Total | 54 | 2.7 | 0.6 | 54 | 3.0 | 0.5 |
| Positive | | | | | | |
| Younger | 22 | 2.9 | 0.5 | 22 | 3.0 | 0.5 |
| Older | 32 | 3.0 | 0.8 | 32 | 3.3 | 0.7 |
| Total | 54 | 2.9 | 0.7 | 54 | 3.2 | 0.6 |
| Negative | | | | | | |
| Younger | 18 | 2.7 | 0.4 | 18 | 2.9 | 0.6 |
| Older | 29 | 2.5 | 0.7 | 29 | 2.9 | 0.6 |
| Total | 47 | 2.6 | 0.6 | 47 | 2.9 | 0.6 |

Table 4-7. Manipulation Check as a Function of Condition and Age

| Group | N | M | SD |
|---|---|---|---|
| Control | | | |
| Younger | 23 | 13.7 | 2.7 |
| Older | 31 | 14.8 | 2.6 |
| Total | 54 | 14.3 | 2.6 |
| Positive | | | |
| Younger | 22 | 13.5 | 3.0 |
| Older | 32 | 14.4 | 2.9 |
| Total | 54 | 14.1 | 2.9 |
| Negative | | | |
| Younger | 19 | 14.4 | 2.7 |
| Older | 29 | 14.7 | 2.6 |
| Total | 48 | 14.5 | 2.6 |
| Total | | | |
| Younger | 64 | 13.8 | 2.8 |
| Older | 92 | 14.6 | 2.6 |
| Total | 156 | 14.3 | 2.7 |

Table 4-8. Correlations Between Predictor and Memory Performance Variables

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Memory Performance (Strict Recall) | ** | .98** | .28** | -.12** | -.19* | -.28** | .07 | -.08 | -.15 |
| 2. Memory Performance (Lenient Recall) | | ** | .27** | -.13** | -.18* | -.25** | .09 | -.08 | -.14 |
| 3. Memory Self-Efficacy | | | ** | -.23* | -.36** | -.28** | .17 | .08 | -.16* |
| 4. Memory Anxiety (Baseline) | | | | ** | .68** | -.01 | -.43** | 0.16 | .27** |
| 5. Memory Anxiety (Follow up) | | | | | ** | .10 | -.24* | .06 | .23** |
| 6. Chronological Age | | | | | | ** | .04 | .11 | -.02 |
| 7. Subjective Age | | | | | | | ** | .03 | -.36** |
| 8. Domain Identification | | | | | | | | ** | .05 |
| 9. Health | | | | | | | | | ** |

Note. ** $p<.001$, *$p<.05$

Table 4-9. Path Coefficients as a Function of Age

| Group | Path | β | *P* |
|---|---|---|---|
| Younger Adults | | | |
| | Health to Anxiety | .23 | NS |
| | Gender to Anxiety | .32 | .033 |
| | Anxiety to MSE | -.11 | NS |
| | Gender to MSE | -.32 | .012 |
| | Age to Performance | .09 | NS |
| | MSE to Performance | .26 | NS |
| | Education to Performance | -.16 | NS |
| Older Adults | | | |
| | Health to Anxiety | .32 | .005 |
| | Gender to Anxiety | .16 | NS |
| | Anxiety to MSE | -.53 | <.0001 |
| | Gender to MSE | .42 | <.0001 |
| | Age to Performance | -.15 | NS |
| | MSE to Performance | .33 | .010 |
| | Education to Performance | .34 | .003 |

NS = $p > .05$

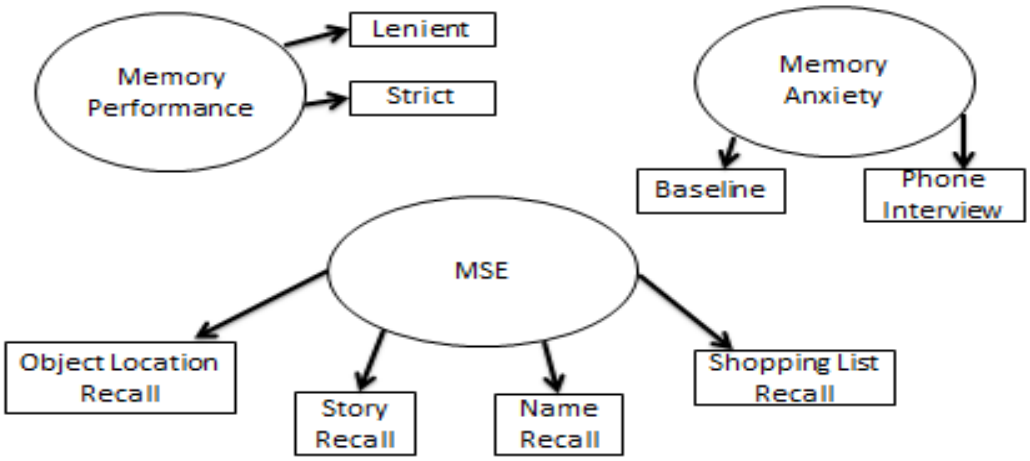


Figure 4-1. Measurement Model

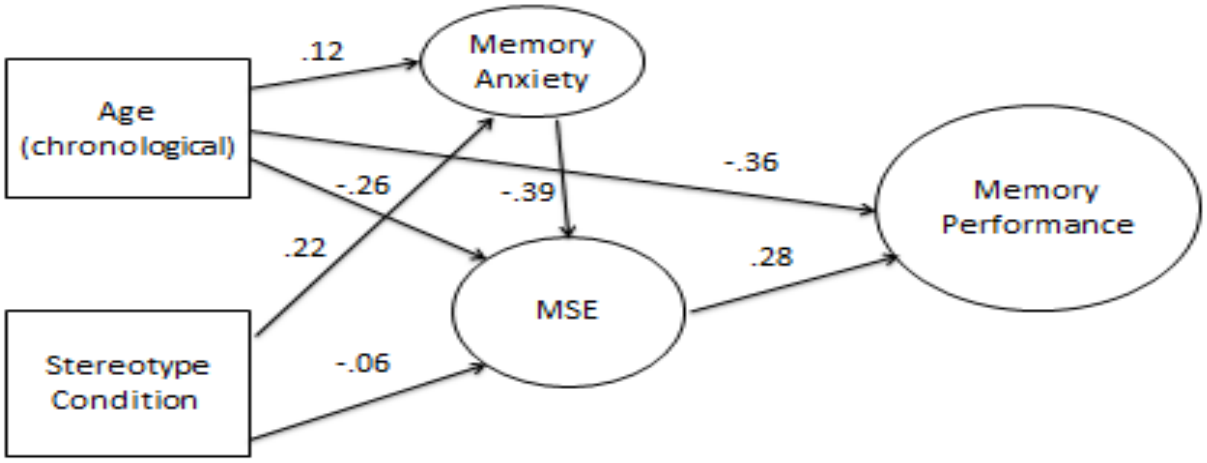


Figure 4-2. Predicted Model with Younger and Older Adults

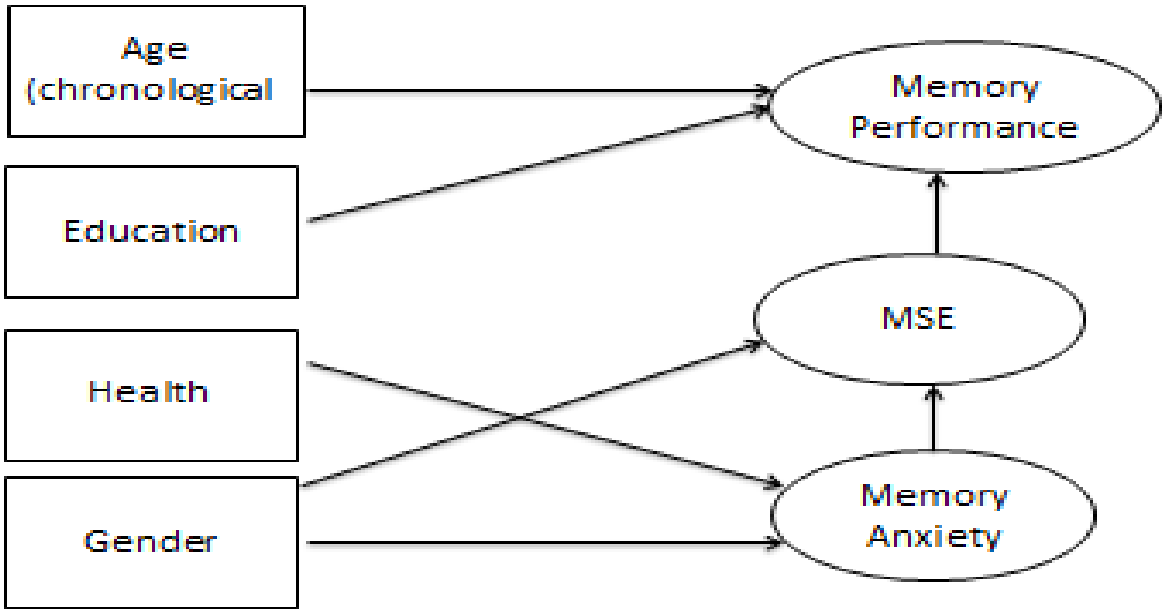


Figure 4-3. Best Model with Younger and Older Adults. Note: path coefficients are listed in Table 4-9.

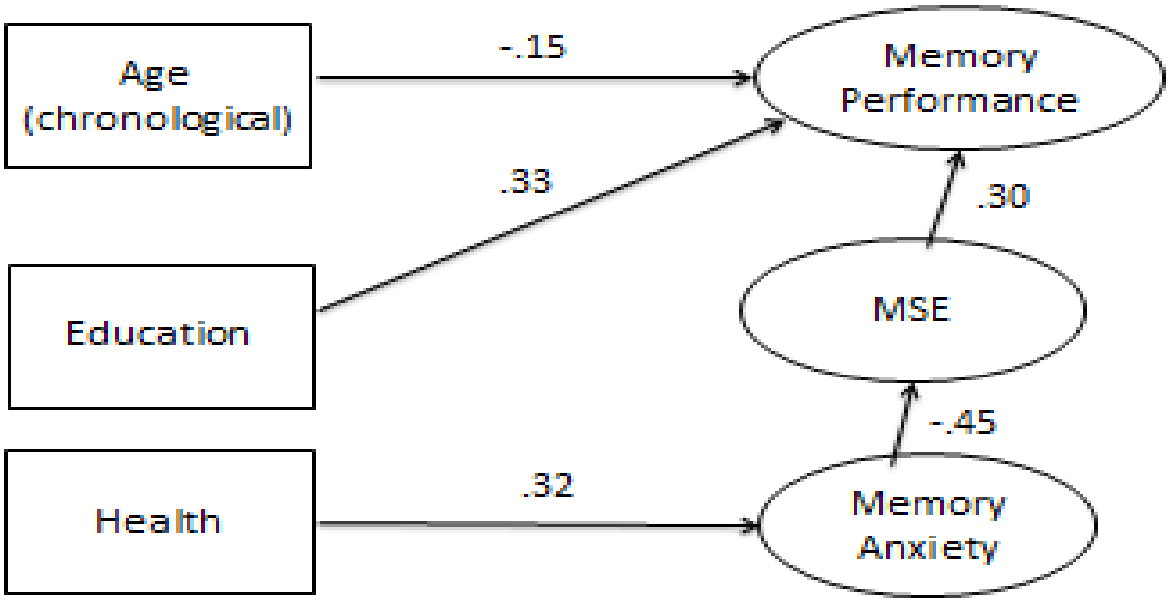


Figure 4-4. Final Model with Older Adults Only

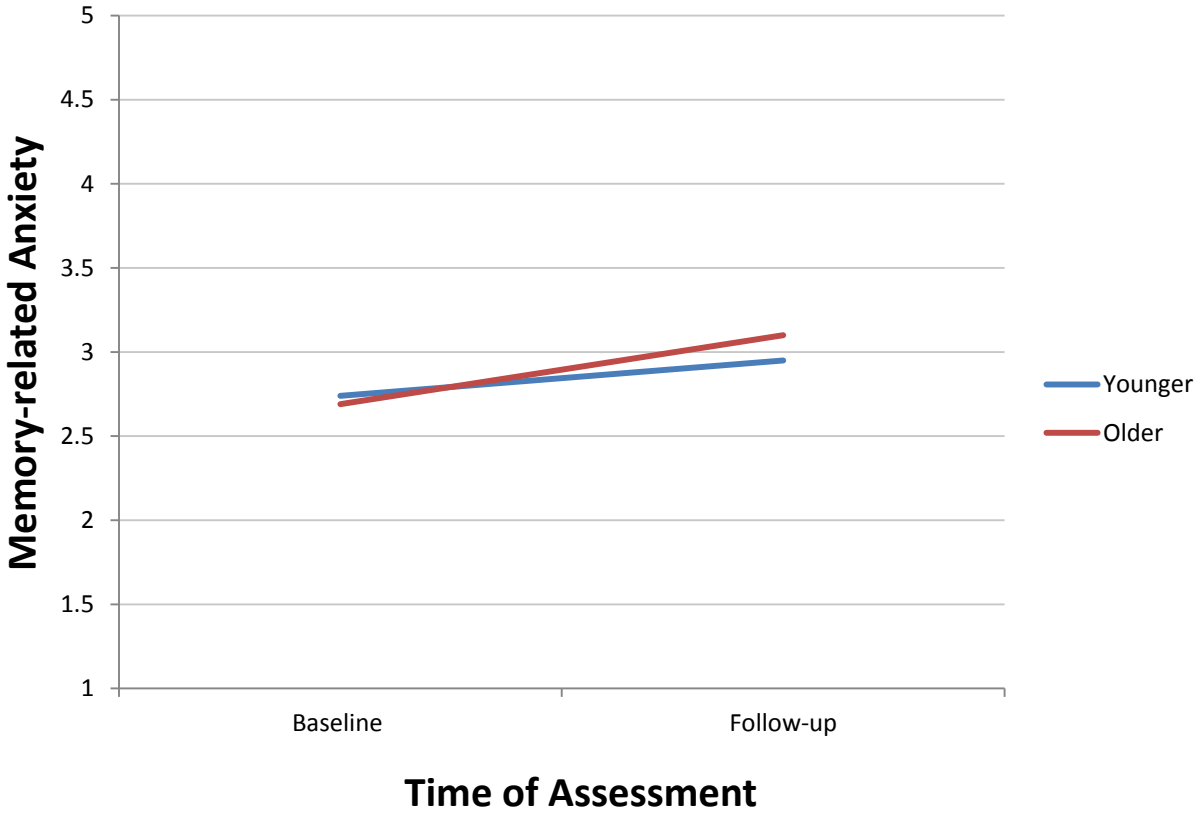


Figure 4-5. Age Differences in Memory Anxiety Change After Baseline

# CHAPTER 5
# DISCUSSION

The current study addressed several interrelationships among memory self-efficacy, memory performance, anxiety, age, and aging stereotypes. To the author's knowledge, this is the first empirical attempt to include memory self-efficacy, as theorized by Bandura, when evaluating the link between aging stereotypes and memory performance across the lifespan. Results for each of these variables will be considered in detail.

## Age

It is clear that chronological age is a recurring, central theme in memory research, and ageist stereotypes, many of which are memorial in nature, are ubiquitous in many contemporary societies. Recently, these stereotypes have become important in theoretical and empirical arenas (e.g., Steele, 1997; Levy & Leifheit-Limson, 2009), including memory (Hess et al., 2004), though experimental attempts to manipulate aging stereotypes have yielded mixed results in terms of effects on older adult memory performance (e.g., Hess & Hinson, 2006).

As encapsulated by Levy's (2003) self-stereotyping theory, the domain of memory becomes an increasingly sensitive area for people over time. Theoretically, as people age, they increasingly monitor their memory ability and interpret memory lapses as mounting evidence of age-related memory decrement. Steele (1997) has also theorized that societal stereotypes can contribute to or reinforce such beliefs or schemas, inevitably hindering maximum performance in a functional domain, in this case memory. Although positive aging stereotypes do exist (e.g., wise, kind), one need only glance at popular media or greeting cards to appreciate the great extent to which older adult

memory and cognitive function serve as negative stereotype targets. Elders are often mocked as senile, forgetful, or even demented.

Bandura (1997) has highlighted the persuasive influence such messages can exert on one's domain-specific confidence (i.e., self-efficacy), and ultimately, performance. Self-efficacy theory identifies four primary sources from which efficacy is derived, one of which Bandura terms "verbal persuasion" or the influence of societal views, in general, as well as the beliefs of significant friends and family. Often but not exclusively verbal in nature, negative messages about aging are often internalized and can shape how people view themselves (efficacious or inefficacious) in regard to specific areas of functioning. Another theorized self-efficacy source is "physiological arousal." In essence, people attend to their affective states (e.g., anxious, calm) while performing in a domain, and utilize such information as a cue that can shape their perceived efficacy level.

Reviews in this paper have highlighted overlap between theories of stereotype effects and self-efficacy. Guided by these theories, empirical work within both the memory self-efficacy (e.g., West et al., 2003; West et al., 2005; West et al., 2007) and the aging stereotype (e.g., Hess et al., 2003) literature has tested and established this belief-performance link, and has also shown consistent age differences in performance favoring youth. Not surprisingly, preliminary ANOVA results from the current study were no exception, as older adults were outperformed by their younger counterparts on the memory recall tasks, possessed comparatively lower levels of MSE, and more frequently perceived age to have an impact on memory (manipulation check variable). These findings were consistent across stereotype conditions and memory tasks,

bolstering the notion that the domain of memory holds more sway as people age. Why is this the case? In regard to the above theories, it seems such beliefs may be partially rooted in actual performance differences. The trend of cognitive decline with increased age has been well-established empirically. Age differences in memory performance occur on almost all episodic memory tasks (e.g., Spaniol et al., 2006; Head et al., 2008) and on many other kinds of cognitive tasks (e.g., Colcombe & Kramer, 2003; Salthouse, 2009). Therefore, it is likely that older adults' pre-existing beliefs in stereotypes, fading confidence, and actual performance differences all influence each other over time.

The current study utilized structural equation modeling, a powerful statistical technique for exploring such complex, multivariate interrelationships. The study analyzed a single moment in time to understand the interrelationships. Informed by extant literature, an initial model (see Figure 4-2) hypothesized age would directly predict performance and exert an indirect effect on performance via MSE and anxiety. Stereotype condition, also a predictor in the model, will be discussed below (see Stereotype Condition).

The predicted model (Figure 4-2) revealed results similar to those captured by analyses of variance, namely, age was a significant predictor of MSE and memory performance. Unexpectedly, however, these effects were attenuated in subsequent alternative models. It appears that the predictive effect of age on performance in analyses of variance may have been due to the power of other "age-related" variables, rather than chronological age, itself. In other words, age may have been a proxy for education, memory anxiety, and MSE, and it was those variables that showed the

strongest link to variance in performance when multiple factors were taken into account in subsequent models.

As shown throughout this paper, the case for the relevance of age seems a strong one. At the same time, there are many different ways to assess age, and selection of specific age groups can affect study outcomes. First, chronological age is commonly assumed to be an important and meaningful grouping variable. Based on this default category, experimental aging research tends to utilize two kinds of samples; combined young/old and older adult only. Combined samples generally compare “younger” adults, mainly undergraduate college students, to a range of “older” adults, which often includes participants ranging in age from 50 to 90-years-old. Because people in their early 50s are likely quite different from those in their late 80s, especially in terms of physical health and cognitive function (including memory), both commonly researched outcomes, some studies account for potential heterogeneity by dichotomizing “older adults” into “young-old” and “oldest-old.” This design is especially common when examining exclusively older adult samples. Though still in its nascence, the “young-old”/”old-old” distinction has been investigated empirically, including research focusing on aging stereotypes and memory (e.g., Hess et al., 2007).

The current study did not include such a distinction, and analyses of the final model with older adults only (see Figure 4-4) revealed a relatively unimportant role for age vis-à-vis memory performance. Chronological age predicted less than 3% of recall score variance and this relationship was non-significant. It appears that the sample’s older adults performed comparably whether at the younger (60-70) or older (>70) end of the late life spectrum. Although the current results suggest little variation within the

sample's range of older adult participants, the heterogeneity within this demographic remains understudied and theoretically important. Any arbitrary designation or categorization of "older" based on chronological age, may be at once common practice (socially and methodologically) yet not always empirically meaningful. Inclusion criteria for the label "old' remains an unresolved empirical question. One alternative is to consider subjective age, rather than chronological age. Although this approach was used here, it was not as useful as expected (see exploratory analyses).

Cumulatively, several pieces of evidence emphasize the importance of chronological age with the current sample: the non-significant correlations of subjective age mentioned above, ANOVA results showing age differences in MSE and memory performance, and the fact that the predictive paths were more frequently significant and loadings were stronger when modeling data from an exclusively older adult population. However, it should be reiterated that the significant age effect revealed by ANOVA was attenuated in exploratory structural equation models (see Figures 4-3 & 4-4). The fact that age differences constitute a consistent and robust outcome across cognitive aging literature makes this particularly surprising. Again, it could be the case that chronological age was "standing in" for education, self-efficacy, anxiety, and overall health differences in other research, whereas with the multivariate models employed here, there is a stronger respective influence of these "stand-in" variables. More research should be devoted to the goal of understanding factors that covary with age which may, in fact, be better predictors of performance than chronological age.

## Stereotype Condition

Stereotypes are a pervasive reality in many, if not all, societies. Psychologists have established a theoretical and empirical link between such beliefs and actual

behavior across diverse groups and performance domains, including older adults and memory, the primary focus here. Patterned after earlier work (Hess et al., 2004), the current study attempted to activate positive and negative aging stereotypes both implicitly and explicitly. Because members of all ages are exposed to aging stereotypes, and given the theorized differential salience for stereotyped group members (i.e., older adults), both younger and older adults were assigned to various stereotype conditions. Based on the extant literature, across hypotheses, aging stereotypes were expected to exert an impact on several outcome variables, namely, memory performance, memory self-efficacy, and memory-related anxiety, for older adults only.

Contrary to hypotheses, direct empirical tests of this interaction of age and condition proved non-significant. Because of the proposed multivariate nature of the stereotype-performance link, a structural equation model was constructed to account for these multiple pathways. The predicted model identified age and stereotype condition as the primary predictors of performance. Given the proposed importance and theoretical mechanism of action of MSE, stereotype condition was expected to predict performance indirectly only, via MSE and memory-related anxiety (a theoretical component of MSE).

Structural equation analyses of the predicted model (see Figure 4-2) showed poor fit to the data. The effect of condition on anxiety was significant but the effect on MSE was not. These mixed results are difficult to interpret. Reasoned from the perspective of self-efficacy theory, stereotype messages signify a type of verbal or social persuasion, one of four primary sources from which self-efficacy is derived according to

Bandura (1997). The null finding for MSE suggests the stereotype messages may not have been persuasive enough to create a significant effect. However, another self-efficacy source is theorized to be physiological arousal such as anxiety or other affective states more broadly. In accordance with the theory, condition was found to exert a significant impact on memory-related anxiety. Taken together, it appears that condition may have been persuasive enough to tap this arousal source, thus increasing anxiety, but the magnitude of this impact may have fallen short of that necessary to alter overall MSE level. Again, self-efficacy is thought to stem from four unique sources. That said, it is difficult to surmise precisely why condition did not significantly affect MSE, although several additional explanations seem plausible.

First, although participants were assigned to condition by unbiased counterbalancing, closer inspection revealed the majority of older adult males were placed in the positive stereotype condition ($N$ = 17) followed by negative ($N$ = 14) and control ($N$ = 10) conditions respectively. Most female older adults were placed in the control ($N$ = 22) condition, with an equal number ($N$ = 15) in both negative and positive stereotype conditions respectively. It is unclear whether participant gender has relevance for susceptibility to stereotypes, though it seems feasible given the long history of women serving as targets of innumerable gender-based stereotypes, and collectively representing an oppressed social underclass. Does such experience make them more sensitive or resilient to stereotype effects? To the author's knowledge, any gender-stereotype relationship has not been empirically investigated with older adult memory performance. However, some stereotype literature (e.g., Spencer et al., 1999) has demonstrated that women are vulnerable to stereotypes when performing tasks in

stereotypically male gendered domains (e.g., advanced mathematics). Further, prior self-efficacy research has shown women report lower MSE levels than men, even when performing at comparable levels (e.g., West, Welch, & Knabb, 2002). Exploratory causal analyses were somewhat consistent with these findings. In the best-fitting model, a significant path emerged from gender to MSE for participants of all ages. Gender was also found to predict memory-related anxiety, though this path was significant for younger adults only. Future investigation of the role of gender vis-à-vis stereotype effects, within both stereotypically gendered and gender-neutral domains, seems warranted.

Baseline levels of anxiety among older adults also may have been relevant in terms of participants' suggestibility in response to the stereotype activation. Again, in spite of counterbalanced assignment to condition, baseline anxiety was highest in the positive stereotype group and lowest in the negative stereotype group. When reanalyzing the data with baseline anxiety as a covariate, the results for memory and self-efficacy still were not consistent with planned hypotheses for these variables. Nevertheless, it is possible that these sample characteristics may have created a differential reaction to the condition manipulation, as will be discussed later (see memory anxiety section).

The ideas above have focused on sample characteristics, the assumption being that some qualities inherent to participants may have impeded or even nullified an otherwise effective stereotype activation. In keeping with this idea, it is interesting that limited empirical attention (e.g., Eibach et al., 2010) has focused on the divergent contrast and assimilation effects such stereotype inductions can have, that is, why

stereotype effects can influence some people but not others. For some, exposure to stereotypes about a group may elicit thoughts about how such beliefs are personally applicable (assimilation effect). Others, however, may decide such ideas are not personally relevant (contrast effect) even if they do belong to the stereotyped group. An example applied to the current context is illustrative. Negative aging stereotypes may lead some older adults to assimilate by identifying supporting evidence from their personal experience consistent with the stereotype.

In the current study, when older adults heard a statement about age differences in memory performance (i.e., young are superior), this may have activated retrieval of personal experiences consistent with this idea. Conversely, the same stereotype may have led others to identify evidence that contrasts with the stereotype, rendering it personally inapplicable. Other research has begun to investigate the importance of stereotype content (e.g., positive vs. negative valence; cognitive vs. physical), in relation to differential effects on performance, finding, for example, that when stereotype content matches outcome domain (e.g., cognitive, physical), its valence (e.g., positive vs. negative) has a greater impact on subsequent performance (e.g., Levy & Leifheit-Limson, 2009). The current study investigated performance in a cognitive domain, memory, and included some, but not exclusively, memory-based stereotype content. It is unknown to what extent this could have weakened or diluted any stereotype condition effects.

Broadly, this raises questions about the impact of perceived self-relevance vis-à-vis stereotype activation and threat. Does belonging to a stereotyped group or attempting a task in a stereotyped domain suffice for threat to occur? What if one does

not identify with the group or is not familiar with the particular stereotype? What if the stereotyped domain does not hold value for the individual? For reasons explicated earlier, in the case of memory and the aged, this seems unlikely. However, even in the case of ageist stereotypes, stereotype manipulations are not always successful (Hess, 2008, personal communication). Therefore, the current study attempted to empirically assess factors that might affect susceptibility to the manipulation such as domain identification and subjective age, albeit in an exploratory fashion. These analyses will be discussed in more detail later (see exploratory analyses).

Aside from personal attributes of the sample, the stereotype manipulation employed in this study should be considered as well. From a methodological perspective, it is unclear what impact the use of a telephone survey had on the study as a whole. This is particularly true of the stereotype activation, which has not been done via telephone in prior work. It is unclear if an in-person interview might have been more effective at activating stereotype effects. It seems intuitive that face-to-face communication might be preferable, especially with an older adult sample for which hearing might be less acute. However, the telephone interview script was patterned closely after previously successful stereotype manipulations (e.g., Hess et al., 2004) published in the extant literature. During pilot trials, interview length seemed acceptable as participants were able to follow instructions and perform tasks appropriately, and MSE and memory performance were highest in the positive condition and lowest in the negative condition, as predicted. Similarly, older adults in the current study were able to follow directions and complete the required tasks. Anyone whose ability to participate seemed at all questionable was administered the TICS, which in the current sample,

occurred only once. Thus, the interview, itself, did not appear to be problematic in any way. It could still be the case, however, that stereotype manipulations are more effective in person, and future studies could address this issue.

## Memory Self-Efficacy

As emphasized throughout this paper, extensive empirical literature has found older adults to have lower MSE than their younger counterparts. This is particularly important given that studies have also found that MSE predicts memory performance (e.g., West & Yassuda, 2004; Bensadon, 2007). With regard to performance, other factors, including other types of beliefs (e.g., stereotypes), have also been shown to play a predictive role. This begs the empirical question, which is more important? The current study employed a unique methodology to test precisely that, examining MSE and stereotypes, simultaneously. No significant change in MSE level resulted from either positive or negative stereotype manipulations, in comparison to the control group.

This lack of condition effects underscores the inherent difficulty of externally enhancing one's self-efficacy, which the positive stereotype condition intended (and was predicted) to do. Though Bandura identifies such external influences (i.e., social persuasion) as a key source from which self-efficacy is derived, over time, he does suggest it is more easily reduced than improved, as corroborated by results here and from memory intervention and goal-setting studies showing that short-term (beneficial) changes in self-efficacy are empirically challenging (e.g., Floyd & Scogin, 1997; West & Thorn, 2001). Similarly, stereotype research has shown that negatively-valenced stereotypes may be more easily internalized and quicker to exert their impact than those that are positively-valenced, though both are possible (e.g., Levy 2009).

In keeping with results from prior studies (e.g., West et al., 2005), and consonant with the author's prediction, older adults in the current sample exhibited lower levels of MSE than the younger adults. These findings are consistent with the posited differential salience of the memory domain as people age. In addition, bivariate correlations showed MSE and memory performance were significantly correlated. MSE was also found to play a key role in several relationships among variables tested in exploratory structural equation models. As mentioned, the most parsimonious model included older adults only and showed MSE significantly predicting performance, accounting for nearly 10% of the variance in memory recall scores. Considering that MSE is largely a measure of one's confidence and belief in self, this is not an insignificant number. Theoretically, Steele (1997) postulates that anxiety is the key variable, influenced by stereotype activation, that subsequently threatens performance. Bandura's (1997) self-efficacy theory, however, states that anxiety or arousal is one of self-efficacy's precursors. In other words, anxiety, like other physiological arousal or affective states (i.e., depression) is a threat, but to self-efficacy, which in turn influences subsequent performance. This proposed theoretical chain of events was precisely that elucidated by the final model.

Aside from MSE's direct effect on performance, the path from anxiety to MSE was statistically significant and accounted for more than 20% of MSE variance. To reiterate, the study's methodology aimed to manipulate anxiety via stereotype activation. Though condition differences did not support hypotheses, the testing environment seems to have had some impact on anxiety, particularly among older adults. Both age groups showed comparable baseline anxiety levels, and a significant increase in anxiety at

follow-up. This increase, however, was larger for older adults. Like other arousal states, anxiety, as addressed by Bandura (1997), serves as a primary indicant of self-efficacy. The indirect pathway from anxiety to MSE and then to performance was also confirmed and significant. Again, as explicated by self-efficacy theory, anxiety level is a source and therefore predictive of self-efficacy level. Higher anxiety was associated with lower self-efficacy. In fact, aside from relationships between latent variables and their predictors (e.g., measurement model), the path from anxiety to MSE constituted the strongest loading. In sum, the final model illustrated MSE's multi-faceted role with regard to older adult memory performance.

## Memory Anxiety

Thus far it is clear that aging stereotypes and MSE were the primary predictors examined in the current study as both have garnered research support suggesting they directly influence memory performance. Anxiety was also included in the study, given its theoretical importance to both self-efficacy and stereotype threat. As described earlier, anxiety and other types of affective states (e.g., depression) or physiological arousal were identified by Bandura (1997) as one of the four primary sources of self-efficacy. The theory suggests that people are attentive to such states during task performance, which can increase or lower their perceived efficacy. If one feels calm while trying to remember something, efficacy may improve or at least remain at its current level. Conversely, if one struggles to remember something, this may increase anxiety and thus reduce one's sense of efficacy.

According to stereotype threat theory (Steele, 1997), stereotyped group members performing in a stereotyped domain may worry about confirming or, phrased differently, feel pressure to disconfirm, the prevailing stereotype. Herein lies the threat, which can

manifest as heightened anxiety when performing in the stereotyped domain. Based in part on this theory, the current study hypothesized that hearing stereotype-consistent messages about memory and aging would increase memory anxiety levels of older adults (for whom stereotypes about memory pervade).

By and large, analyses from the current study did not support these hypotheses. Stereotype condition and age were not significant predictors of memory anxiety level nor was their interaction. Baseline anxiety and follow-up memory anxiety measured during the phone interview were highly correlated. Initial analyses revealed younger and older participants alike displayed comparable baseline anxiety levels. However, once baseline anxiety was covaried out, a significant age effect did emerge, with older adults showing higher levels of memory anxiety across conditions. In modeling these relationships, it was apparent that anxiety affected self-efficacy but played no direct role in performance for either age group. In interpreting these findings, several ideas seem worthy of discussion.

First, as addressed earlier, in spite of randomization, baseline anxiety was not equally distributed across stereotype conditions. Among older adults, highest baseline anxiety levels were found in the positive stereotype condition followed by the control and negative stereotype conditions. Though speculative, it stands to reason that such differences may have minimized any potential impact of the study's stereotype manipulation. Theoretically, the higher levels of anxiety in the positive condition may have created a suppression effect, nullifying any positive boost from positively-valenced stereotypes and rendering their impact non-significant. Conversely, the low anxiety levels in the negative stereotype condition may have served as a buffer to any

performance-damaging impact that negatively-valenced stereotype content might have otherwise exerted. Though this explanation is theoretically possible, condition remained non-significant even after baseline anxiety was covaried out, making such an interpretation speculative at best.

Related hypotheses were not supported in terms of stereotype valence, but closer inspection suggests the mere discussion of age and memory performance, in tandem, may have had some impact on anxiety. Analyses revealed a significant increase in follow-up anxiety measured as part of the telephone interview for all ages. However, this increase was stronger for older adults as evidenced by the 2-way interaction between time of assessment and age. Given the non-significant results of condition, directly attributing the anxiety increase to stereotype effects, however, would be conjecture. Though condition findings did not support Steele's theory, some authors have suggested any testing or evaluative environment, itself, can lead to increased anxiety (Desrichard & Kopetz, 2005). It remains unclear to what extent the experimental condition itself may have increased anxiety, or whether the mere mention of "memory" was sufficient. Regardless, it seems safe to conclude from the current findings that memory is a particularly sensitive functional domain for older adults and that anxiety is affected by testing situations for both age groups.

## Exploratory Analyses

Given their theoretical importance, domain identification and subjective age were measured in a single-item pre-post format. Stereotype threat theory explicitly mentions domain identification as directly relevant to performance. Those for whom the domain holds most importance are theoretically most vulnerable to threat when performing in that domain. Backed by an extensive literature review, the author identified memory as

a domain of particular salience to older adults. Explicit tests of this with the current sample, however, generally did not support this notion. Domain identification was not a significant predictor of any of the outcome variables in this study. Further, it was not significantly correlated with any other study variable. This violates Steele's conception that high domain identification corresponds with high susceptibility to stereotype threat. Possible explanations for these results may relate to the study's methodology. Though single-items have been used in prior literature, ensuring reliability can be challenging. The current study attempted to account for this by capturing these data twice. Although the two items were significantly correlated, more extensive assessment of domain identification may be needed.

Similarly, subjective age was measured in an exploratory fashion. The assumption throughout this paper, and cognitive aging literature as a whole, is that older adults are aware they are "old" based on their chronological age, and can be grouped accordingly, yet direct study of this assumption is rare. Because many of the hypotheses here were focused on chronological age, the current study explored the importance of subjective age. This was measured in the same manner as domain identification, and yielded several non-significant results.

Perhaps most interesting among these was a non-significant correlation with chronological age, thus providing empirical support that age, as a meaningful performance predictor and demographic grouping variable, may be more than just a chronological number. The fact that subjective age was not a significant predictor of the primary outcome variables with the current sample may relate more to the single-item

measurement structure. This methodology may have been too limited to detect any predictive relationship with memory performance or MSE.

Given the “state-like” nature of perceived age, which may be heavily influenced by mood or other seemingly unstable affective factors, accurate measurement seems problematic. Methodology notwithstanding, subjective age was significantly correlated with both baseline and follow-up memory anxiety, and health. Though beyond the scope of this paper, these relationships might be worthy of further exploration in future cognitive aging work.

Structural equation analyses revealed two additional variables to be relevant for older adults, subjective health and education level. Not surprisingly, the causal path from health to anxiety was found to be significant for older adults only (figure 4-4). Although anxiety items were specific to memory, it could be that individuals experiencing health difficulties are more vigilant about memory and concerned that their health problems will lead to memory problems as well. Again, in terms of methodology, a snapshot of perceived health was assessed with only one item, while anxiety was assessed with multiple items, all memory-specific in content, and administered both at baseline and during the phone interview. Therefore, it seems safe to conclude that beliefs about memory were tapped more deeply than subjective health in the current study. However, while a single-item health measure should be interpreted with caution, studies across various disciplines have demonstrated the adequacy and predictive power of this approach, finding particularly robust associations between single self-perceived health measures and mortality (e.g., Idler & Benyamini, 1997; DeSalvo et al., 2006).

The finding that formal education was predictive of superior performance in a cognitive domain such as memory is theoretically intuitive and empirically consistent with some memory aging literature (e.g., Huppert et al., 2000). Conversely, in terms of stereotype threat, some literature has revealed the opposite, with stereotype's negative impact on memory performance most powerful among those highest in education (e.g., Hess et al., 2007). The current result, it seems, can be explained at least in part through a self-efficacy lens.

More formal education increases opportunities for enactive mastery experience, in this case, memory-related cognitive tasks. In fact, while definitions and types of education may vary, it stands to reason that virtually any type of new learning requires some degree of memory function. Congruent with self-efficacy theory, empirically, those higher in education should display higher self-efficacy, which as explicated throughout this paper, would be closely tied to better performance. Results demonstrating an education-performance link in the current study would seem to favor the older adults since the sample data revealed, on aggregate, older participants have amassed more education than the younger adults. However, confounding this conclusion is the fact that older adults, including those in the current sample, tend to display lower MSE levels than their younger counterparts.

Perhaps these seemingly conflicting ideas are more palatable when considering at once the potential impact of stereotype threat, the uniqueness and differential salience of the memory domain within the broader cognitive arena, and educational status of the current study's mixed age sample.

On one hand, by definition, elders have had more years of life experience, which in this sample included years of education, during which they have theoretically needed to utilize their memory more often and in more varied ways than their younger counterparts. However, the younger adult sample in the current study was comprised exclusively of undergraduate university students. Though exceptions may exist, it seems safe to conclude that college in the United States embodies a developmental process where young people increasingly assert their independence and discover personal strengths and weaknesses. Integral to this process is the identification from within, and via external sources (e.g., social persuasion), of domains in which they perceive themselves as more or less efficacious. Over time such perceptions take hold and increase in permanence, ultimately shaping the young person's adult identity.

Beyond this temporal component, in practical terms, college represents a period where memory reliance peaks, with students consistently required to absorb, retain, and later retrieve information (e.g., exams, written research papers, oral presentations, notetaking). Framed in self-efficacy terminology, younger adults currently enrolled in college are likely presented with and engaged in enactive mastery opportunities more than ever. In spite of this theoretical rationale, structural equation models with the full sample found a significant education-performance relationship with older adults only, suggesting this link is not as strong with younger adults. However, this was likely due to limited variability in younger adult education level, since nearly two-thirds (62%) of younger adults in the current sample were underclassmen (e.g., 12 or 13 years of educational experience). It remains to be seen whether such a relationship would prove

significant with a more heterogeneous sample of younger people (e.g., high school freshmen vs. advanced doctoral students).

## Study Limitations

Though informed by prior empirical designs, the use of telephone interviews is rare in the stereotype threat literature. The extent to which this was a limitation is unclear, though the non-significant findings for stereotype condition suggest this may have been relevant. It should be noted, however, that those conducting the phone interviews participated in several weeks of intensive training and subsequent evaluation of role-played interviews prior to contacting study participants. In addition, the telephone interview script was patterned after previously successful stereotype manipulations (e.g., Hess et al., 2004) published in the extant literature. Though not focused on stereotype effects, other cognitive aging studies examining memory have found comparable validity between in-person and telephone interview methodologies (West et al., 2008). Thus, it is not clear whether the condition manipulation would have been more effective using in-person interviews.

Interview method aside, condition assignment may have been a limitation. As mentioned earlier, participant gender and anxiety levels were not evenly distributed across the three conditions. It is unclear to what extent this affected current results. As mentioned earlier, while the role of gender has been investigated in stereotype literature, it has been considered less frequently within cognitive aging. Regarding anxiety, though baseline levels varied across condition, they were comparable for younger and older adults.

Another methodological limitation pertained to assessment of subjective age and domain identification. As mentioned earlier, these variables were measured with single-

items, which, generally speaking, can be limited in terms of reliability. In light of this, each item was utilized in an exploratory fashion and assessed twice, both before and during the telephone survey. Furthermore, although both seem central to theoretical tenets of stereotyping and self-efficacy literature, empirically, neither concept has been examined in a consistent or comprehensive manner.

A similar lack of consensus exists when determining how to measure anxiety. The current study relied on the MIA-anxiety subscale, a broadly accepted and well-established tool for tapping memory-specific anxiety. Comparisons of baseline and follow-up anxiety were made based on slightly different assessments. As mentioned earlier, participants were initially administered the MIA-anxiety subscale plus distractor items created by the author as a means of disguising the memorial component of the study. This instrument was completed by participants in person on paper. Follow-up anxiety was measured with the MIA-anxiety subscale in its original form without any distractor items. Further, these questions were administered by student interviewers via telephone. The actual items were the same, both sets of items were significantly correlated with each other, and both assessments were found to have good reliability with the current sample. But it is unclear what impact the subtle differences in administration may have had on these results.

A final potential limitation concerns the content of the stereotype adjectives used. Though memory-specific stereotypes and stereotypic messages were included in the current study, most stereotype primes related to age more broadly (i.e., wise, respected, confused, brittle). This does not appear problematic since the primary stereotype activation, in keeping with published designs, consisted of messages explicitly linking

memory performance and age. In fact, to the author's knowledge, only one empirical study has been guided by the theoretical importance of content match (e.g., Levy et al., 2009). These authors grouped aging stereotype content into physical and cognitive domains, and similar to the current approach, they included material related to cognitive health but not necessarily memory-specific (i.e., sage, alert, dementia, confused). Further, when employing adjectival primes, it is unclear to what extent a positive stereotype condition with exclusively memory-specific content is possible. Positively-valenced stereotypes about older adult memory are rare to non-existent. Thus, for memory, it would be very challenging, if not impossible, to create testing conditions using both negatively-valenced and positively-valenced adjectives that were all tied directly to the domain of memory.

# CHAPTER 7
# CONCLUSION

## Clinical Implications

As age increases, so does the likelihood of some form of decline, which may or may not be amenable to clinical treatment. Beliefs, however, central to both stereotype effects and self-efficacy, lie well within the purview of psychological intervention. As mentioned throughout this paper, beliefs about one's memory increasingly become a central concern to individuals as they age. Supporting evidence for this was found in the current investigation which showed lower MSE levels among older participants across all stereotype conditions. Reinforcing this concern, unfortunately, are myriad negative and ageist societal messages, often rooted in stereotypes, which can discredit, discount, devalue, or even insult older adults (e.g., Kite et al., 2005). The deleterious consequences of aging stereotypes have been well documented, and these external messages can be internalized as self-beliefs. This can result in psychological damage, intensify older individuals' cognitive concerns, and ultimately inhibit cognitive performance, independent of objective ability or capacity.

Similarly, one's self-efficacy can be influenced by external sources via social persuasion (Bandura, 1997), and can subsequently impact performance. The more efficacious people feel, the likelier they are to perform successfully, or persist until they achieve a successful outcome (i.e., mastery). Conversely, those feeling inefficacious may shy away from experiences they perceive as threatening, thus limiting opportunities for improvement and enhanced efficacy (e.g., West et al., 2003). Clearly, beliefs occupy a central role in determining an individual's functioning. Less clear, however, is how the interplay of competing beliefs (i.e., self-efficacy & stereotypes) can impact

performance. By manipulating aging stereotype activation and incorporating measures of memory self-efficacy, the current study carried out a novel approach to understanding just that and yielded some results worthy of cautious optimism. Evidence from the current study underscores the importance of beliefs in determining performance outcome. Here, MSE, and anxiety's impact on MSE, accounted for percentages of variance comparable to that of chronological age alone. In light of this finding, rather than accept a reality of inevitable decline, it seems elders and the clinicians who serve/treat them alike, may focus on a more active approach to self-efficacy enhancement rather than merely developing skills for coping with a harsh "reality." At the risk of stating the obvious, this need not be limited to memory or aging. Self-efficacy theory, predicated on a belief-performance link, is applicable to any functional domain.

The preponderance of data from the current study showed non-significant effects of stereotype condition. Nonetheless, as illustrated by the extensive literature review summarized earlier, stereotypes can exert an impact, often negative, on performance, and there is little reason to assume such beliefs will somehow disappear from society. In light of this reality, the current results underscore the importance of believing in self, and suggest clinical attempts to empower older adults by incrementally enhancing their personal efficacy may provide them with an adequate buffer to any negative impact. Regarding stereotype beliefs more specifically, interventions may be directly informed by self-efficacy theory. Clinicians may foster non-threatening opportunities for enactive mastery (e.g., identifying realistically attainable memory goals), while simultaneously using verbal persuasion to counter negative stereotypical messages while increasing the frequency, salience of and exposure to positive ones. The data presented here

argue for a focus on efficacy enhancement, a result of which might include reduction of uncomfortable affective states such as anxiety. Ultimately, the goal of such intervention should be ensuring virtually anyone will be able to achieve peak memory performance, in spite of stereotyped beliefs asserting the contrary.

## Theoretical Implications

The stereotype literature reviewed in this paper identifies areas of uncertainty regarding the mechanisms underlying the impact that stereotypes have on people, particularly with regard to their performance in a given domain. Theories of stereotype threat (Steele, 1997) and self-stereotyping (Levy & Langer, 1994; Levy, 1996) have garnered the most attention and have informed the majority of research designs carried out to date, particularly in the domain of memory performance. As the current literature review indicates, these two approaches share some overlap yet are also distinct explications, and both have been bolstered by some empirical support.

However, these theories, alone, do not sufficiently explain the entire stereotype effects-performance picture. Researchers have therefore sought to identify variables that may moderate or mediate the stereotype-performance relationship. Empirically, these efforts have yielded mixed results. Largely absent among these has been self-efficacy. Considering its direct theoretical relevance, this absence is particularly curious. The current study focused on the impact of both stereotype effects and self-efficacy on performance, in an attempt to provide the empirical basis on which to further extend theories of stereotype effects to incorporate the self-efficacy construct. The non-significant findings regarding condition differences, however, make any conclusions about the impact of stereotypes speculative at best. As alluded to earlier, not everyone is equally influenced by stereotypes. Why do some stereotypes seem to have an

impact on performance of some individuals but not others? Are all stereotypes created equal? Current theory attempting to elucidate the stereotype-performance link does not sufficiently explain this. Are individual differences (e.g., personality traits/characteristics) most important? Are certain types of stereotypes more powerful than others (e.g., negative vs. positive)? Do certain stereotyped contexts or domains leave individuals more vulnerable? Calls to address these nuances have led to some interesting recent research, most notably that of Levy & colleagues (2009) who have discovered matching stereotype content with outcome domain (e.g., cognitive or physical) increases the strength of stereotype-performance associations.

Given the abundance of existing stereotypes about people and their performance in various functional domains, and self-efficacy's theoretically universal applicability across human performance, future work may aim to extend both theories to more directly answer such questions and further explore their respective relevance to each other and resulting performance. If stereotypes and their effects differ from other forms of social persuasion, this should be explicated in self-efficacy theory. If stereotype effects exert their impact on performance by altering self-efficacy, this should be included in theoretical models of stereotyping. These are merely two examples but to date, neither of these ideas has been investigated systematically. Current findings provide some evidence for the relevance of anxiety. Further theoretical expansion may address the importance of anxiety's role in stereotype effects, self-efficacy, and performance, both within memory and beyond.

## Research Implications

The fact that stereotypes abound for virtually every categorizable group and functional domain is not a novel phenomenon. Regardless of whether one views

stereotyping as inevitable, there is little reason to believe that such categorization will disappear in the near future. Psychologists have focused extensively on the potential links between stereotyped individuals and their performance in a stereotyped domain. Initial studies focused on gender and racial differences in academic achievement (Steele & Aronson, 1995; Spencer et al., 1997). More recently, perhaps fueled by the increase in human longevity, cognitive aging researchers have applied stereotype theories to older adult memory performance (e.g., Levy, 2003; O'Brien & Hummert, 2006; Hess & Hinson, 2006; Hess et al., 2007). In addition, some have theorized that age-based (e.g., ageist) stereotypes have unique features, such as holding no self-relevance until late in life, not being proscribed by a culture of political correctness, and the simple fact that unlike other prejudicial areas (e.g., race, gender, sexual orientation), with ageism, everyone, assuming they live long enough, eventually belongs to the group being stereotyped. It has been argued that this uniqueness may intensify the impact of such stereotypes (e.g., Levy, 2009).

Though results have varied at times, the link between stereotype effects and performance has been empirically established. Mechanisms through which the stereotypes exert their impact, however, remain an empirical mystery. Various mediators and moderators have been proposed and tested, yielding mixed findings (e.g., Andreoletti & Lachman, 2004; Chasteen et al., 2005 O'Brien & Hummert, 2006; Hess et al., 2007).

The current study attempted to build on this research by including memory self-efficacy, consistently shown to be directly related to memory performance (e.g., Bensadon, 2007; West et al., 2007; West et al., 2008), but conspicuously absent from

the stereotype literature. Although stereotype effects on both performance and self-efficacy were not statistically significant in the current study, this may have been related in part to sample characteristics as opposed to the stereotype activation itself. Ideally, participants would have shown equivalent baseline anxiety levels across conditions. Counterbalancing ensured this to the extent possible, though differences remained.

Such challenges notwithstanding, future empirical work, including similar designs or replications conducted in person, might shed further light on how best to activate stereotypes as consistently and efficiently as possible. Methodological consensus might allow for greater focus on the impact such effects may exert on memory anxiety, self-efficacy, and ultimately, performance. In addition, further research is needed to test theory asserting the uniqueness of age-based stereotypes, and the importance of stereotype content matching the performance domain (e.g., Levy, 2009; Levy & Leifheit-Limson). Though memory was included in the current study, part of the stereotype manipulation relied on stereotypes related to age more broadly (i.e., not memory-specific).

Beyond stereotype condition, the exploratory models reported here did offer further empirical support for MSE's role in the relationship between anxiety and memory performance. Given the theoretical significance of anxiety to both self-efficacy and stereotype threat, future research should replicate the current design by elucidating a model of performance that includes both stereotype effects and self-efficacy, each shown to influence performance individually. Although stereotype effects did not have a significant impact with the current sample, ideally, this project may provide the building blocks for future empirical attempts both to disentangle the relationships among anxiety,

stereotyping and self-efficacy, and to examine their multivariate effects on performance. Results from the current study provide a strong case for anxiety and self-efficacy to play a central role in future efforts.

# APPENDIX A
# RECALL LIST (POSITIVE)

buttery

dignified

idea

aluminum

bud

kind

lift

wise

clear

bush

silky

can

blossom

respected

toast

calf

nail

blue

insightful

sound

# APPENDIX B
## RECALL LIST (NEGATIVE)

sky

brittle

red

damp

confused

hot

tooth

forgetful

curly

leg

complaining

button

lock

screen

senile

detergent

circling

scrubs

snap

pan

# APPENDIX C
## RECALL LIST (AGING-NEUTRAL)

high

beat

costly

foil

breeze

green

ink

southern

large

paper

flat

merger

drum

wavy

shoe

carton

glass

boat

yelling

metallic

# APPENDIX D
# PHONE SURVEY SCRIPT

I am calling because you are scheduled to complete a brief telephone interview today. This interview should take 20-30 minutes. Is this a good time to do the interview? During this phone call, I will ask you a few questions and ask you to do some exercises that involve remembering and making judgments about words. Your participation is completely voluntary. If you prefer not to answer any question, just let me know and we will move on to the next question. The information you give me will be confidential. All of your answers will be identified by a computer code. Your name and identifying information will not be attached to your responses. This phone call will take about 20 minutes. We will be recording the interview today so that we can review your responses later, if need be. Feel free to stop me if you have any questions about the directions. Do I have your permission to go ahead with the interview?

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## BIOGRAPHICAL SKETCH

Benjamin André Bensadon was born on April 10, 1974, in New York City. An only child raised in part by his grandmother, Benjamin's affinity and respect for older adults has shaped him as a person and continues to guide his quest to help others. He earned his Bachelor of Arts in psychology and his Master of Education from Boston University in 1996 and 2000, respectively. He earned his Master of Science from the University of Florida in 2007, and has supplemented his graduate studies in psychology with coursework in epidemiology, social policy, and health & social behavior while an employee at the Harvard School of Public Health.

Benjamin has provided individual and group psychotherapeutic and assessment services to children and adults, in college counseling and primary healthcare settings. Benjamin has also spent substantial time traveling, studying, and living in Europe, and is fluent in Italian and conversant in Spanish. Upon completion of his Ph.D. program, Benjamin will utilize his linguistic, research and clinical skills to maximize his ability to ameliorate human suffering, particularly that of older adults, as broadly as possible.