ABSTRACT

OSOWSKI, NICOLE LYN. The Influence of Token Status Induced Stereotype Threat on Memory Performance in Older Adults. (Under the direction of Thomas M. Hess, Ph.D.)

The purpose of the current research was to investigate how contextual features of a situation affect cognitive performance. Specifically, this research explored the role that a social characteristic of the testing situation, group composition, had on memory performance. The study tested older adults (N=72) between the ages of 65 and 75 who were evenly divided into three testing conditions. In the minority status condition, one older adult was tested with two younger adult confederates whereas in the majority status condition, older adults were tested with two similarly aged individuals. The third condition involved individualized testing. It was expected that older adults would experience stereotype threat in the minority status condition and that this would result in poorer performance on a memory task relative to those in the majority status and alone conditions. Contrary to expectations, memory performance did not significantly differ between the three conditions, providing no support for the hypothesis that group composition at testing would be related to stereotype threat . In addition, no evidence was found that the hypothesized moderators (stigma consciousness, value placed on memory) and mediators (anxiety, evaluation apprehension, strategy use) were related to threat-based effects.

**THE INFLUENCE OF TOKEN STATUS INDUCED STEREOTYPE THREAT ON
MEMORY PERFORMANCE IN OLDER ADULTS**

by
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Chair of Advisory Committee

DEDICATION

For my parents, Linda and Michael Osowski, who always told me that I could accomplish anything. Thank you for believing in me.

BIOGRAPHY

Nicole Lyn Osowski was born in Rochester, NY on January 23, 1975. Nicole graduated from E.J. Wilson High School in Spencerport, NY in June, 1993. She then attended the State University of New York College at Fredonia where she worked diligently to graduate in three years with magna cum laude honors. She earned a Bachelor of Arts degree in English and a Bachelor of Science degree in Communication in May of 1996. Following college, Nicole worked in public relations at Keuka College in New York for one year before moving to North Carolina. Since moving, Nicole has held positions in internal communications and marketing for both Ericsson and IBM in Research Triangle Park, North Carolina. Nicole left the corporate world in August of 2003 to pursue a degree in psychology at North Carolina State University.

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BACKGROUND

Previous research has demonstrated an age-related decline on memory tasks (for review, see Zacks, Hasher & Li, 2000). For the most part, these declines have been attributed to underlying neurobiological mechanisms that change with age (e.g., processing speed, Salthouse, 1996; inhibitory processes, Hasher & Zacks, 1988; capacity resources such as working memory functioning, Craik, 1986). There is emerging evidence, however, that other factors play an important role in determining age differences in memory performance (Hess, 2005).

Specifically, there are a variety of studies that now suggest that at least part of the age-related variance in memory performance can be accounted for by factors other than the efficiency and integrity of the information processing system. For example, the manner in which task instructions are framed has been demonstrated to impact age differences in memory performance (Rahhal, Hasher, & Colcombe 2001). Motivation has also been found to influence the magnitude of age differences in performance on memory tasks. For example, consistent with socio-emotional selectivity theory (see Carstensen, Isaacowitz, & Charles, 1999), research has demonstrated that older adults remember advertisements depicting emotional goals better than advertisements depicting knowledge-related goals (Fung & Carstensen, 2003), and that age differences in performance are smaller for the former type of stimuli. Relatedly, Hess, Rosenberg, and Waters (2001) have shown that task relevance has a more potent influence on the memory performance of older adults than it does on that of younger adults. Such findings are consistent with a contextualist view of adult development in that they suggest that age differences in memory performance are affected by multiple factors that reflect normative and nonnormative influences (Hess, 2005).

A specific culturally based influence on performance that is of increasing interest in the field relates to negative stereotypes of aging. Initial examinations of stereotype-based influences have proceeded by investigating the degree to which beliefs about aging and one's own ability account for older adults' memory performance. For example, research has investigated the extent to which control and self-efficacy beliefs about memory reflect aging stereotypes (for a review, see Hertzog & Hultsch, 2000). The assumption underlying this research is that stereotypes impact beliefs which then influence effort and strategic behavior, which in turn determine performance. A more recent way of conceptualizing the influence of stereotypes is through the "stereotype threat" framework (Steele & Aronson, 1995). Recent research in this domain with aging adults provides evidence that stereotypes can have a more direct impact on performance independent of beliefs (Levy, 1996; Hess, Auman, Colcombe, & Rahhal, 2003), and that the stereotype threat framework may be useful for understanding age differences in memory performance.

Stereotype Threat

Steele (1998) proposes that stereotype threat occurs when an individual recognizes that a negative stereotype about a group to which one belongs is applicable to oneself in a particular situation. Specifically stereotype threat is defined as "being at risk of confirming, as self-characteristic, a negative stereotype about one's group" (Steele & Aronson, 1995, p. 797). Subjective feelings of threat are thought to negatively affect performance. Steele and Aronson argue that the underlying mechanism for this negative effect is that feeling threatened consumes cognitive resources and thus redirects attention away from the task at hand, resulting in poorer performance when compared to those who are not experiencing stereotype threat. This redirection of attention is presumed to occur because an individual is

concerned with aspects of a particular situation as opposed to being focused on the central task. In addition to this availability of resources explanation, threat is also believed to affect the allocation of resources which in turn influences performance. Thus, potential mediators of threat include constructs that consume resources (e.g. anxiety, apprehension) and constructs that affect the allocation of resources (e.g. motivation). Steele and Aronson also hypothesize that threat will occur only under certain conditions. For example, threat will occur only when an individual identifies with a particular stereotyped domain and when an individual is aware that a specific domain is stereotyped.

Research demonstrates that stereotype threat operates in a variety of domains. The pioneering work looking at stereotype threat examined African Americans and performance on intelligence tests. Steele and Aronson (1995) compared groups of Black and White students in terms of their performance on various intellectual tasks and found that Black participants in the threatening condition (the one highlighting the diagnosticity of intellectual ability) performed significantly worse than both White participants in the threatening condition and Black participants in the non-threatening condition. Threat has also been found to affect performance in a variety of other situations involving both racial and nonracial stereotypes (e.g., Stone, Lynch, Sjomeling, & Darley, 1999; Spencer, Steele, & Quinn, 1999; Aronson et al., 1999; Quinn & Spencer, 2001; Roberson, Deitch, Brief, & Block, 2003; Stangor, Carr & Kiang, 1998).

Stereotype Threat and Aging

Stereotypes about aging are pervasive in the American culture and can be encountered or activated in almost any social context. Indeed, as Steele describes it, these stereotypes are "in the air" (Steele, 1997). Negative stereotypes about older adults

characterize them as forgetful, slow thinking, senile, and impaired, among others (Schmidt & Boland, 1986). The activation of these stereotypes in experimental settings has been shown to influence performance on memory tasks. Preliminary work examining the implicit activation of aging stereotypes laid the foundation for later work examining stereotype threat and aging.

In the first study of this type, Levy (1996) examined whether implicit activation of stereotypes about aging would influence performance on a memory task. She hypothesized that activating negative stereotypes would be detrimental to memory performance, while activating positive stereotypes would improve memory performance. She found that subliminal activation of stereotypes impacted memory performance in the expected direction. In a second study, Levy found that the interventions of the first study had no impact on performance in a sample of younger adults. Thus, being a member of a stereotyped group was a necessary precondition for the experience of stereotype activation. Being a group member may increase the probability of stereotype activation because the threshold of activation is already heightened in older adults (Shih, Ambady, Richeson, Fujita, & Gray, 2002).

Initial work in the field of aging has also suggested that the stereotype threat construct might have some viability in terms of explaining age differences in performance. In the first application of the stereotype threat framework with aging adults, Rahhal et al. (2001) examined whether altering test instructions prior to a memory test to either emphasize or de-emphasize the memory aspect of the task would influence subsequent memory performance. Consistent with previous theorizing (Steele, 1997), they hypothesized that instructions emphasizing memory would differentially impact older adults compared to younger adults

because older adults believe in aging-related stereotypes in which memory deteriorates with age. Rahhal et al. found that older adults' performance was significantly worse than that of younger adults in the memory-emphasis condition, but no significant differences were observed in the memory neutral condition. One explanation the authors provide for their findings is that varying the instructions affects an older adult's perception of the diagnosticity of the task with respect to the stereotyped skill. They posit that the memory neutral instructions controlled for stereotype activation, thus providing a more accurate indication of differences between age groups. These studies provided the groundwork for future research examining stereotype threat in older adults.

Hess et al. (2003) also examined the impact of stereotype threat on older adults' memory performance. They tested younger and older adults and manipulated threat by using fabricated newspaper articles describing research findings about either the negative impact of aging on memory (negative condition) or more optimistic results regarding the relationship between aging and memory (positive condition). They found that older adults in the positive condition had significantly better memory performance than older adults in the negative condition, and that the effect of stereotype activation was greatest in older adults who placed a high value on their memory ability. In contrast, the younger adults did not show significant differences in recall across the conditions. These findings are consistent with the threat framework, lending support to Steele and Aronson's (1995) hypotheses that threat is specific to the stereotyped group and that threat will have its greatest effect on those individuals who identify with the stereotyped domain.

Hess and Hinson (2005) tested a continuous aged group (24-86 years old) using a stereotype threat activation process similar to Hess et al. (2003). They found similar effects

with younger adults in that threat had no effect on memory performance. They also found that older adults remembered more information in the positive condition compared to the negative condition, although these results were not as strong as those in the initial study. In the middle-aged group, they found the adults in the negative condition remembered more information than adults in the positive condition. They attributed these results to reactance on the part of those participants who may be attempting to prove that they are not a member of the stereotyped group (e.g. older adults).

In another study, Hess, Hinson and Statham (2004) examined the influence of both implicit and explicit primes of aging stereotypes on memory performance in younger and older adults. They found that implicit priming of aging stereotypes significantly affected memory for older adults. Older adults demonstrated greater free recall of a word list following positive primes versus negative primes, thereby replicating Levy's (1996) initial work in this area. In addition, they found that alerting older adults to the diagnostic value of the memory test negatively affected their performance in the presence of explicit primes. No effects were found for either explicit or implicit primes in younger adults. These latter two findings again provide support for the operation of stereotype threat in relation to aging and memory.

In another recent study, Chasteen, Bhattacharyya, Horhota, Tam, and Hasher (2004) gave participants behavioral descriptions of fictitious people, and participants were told to either form an impression of the individual or to memorize the information. They hypothesized that the memory instructions would induce threat in the older participants and the impression instructions would not induce threat. They anticipated that they would find age differences in recall for the memory condition, but not for the impression condition. In

contrast to this expectation, they did not find an age by instruction interaction in that type of instructions did not alter performance between groups. Specifically, in comparison to memory instructions, the impression instructions improved performance equally for both age groups. In two subsequent studies, they found some support for stereotype threat's impact on memory performance in that perceptions of stereotype threat were observed to mediate the relationship between age and memory performance. Specifically, there was a positive relationship between age and stereotype threat and a negative relationship between threat and memory performance. These results replicate and extend the research of Hess et al. (2003) by finding that older adults who experienced threat in relation to aging had poorer performance on both recall and recognition tasks. They also represent the first findings that specifically attempted to link the subjective experience of threat to performance.

A criticism of this early work with stereotype threat and aging is the overt use of aging-related information to activate aging stereotypes. Some of these early studies had participants read newspaper articles related to aging, with specific references to aging and later adulthood. It is believed that in environments in which aging stereotypes exist that situational cues may induce threat without direct reference to aging. This more subtle activation of aging stereotypes (i.e., through cues associated with aging stereotypes) may be more representative of the type of "threatening" situation that older adults encounter in everyday life. The current study sought to examine the activation of threat with more subtle situational cues. The primary goal of the current research was to study the operation of stereotype threat in a social context. Such research is important for testing the generalizability of threat effects. It also takes into account the fact that stereotype threat is inherently a social phenomenon, thereby providing a strong test of the threat framework.

Current Study

The current research extended previous research on aging and stereotype threat by focusing on an inherent contextual feature of social situations, the composition of group members in terms of age in a particular setting, as a potential determinant of threat. Previous research (Fuegen & Biernat, 2002; Lord & Saenz, 1985) has indicated that people are sensitive to subtle manipulations of situational variables like group composition, especially for members who are the sole representative of their particular group. The current study attempted to discover whether being the only older adult in a room of younger adults influences the memory performance of older adults. Being an older adult in an environment with younger adults may make age more salient and increase feelings of threat. This type of threat induction may mimic more everyday contexts in which older adults function (e.g. grocery store, doctor's office, and occupational settings). Indeed other researchers point out that group composition can automatically activate stereotypes (Inzlicht & Ben-Zeev, 2003) and this activation can have a negative impact on performance (Inzlicht & Ben-Zeev, 2000). Token status is one factor that has been shown to increase awareness of negative group stereotypes (Inzlicht & Ben-Zeev, 2000).

Token status

Most social situations involve interactions with other people. Rarely are we forced to remember information or make decisions without the influence of others either consciously or unconsciously. Saenz and Lord (1989) point out that a group can influence a group member's performance by either direct pressure or mere observation. For example, suppose an older adult is in an occupational environment and they are interacting with or observing younger adults. The older adult may form negative self-perceptions based upon these

interactions or observations. These negative perceptions have the potential to influence subsequent performance (e.g. at a team meeting) and future interactions. These performance declines may then further reinforce the older adult's negative self-perceptions thus perpetuating the process over and over again. This example demonstrates how features inherent in the social context can influence cognitive performance.

Research in the mainstream social cognitive domain investigating the influence of group composition on cognitive performance has focused on token status or solo status. A token is an individual who is the only member of a particular social category in a group or social setting (Lord & Saenz, 1985). Research demonstrates that minority status in a group context has negative implications for cognitive performance. This relationship is postulated to be mediated by the anxiety and evaluation apprehension an individual associates with a particular social situation.

Lord and Saenz (1985) hypothesized that tokens would pay less attention to a group task because of an increase in anxiety related to self-presentation concerns. This decreased attention would subsequently result in tokens remembering fewer opinions expressed by group members even when tokens were treated no differently than nontokens. The token status in their experiment was related to gender with both males and females participating. They found that being the token in a particular group setting inhibited participant's memory for the content of a group discussion. Specifically, token participants remembered fewer of the opinions expressed by group members than nontoken participants. This effect occurred for both men and women in this study.

In their study, Lord and Saenz found that performance on a memory task was poorer for tokens (opposite sex) than for nontoken (same sex) participants. An important feature of

this study is that the token status, in this case gender, was never brought to the participants' awareness. Thus participants had to notice their own token status. The researchers attributed this poor performance to reduced cognitive resources resulting from anxiety about both their own self-presentation concerns and from concerns about being evaluated by others (Lord & Saenz, 1985). These results are particularly important because this study was done with undergraduate students who would not be expected to feel inferior to other students or to feel as though they were being evaluated. These feelings might be more apt to occur in occupational environments in which tokens are typically in lower-level positions than nontokens (Saenz & Lord, 1989) as tokens are typically from disadvantaged groups. Further studies have demonstrated support for their hypotheses that evaluation anxiety mediates the impact of token status on cognitive performance (Fuegen & Biernat, 2002; Spencer et al., 1999).

This early work examining token status suggests that being a token or minority would impact performance regardless of the particular domain that was investigated; that is, being the only member in a group will influence performance no matter what type of performance investigators are examining. In contrast, the stereotype threat framework would suggest differential performance for tokens and nontokens in domains based upon the stereotypicality of the situation or task. For example, men should not have poorer performance on a math test in a room of women because men are not stereotyped in the math domain. This suggests that the influence of tokenism is only relevant when a task taps into a stereotyped domain and to individuals who identify with a particular stereotype within that domain.

Token Status and Stereotype Threat

Recent work suggests that the effect of token status is consistent with stereotype threat-based ideas. The simple existence of being a token or minority member in a particular group setting is posited to evoke the activation of stereotypes and thus result in feelings of stereotype threat which then impacts performance on the stereotyped ability. Steele and Aronson (1995) attributed poor performance in token situations to the self-consciousness that being the token member of a social situation causes. Research across multiple domains (e.g. gender, race) supports the link between token status and stereotype threat. This area of research is of particular importance for the current research since the goal of this study was to extend token status research with aging participants.

Inzlicht and Ben-Zeev (2000) performed a study in which they tested the link between token status and stereotype threat in a situation involving math performance and gender. They hypothesized that the mere existence of being outnumbered by members of the opposite sex in an experimental context involving math performance would activate gender stereotypes. The researchers believed that this activation would result in poorer performance for females on a math test. They had participants assigned to either a same-sex condition in which there were two other participants of the same-sex or the minority condition in which the participant was the solo member of their sex. They found that female participants in the token (minority) condition performed worse on the math ability test than females in the same-sex condition. In contrast, males performed equally well on the math test in both conditions because math is not a stereotyped domain for them. They did not find that minority status impacted women's performance in a nonstereotyped domain for their gender, in this case verbal ability.

In another study, Sekaquaptewa and Thompson (2002) tested whether performance of disadvantaged group members is more affected by solo status than is that of privileged group members' performance using two different groups. The first experiment tested white male and female participants, and they hypothesized that female solos would be more affected by solo status than male solos in an oral exam testing memory for information for previously learned advanced psychological facts. They found that women performed significantly worse than men. One explanation the authors provide for these results is that, consistent with previous research, women tend to underperform when tested on topics viewed as stereotypically male (e.g. science). The authors also did a second study to examine race and performance by using African American and White women solos using an oral exam testing previously learned facts relating to animal behavior. Consistent with their predictions, they found that African American women tested as solos performed significantly worse than White women solos. No significant differences were observed between the two race groups when they were tested as nonsolos. Also African American women performed significantly worse as solos than as nonsolos whereas the performance of the White women did not differ between conditions. These results demonstrate that performance is influenced by solo status, but only in the direction that is consistent with societal stereotypes.

Sekaquaptewa and Thompson (2003) expanded their previous research by examining the dual impact of stereotype threat and solo status on women's performance. They hypothesized that test performance deficits would be compounded for women who were tested as solos in a stereotypically threatening situation. They predicted that men's performance would be unaffected by solo status or by taking a test of math ability, a domain unstereotyped for males. Contrary to Inzlicht and Ben-Zeev (2000), these researchers

predicted that even when the task was described as gender neutral that women in solo status conditions would still suffer performance decrements. They made this hypothesis because their performance task was public rather than private, as was the case with the earlier research by Inzlicht and Ben-Zeev which used a written math exam. Sekaquaptewa and Thompson (2003) found that both solo status and stereotype threat negatively influenced the performance of women, but not men. Specifically, the effect on women's performance was compounded when they were solos and in the threat condition as these participants scored the lowest. Women in the nonthreat and nonsolo condition performed the best with performance falling in between for women who were tested in either solo or threat condition. In contrast to earlier work (e.g. Inzlicht & Ben-Zeev, 2000), these researchers found that solo status still had a negative effect on performance even in a nonthreatening condition. The authors attribute their findings to the public nature of their performance task which they believe evoked negative stereotypes in women regardless of threat condition because consistent with previous research "the idea of giving a public performance before an opposite-sexed audience activates more negative constructs for women than men" (Sekaquaptewa & Thompson, 2003, p.73).

Inzlicht and Ben-Zeev (2003) performed a subsequent study to further examine this public versus private explanation. They tested whether solo women, who were highly identified with the math domain, would still underperform when performance was characterized as anonymous and confidential. They attempted to determine whether an underlying mechanism for solo status and threat effects was due to the nature of the task as public (making a good impression on others) or private (self-evaluative). Participants either believed that they were taking a highly public test in which they would share their scores

with each other or that their scores would remain anonymous and confidential, and that no one (not even the experimenter) would have access to their scores. They found that solos in both public and private groups had lower scores than nonsolos. Solo women performed poorly in both public and private settings. These results indicate that being a token can create a threatening environment for members of stigmatized groups regardless of the type of evaluation that is expected. Specifically this study indicates that "the mere presence of others is sufficient to evoke threat" (Inzlicht & Ben-Zeev, 2003, p.801).

Another study examining token status and stereotype threat in the workplace found that African American professionals who were tokens (the only minority) in their department experienced a greater amount of stereotype threat on the job (Roberson, et al., 2003). This threat resulted in greater use of suboptimal feedback strategies. These suboptimal strategies include heightened use of indirect feedback (e.g. monitoring) and the greater tendency to discount feedback from supervisors. These professionals attributed the negative feedback to prejudice and the positive feedback to a supervisor's desire to appear unbiased. The above research clearly demonstrates the link between token status and stereotype threat. Additionally the multiplicity of domains in which stereotype threat operates provides evidence for its generalizability across contexts.

Current Study and Hypotheses

The goal of the current research was to further explore the role that social stereotypes have on cognitive performance in older adulthood. Specifically, this study examined stereotype threat in older adults utilizing a more subtle method than that used in previous studies. This study altered a subtle situational cue–group composition–by having three conditions in which older adults took a memory test either alone, with other older adults

(majority condition) or with younger adults (minority condition). Figure 1 provides a visual of the hypothesized relationships of all of the variables in the current study.

Hypothesis 1. It was hypothesized that as the social context increased the salience of age for older adults, stereotype threat would increase and memory performance and memory beliefs would decrease. Age salience was expected to be highest in the minority condition and lowest in the majority condition, with the alone condition expected to fall somewhere in between. This age salience was expected to modify feelings of threat and impact performance. Specifically, older adults in the minority condition were expected to feel more threatened than older adults in the alone and majority conditions. Threat has been demonstrated to have a negative impact on memory performance (see Hess et al., 2003; Hess et al., 2004), and similar effects were expected here. Specifically it was predicted that older adults in the majority condition would have better recall scores than those in the alone condition, who would in turn perform better than those in the minority condition. It was also expected that the participants in the alone condition would differ from those in the majority and minority conditions because participating in the experiment may inadvertently induce threat, but not to the same degree as that induced in the minority status condition.

Beliefs about whether or not memory ability is something that you can control or an ability that will inevitably decline with age are also believed to change as a result of threat. Hess and colleagues (2004) found that controllability beliefs increased from pre-test to post-test in the positive condition (non-threat) and declined in the negative (threat) condition. Other findings support the notion that older adults believe that they have less control over memory function (Chasteen et al., 2004). In addition, Hess et al. (2004) found that participants' scores on this measure from pre- to post-test increased in the positive threat

condition and declined in the negative threat condition. The current study tested whether a more subtle manipulation of threat would result in a similar effect.

Hypothesis 2. Consistent with the stereotype threat framework, the threat manipulation was only expected to influence performance on tasks that are diagnostic of the negatively stereotyped ability. To test this idea in the current study, a math task was administered to all participants. This task was selected because it is not believed to be associated with aging stereotypes, and previous research has demonstrated relatively small age related declines in performance on mathematical tasks when compared to that observed with other abilities (Schaie, 1979). Performance on this nonstereotypical task was expected to be unaffected by the group manipulation. This proposed relationship is consistent with previous research findings that token status does not impact performance in a nonstereotypical domain (e.g. women and verbal ability; Inzlicht & Ben-Zeev, 2000).

Hypothesis 3. The effects of threat were expected to be moderated by the value placed on memory and the extent to which individuals feel that they are being stereotyped. Aronson et al. (1999) argue that valuing the stereotyped ability is a necessary precondition for threat to take place. Indeed Steele (1997) says that in order for threat to occur, the individual must identify with the domain that is relevant to a particular stereotype; in other words, it must be self-relevant. In line with this reasoning and consistent with previous findings (Stone, et al., 1999; Hess et al., 2003), it was expected that older adults who place greater value on their memory would be most impacted by the threat manipulation in the current study.

The extent to which an individual is conscious of aging stereotypes or stigmas was also expected to moderate the impact of threat on memory performance. For threat to impact performance, a person does not need to believe in a particular negative stereotype, but he or

she needs to be aware that the negative stereotype exists (Steele & Aronson, 1995). Pinel

(1999) defined stigma consciousness as "an expectation that one will be stereotyped,

irrespective of one's actual behaviors" (p. 115). People high in stigma consciousness

describe impressions that out-group members interpret all of their behaviors in terms of

social stereotypes (Brown & Pinel, 2003). Brown and Pinel (2003) found that participants in

a high threat condition with high stigma consciousness had significantly lower scores on a

math test than low stigma consciousness participants in the same condition. This same

relationship was not observed in the low threat condition with both high and low stigma

conscious individuals performing at equal levels on a math test. In the present study, it was

expected that participants high in stigma consciousness would be most influenced by the

threat manipulation.

  Hypothesis 4. Consistent with previous research, the effects of threat were

hypothesized to be mediated by anxiety, strategy use and evaluation apprehension. Steele and

Aronson (1995) argue that threat has its influence through factors that affect the availability

of cognitive resources. According to Spencer at al. (1999), evaluation apprehension is "a

performance-interfering anxiety and distraction that is aroused by an evaluative audience,

real or imagined" (p.14). Previous research has found that situations involving threat increase

both anxiety and evaluation apprehension which impacts cognitive availability and has an

influence on performance on a particular cognitive task (Steele & Aronson, 1995; Spencer et

al., 1999; Stone et al., 1999). Consistent with this research, it was expected that state anxiety

and evaluation apprehension would consume cognitive resources and mediate the

relationship between threat and performance in the current study. It was hypothesized that

participants in the minority status condition would have the greatest anxiety and evaluation

apprehension followed by those in the alone condition and then by those participants in the majority condition.

Threat also interferes with the generation and use of strategies that can effectively improve performance. Previous research provides support for this notion (Hess et al., 2003; Quinn & Spencer, 2001) suggesting that threat impacts the executive functions that control strategy use. For example, Hess and colleagues (2003) found that strategy use mediated the relationship between threat condition and memory performance by explaining 56 percent of the variance associated with stereotype threat-related effects. The current study assessed strategy use in two different ways. The first examination was to look at actual strategy use on a task assessing memory for a categorized word list. The second way was to compare performance on that same memory task with its strong strategic component (recall of a categorizable list) to that of a task with less of an obvious strategic component (recall of a noncategorizable list). It was expected that older adults in the majority condition would have greater strategy use—as reflected in clustering scores and difference in performance across memory lists–than those in the alone condition, who would in turn have better strategy utilization scores than those in the minority condition.

<div align="center">METHOD</div>

Participants

Seventy-two older adults ranging in age from 65 to 75 years old (M_{age} = 68.75, *SD* = 3.20; 36 women, 36 men) were tested. Previous research has revealed that aging-related stereotype threat effects are strongest in this age group (see Hess et al., 2003; 2004; Hess & Hinson, 2005). All participants were recruited through newspaper advertisements and had not

participated in any previous experiments in the Adult Development Laboratory. Participants

were compensated $20 for participation in the study.

Materials

Demographic information. A background questionnaire was administered to gather

demographic information about the participants (e.g. age, education, occupation).

Health assessment. The SF-36 Health Survey (Ware, 1993) was used to obtain self-

reports of both physical and mental health (α = .88 - .93). The two scores obtained from this

survey have strong divergent validity in terms of differential relationships to symptoms

relating to physical and mental health symptoms (Ware, 1994).

Stigma consciousness. The Stigma Consciousness Questionnaire (SCQ; Pinel, 1999)

was adapted for use with older adults in a previous study in our laboratory. This 10-item

questionnaire taps into older adults' consciousness about aging stereotypes on a 7-point

Likert Scale (α = .694 for current sample). Examples of questions on this scale are: "Most

young adults do not judge older adults on the basis of their age" and "I never worry that my

behaviors will be viewed as stereotypically old."

Domain identification. To measure the value or importance that participants place on

memory ability, the 16-item memory achievement subscale of the Metamemory in Adulthood

questionnaire (MIA-Ach; Dixon & Hultsch, 1984) was administered (α = .76 - .79).

Examples of items of on this scale include: "It is important to me to have a good memory"

and "I work hard at trying to improve my memory."

Memory beliefs. The Memory Controllability Inventory (MCI; Lachman, Bandura,

Weaver, & Elliott, 1995) assessed participants' beliefs about their memory. The MCI has 20

questions, which can be divided into four subscales representing: Present Ability (α = .58 -

.70); Potential Improvement (α = .62 - .75); Effort Utility (α = .65 - .73); and Inevitable Decrement (α = .58 - .77). Example questions are: "There's not much I can do to keep my memory from going downhill" and "I can think of strategies to help me keep up my memory."

State Anxiety. To assess state anxiety associated with threat, the 10-item short form of the state anxiety subscale of the Spielberger State-Trait Anxiety Inventory (STAI-S; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) was administered (for age range to be tested, α = .90 - .93). Example items on this inventory include: "I feel calm" and "I am nervous."

Evaluation apprehension. The Evaluation Apprehension Questionnaire (Spencer et al., 1999) is comprised of four items and assessed the extent to which a participant was worried about being evaluated during the experiment (α = .82). "People will think I have less ability if I do not do well on this test" and "If I do poorly on this test, people will look down on me" are example items on this questionnaire.

Memory. There were two memory lists: a categorizable list and a noncategorizable list. Each list contained 30 words. The categorizable list was the same as the list utilized in previous studies (Hess, et al., 2003; 2004; Hess & Hinson, 2005). The categorizable list included five exemplars from each of six different semantic categories. The words on this list are moderate to high-frequency exemplars of their respective categories based on norms developed by Howard (1979). The noncategorizable list included 30 words from different semantic categories based on norms by Overschelde, Rawson and Dunlosky (2004). Both lists were matched on averages for concreteness ($M_{categorizable}$ = 594.33, $M_{noncategorizable}$ = 581.1; Pavio, Yuille & Madigan, 1968; Toglia & Battig, 1978; Gilhooly & Logie, 1980), frequency

in the English language ($M_{categorizable} = 26.22$, $M_{noncategorizable} = 29.67$; Kucera and Francis,

1967) and number of syllables (both lists $M = 2$) (for all norms, see MRC Psycholinguistic

Database, 1997). The words on both lists were randomly ordered in two vertical columns of

15 words each on a standard sheet of white paper.

Math problems. A series of fill-in-the-blank math problems served as the

nonstereotyped task. The actual problems selected tapped into everyday math abilities, but

were difficult enough to put demands on resources. These questions were moderately

challenging in order to avoid floor and ceiling effects. This task was a compilation of

problems from the Addition, Subtraction and Multiplication tests from the Kit of Factor-

Referenced Cognitive Tests (Ekstrom, French, Harman & Derman, 1976) in which

participants were tested on speed and accuracy for adding, subtracting and multiplying two or

three single or two-digit numbers.

Other ability tasks. Other ability measures were included as part of a standard

background assessment. Verbal ability was measured using the Vocabulary Test II from the

Kit of Factor-Referenced Cognitive Tests (Ekstrom et al., 1976). The letter and pattern

comparison tasks (Salthouse & Coon, 1994) were administered as measures of processing

speed.

Procedure

Prior to coming into the lab, participants were assigned to one of the three conditions.

In addition, participants were sent a packet of questionnaires to complete prior to their testing

session. This packet included the SF-36 health survey, the SCQ, the MIA-Ach, and the pre-

test MCI. An attitudes questionnaire was also included in the packet to disguise the purpose

of the other measures. Participants were instructed to complete this packet as soon as they received it and send it back to the lab in the postage paid return envelope.

Twenty-four participants were assigned to each of three conditions: a) minority status condition (one older adult was tested with two younger adult confederates), b) alone condition (older adult was tested individually), c) majority status condition (an older adult was tested with two other similarly-aged individuals). This assignment was quasi-random and participants were equated for gender (12 women, 12 men in each condition), age range (range = 65-75 for each condition) and mean age ($M_{ageminority} = 68$, $M_{agealone} = 68.75$, $M_{agemajority} = 69.5$) across all three conditions.

Upon arrival at the Adult Development Laboratory, the experimenter greeted the participant(s). In the majority and minority conditions the participants were introduced to each other. However, contact was limited and interactions between participants were encouraged only at the end of the testing session. The participants were situated so that in the minority condition, the older adult was seated at the head of the table. The younger adults in the minority condition were confederates that were affiliated with the Adult Development Laboratory. There were five confederates between the ages of 21 and 30 years of age (four women, one man) that acted as participants in this study. For the 24 testing sessions in this condition, 15 were with one male and one female confederate (older adult was a woman in eight of these sessions) and nine sessions were with two female confederates (older adult was a woman in four of these sessions).

Participants reviewed and signed the Informed Consent Form. Then participants were informed that they would be taking a variety of tests, and a brief description of each task was given. Then the STAI-S and EAQ were administered.

For the memory tasks, participants studied a word list for 2 min and then were given a minimum of 3 min to write down as many of the words as they could remember on standard sheet of paper with thirty lines. If a participant was still writing at the end of 3 min, the recall period was extended until 30 s elapsed without further recall. For the math test, participants were given 5 min to complete as many of the math problems as possible. This amount of time was given in an attempt to equate the total time allotted across each type of task.

Each participant received an initial memory test, the math test, and then a second memory test. The order of the categorizable and noncategorizable memory tasks was counterbalanced across the participants within conditions.

The post-test MCI was administered next. Participants were debriefed and any questions about the study were addressed. Then participants were asked to complete the ability measures and the background questionnaire. Finally participants were compensated.

RESULTS

The purpose of this study was to examine stereotype threat in older adults using a more subtle manipulation than methods used in previous studies. The subtle difference between conditions was the group composition of their testing environment. Participants were tested with two young adult confederates (minority), alone, or with two older adult participants (majority). To confirm that there were no differences between these three experimental groups in terms of potentially influential health or ability factors, one-way analyses of variance (ANOVAs) were conducted on the background variables. Means and standard deviations are reported in Table 1. For each analysis the effect sizes for the critical and significant statistical effects are reported using partial η^2. No significant effects associated with condition were found suggesting that the random assignment of participants

to a condition was successful (age, $F(2,69) = 1.33$, $p = .27$, $\eta^2 = .04$, physical health, $F(2,69)$ = .44, $p = .65$, $\eta^2 = .01$, mental health, $F(2,69) = 1.42$, $p = .25$, $\eta^2 = .04$, education, $F(2,69)$ = .66, $p = .52$, $\eta^2 = .02$, verbal ability, $F(2,69) = 2.15$, $p = .12$, $\eta^2 = .06$ and processing speed $F(2,69) = .22$, $p = .80$, $\eta^2 = .00$). In addition, there was no difference in performance for participants in the minority condition who were tested with either one male and one female confederate or with two female confederates, $F(1,22) = 2.35$, $p = .14$, $\eta^2 = .10$. Each of the sections below report analyses specific to each of the study's proposed hypotheses.

To examine the first three hypotheses, the proportion of correct answers out of all possible answers was calculated for both the categorizable and noncategorizable memory tasks and for the mathematical test. In addition for hypothesis one, the memory controllability scores were calculated by taking the mean response for items on each scale for each time the task was administered. For hypothesis three, the scores for stigma consciousness and value placed on memory were computed by averaging responses to the items on the respective scales. For hypothesis four, an evaluation apprehension score was obtained by summing responses to the four items on the EAQ. Anxiety scores were computed by averaging the items on the STAI-S. To examine strategy use in hypothesis four, clustering scores were computed using the adjusted ratio of clustering (ARC; Roenker, Thompson, & Brown, 1971) measure. The means and standard deviations for all of the dependent measures by condition are reported in Tables 2 and 3.

Hypothesis 1

The first hypothesis concerns the role that the stereotype threat manipulation had on memory performance. Specifically it was predicted that recall scores would be highest for participants in the majority condition followed by participants in the alone condition, and

then by participants in the minority condition. To investigate this hypothesis, the proportion

of correct answers on the categorizable and noncategorizable memory tasks were examined

using a 3 X 2 X 2 X 2 (Condition X Gender X Task Order X Memory Task) ANOVA with

condition, gender and task order serving as between-subjects variables. The hypothesized

condition effect was not significant, $F(2,60) = .34$, $p = .71$, $\eta^2 = .01$, nor were any other

effects, suggesting that the subtle activation of stereotype threat through group composition

was not successful in altering memory performance.

It was also postulated that the stereotype threat manipulation would affect memory

beliefs. It was expected that beliefs about the controllability of memory would increase in the

majority condition, remain stable in the alone condition and decrease in the minority

condition. The pre-test packet for one participant in the alone condition was lost in the mail,

so the subsequent analysis is based on the remaining 71 participants. To examine this

hypothesis, an average score was computed for each of the four subscales of the MCI at each

time the test was administered. A 3 X 2 X 2 X 4 (Condition X Gender X Time of Test X MCI

Scale) ANOVA was conducted on these scores, with condition and gender serving as

between-participant variables. The only effect identified from this analysis was a significant

Condition X Gender X Scale interaction, $F(6, 195) = 2.42$, $p = .03$, $\eta^2 = .07$. This interaction

appears to be the result of the men scoring much lower on the Inevitable Decrement scale in

the majority condition than the women (see Table 4). Note, however, that the effects of

interest would involve changes over time as a function of condition. None of the interactions

involving these effects were significant, including the critical Condition X Time of Test

interaction, $F(2,65) = .02$, $p = .98$, $\eta^2 = .00$, demonstrating the lack of influence of the study's

threat manipulation on memory controllability scores.

Hypothesis 2

According to the stereotype threat framework, the study's manipulation was only expected to influence performance on tasks that are diagnostic of a negatively stereotyped ability (e.g. memory). Thus performance on the mathematical task was not expected to be affected as much by test context as was performance on the memory tasks because there are no aging stereotypes associated with the math domain. To investigate this hypothesis, the proportion of correct answers on the math task and the memory tasks was examined by conducting a 3 X 2 X 2 X 3 (Condition X Gender X Order X Task) ANOVA with condition, gender and task order serving as between-participant variables. The only effect identified from this analysis was a significant Condition X Gender X Task interaction, $F(4, 120) =$ 2.51, $p = .05$, $\eta^2 = .08$. This interaction appears to be the result of the men performing more poorly than the women on the memory tasks in all three conditions, whereas math performance was comparable across sexes (see Table 5). Note, however, that the hypothesized Condition X Task interaction was not significant, $F(4,120) = 1.84$, $p = .13$, $\eta^2 =$ .06, demonstrating that the threat manipulation had no impact on performance in either stereotyped (memory) or nonstereotyped (math) domains.

Hypothesis 3

Consistent with the tenets underlying the stereotype threat framework, it was postulated that the effects of threat would be moderated by the value participants placed on memory. It was expected that participants who place greater value on their memory would be most impacted by the threat manipulation in the study. To test this prediction, the proportion of correct answers on the categorizable recall task—where threat effects were expected to be greatest—was examined using a Condition X Gender X Task Order X MIA-Ach GLM-based

ANOVA. MIA-Ach was treated as a continuous variable in this analysis. Contrary to expectations, there were no significant effects found in this analysis including the critical Condition X MIA-Ach interaction, $F(2,48) = .10$, $p = .91$, $\eta^2 = .00$. This suggests that the value placed on memory did not moderate memory performance across the three conditions.

The extent to which an individual is conscious of aging stereotypes or stigmas was also expected to moderate the impact of threat on memory performance. It was hypothesized that participants high in stigma consciousness would be most influenced by the study's threat manipulation. To examine this hypothesis, the proportion of correct answers on the categorizable recall task was examined using a Condition X Gender X Task Order X SCQ GLM-based ANOVA, with SCQ treated as a continuous variable. The critical Condition X SCQ interaction was not significant, $F(2,48) = .16$, $p = .85$, $\eta^2 = .00$. This suggests that the stigma consciousness did not moderate memory performance across the three conditions.

Hypothesis 4

Consistent with previous research, the effects of threat are hypothesized to be mediated by anxiety, strategy use and evaluation apprehension. It was hypothesized that state anxiety and evaluation apprehension would consume cognitive resources and mediate the relationship between threat and performance. Specifically it was expected that participants in the minority condition would have the highest anxiety and evaluation apprehension scores followed by participants in the alone condition and then by participants in the majority condition.

To examine this mediational hypothesis, the evaluation apprehension score was examined using a Condition X Gender ANOVA. Participants' evaluation apprehension scores were not found to be associated with testing conditions, $F(2,66) = .09$, $p = .91$,

$\eta^2 = .00$. Anxiety scores were also analyzed using a Condition X Gender ANOVA. As with the apprehension scores, anxiety scores did not vary reliably across conditions, $F(2,66) = .79$, $p = .46$, $\eta^2 = .02$. Given that the first two conditions for mediational analyses were not met (i.e., a significant relationship between the independent variable and the dependent variable, and a significant relationship between the independent variable and the mediator; Barron & Kenny, 1986), further mediational analysis was unnecessary.

Threat was also hypothesized to interfere with the generation and use of strategies that can effectively improve performance. It was postulated that participants in the majority condition would demonstrate greater strategy use followed by participants in the alone condition, and then by participants in the minority condition. The initial examination of strategy use analyzed clustering scores on the categorizable memory task. To examine the strategy use hypothesis, ARC scores were examined using a Condition X Gender X Task Order ANOVA. The critical condition effect was not significant, $F(2,60) = .20$, $p = .82$, $\eta^2 = .00$, rendering further mediational analysis using the ARC variable unnecessary.

An additional way of assessing strategy use is to compare performance on the categorizable word list to performance on a task lacking an obvious strategic component; a noncategorizable word list. The null results from the Condition X Gender X Task Order X Task ANOVA that was conducted for Hypothesis 1 illustrate that performance between the categorizable and noncategorizable tasks was not significantly different. Thus further examination of strategy use as a mediator was unwarranted.

DISCUSSION

This study was designed to extend previous empirical work examining aging, stereotype threat and cognitive performance in a social context. Contrary to previous research

which used overt aging-related information to activate aging stereotypes, this study sought to test whether the subtle activation of aging stereotypes would influence cognitive performance. The threat manipulation in this study consisted of altering the group composition of the testing environment, which has been demonstrated to influence performance in previous research (see Fuegen & Biernat, 2002; Lord & Saenz, 1985). This subtle stereotype activation was postulated to be similar to the types of everyday social situations that might result in threat. Support for each of the study's hypotheses is provided in more detail in the sections that follow.

Hypothesis 1

It was expected that older adults experiencing stereotype threat would perform more poorly on a memory task than adults not experiencing threat. Specifically participants who were the only representative of their age group, the "tokens", in their testing environment were expected to perform more poorly on a memory task than the participants tested alone or with two other same-aged individuals. This same relationship was expected for participant's beliefs about the controllability of memory in that "tokens" were expected to show the greatest decline in beliefs about memory controllability after participating in the study. No support was found for either of these expectations. These results cannot be attributed to the nature of the memory task since previous studies have found that threat influenced older adults' performance on this task (see Hess et al., 2003; Hess & Hinson, 2005). Given these previous findings, the lack of significant effects in the current study could be attributed to the lack of effectiveness of the manipulation. The very low partial η^2 for the test of this hypothesis ($\eta^2 = .01$) lends support to this suggestion, indicating that there was nothing to find.

Hypothesis 2

Consistent with the tenets of the stereotype threat framework, this subtle threat activation was expected to influence performance in a stereotyped aging domain (e.g. memory) and not influence performance in a non-stereotyped aging domain (e.g. math performance). No significant differences in performance were expected between the groups for math performance. Indeed, the critical Task X Condition interaction was not significant. There were no differences in math performance between the groups, but this finding is difficult to interpret given the lack of findings regarding differences in memory performance between the conditions.

Hypothesis 3

This study also sought to explore stigma consciousness and value placed on memory as potential moderators of threat's influence on memory performance. It was expected that participants with higher scores for stigma consciousness and value placed on memory would be most influenced by the threat manipulation. No support was found to indicate that stigma consciousness or value placed on memory were acting as moderating variables for threat's influence on memory performance. The initial study by Hess and colleagues (2003) found evidence for value placed on memory acting as a moderator. The findings in the present study are consistent with subsequent studies that have failed to replicate value placed on memory's role as a moderator. This null finding, however, could also be related to the strength of this study's manipulation as discussed previously.

Hypothesis 4

Three mediators of threat's influence on memory were proposed in this study: anxiety, evaluation apprehension and strategy use. It was expected that "tokens"

experiencing stereotype threat would have the greatest anxiety and evaluation apprehension, which would influence performance. This expectation was not supported as anxiety and evaluation apprehension scores did not differ by condition. It was also expected that strategy use would be greatest for participants in the majority condition and poorest for the "tokens" in the minority condition and would subsequently influence memory performance accordingly. This relationship was also not supported as there was no difference in strategy use across the conditions. There is inconsistent support for these constructs acting as mediators in subsequent research examining stereotype threat. In her review of threat studies, Smith (2004) states that even with the abundance of stereotype threat research, "no single mediator has relished strong empirical support" (p.178). It is also possible that the lack of evidence for the proposed mediators is again related back to the strength of this study's manipulation which was discussed previously and is addressed in the section that follows.

Limitations

The lack of support for each of the primary hypotheses in this study could be attributed to a couple of different factors that future researchers should take into consideration when replicating this work with older adults. The previous studies examining token status (e.g. Lord & Saenz, 1985; Inzlicht & Ben-Zeev, 2000; 2003) used samples of younger adults. In these studies, the participant groups were composed of three participants. This study was the first application of the token status and stereotype threat research with an aging population. It is possible that younger adults are more susceptible to subtle peer or group influences than older adults. Perhaps this "subtle" manipulation needs to be strengthened for older adults by the inclusion of more same-age or younger participants in the group testing conditions. Thus, a larger participant group would be required in order to elicit the same effects on older adults

as that obtained with the younger adult samples in these previous studies. These larger testing groups could strengthen the threat manipulation and help to make the subtle group composition manipulation more representative of a typical environment an older adult would encounter in everyday life. This explanation is consistent with previous findings demonstrating a negative relationship between age and self-monitoring (Reifman, Klein & Murphy, 1989). This previous research examined whether individuals behave in accordance with social cues (high self-monitoring) or through reliance on one's own inner states such as attitudes, traits or feelings (low self-monitoring). Reifman and colleagues found that younger adults relied more on social cues for behavior while older adults relied more on their own attitudes.

Social conformity and adult development research also indicates that older adults are less susceptible to social influence than younger adults (Pasupathi, 1999). Pasupathi's study found that older adults were less influenced by conformity pressure for judgments of emotional facial expressions than younger adults. In addition, older adults' confidence ratings for their responses were less influenced by conformity pressure than the confidence scores of the younger adults (Pasupathi, 1999). Both of these studies indicate that older adults rely more on their own abilities than on peer influences. This lends credibility to the suggestion that the threat manipulation in the current study may need to be strengthened. It also brings about the possibility that token status may be an ineffective way of inducing threat in older adults who are impervious to external influences. This resistance to peer pressure could be attributed to greater self-confidence based on accumulated social experiences.

Another possible reason for the lack of significant effects in the present study is that stereotype threat is a social phenomenon. It is possible that interactions between participants are a necessary precondition in order to evoke feelings of threat. The participants in this study were not told that their performance results would be shared with other group members and thus it is possible that the threat manipulation did not evoke feelings of anxiety or evaluation apprehension. Many of the solo status research studies utilized a more public task to elicit feelings of anxiety and evaluation apprehension. In both the Lord and Saenz (1985) and Sekaquaptewa and Thompson (2003) studies, participants believed they were interacting and exchanging opinions with other participants over a video communication system even though the participant was actually viewing previously recorded video tapes. There was an expectation set that others would hear and see them as they completed the experimental task. In the Inzlicht and Ben-Zeev (2000) study, participants were informed that their performance scores would be reported orally to the rest of the group participants. Again the experimenters instilled an expectation that others would be evaluating the participant's performance. A future study could test this hypothesis by altering the procedure so that participants are told that their results would be shared with other group members even though actual results do not need to be disclosed for confidentiality reasons. The expectation that others are judging your performance may be more representative of the type of threat that would be more apt to evoke feelings of threat and subsequently influence memory performance. However, this suggestion contradicts findings by Inzlicht and Ben-Zeev (2003) in which solos performed worse than nonsolos even in a private condition, in which participants were told that their results would not be shared with others.

Another limitation of this research is that the educational background of this sample was relatively homogeneous as most participants were college educated (*M*=15.99 [16 is college graduate], *SD*=2.76). All participants except for one had completed high school and most (86%) had taken college courses. It would be important in future research to extend this research to older adults with different educational backgrounds since the threat manipulation might be expected to be more influential on those individuals with less education as they may be more self-conscious about their performance in the presence of others. It is possible that these older adults who are more educated may be more guarded and less influenced by others in their environment which could have made the subtle manipulation in the current study less effective. Past research lends support to this suggestion. Andreoletti and Lachman (2004) found that older adults with less education were more influenced by stereotypes about memory and aging than older adults with greater education. It would be important to include a more representative sample of the older adult population to determine the generalizability of threat findings with regard to token status and stereotype threat's influence on cognitive performance.

Conclusions

The findings in this study ran contrary to predictions and there were some limitations to this research. This research suggests that the subtle manipulation of group composition is not enough to elicit feelings of threat or to cause a detrimental effect on memory or math performance. Perhaps older adults are guarded against younger adult group influences as a result of accumulated knowledge based on years of social interactions. This research also suggests that the more overt using of stereotypical information (e.g. newspaper articles) may be overriding older adults' self-confidence enough to elicit feelings of threat and

subsequently impact cognitive performance. Perhaps it would be beneficial for future research to endeavor to identify ways to further strengthen this self-confidence in older adults so that even overt methods of eliciting threat will become ineffective.

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Table 1

Means and Standard Deviations for Background Variables as a Function of Condition

Variable	Minority	Alone	Majority
Age			
M	68.00	68.75	69.50
SD	3.09	3.42	3.02
Education			
M	16.46	15.96	15.54
SD	2.48	2.77	3.02
Physical health			
M	42.61	43.09	41.74
SD	5.73	4.26	5.09
Mental health			
M	45.78	45.12	47.19
SD	4.47	4.95	3.44
Processing speed			
M	.02	.07	-.09
SD	.85	.92	.80
Vocabulary			
M	30.60	30.39	29.19
SD	2.09	2.25	3.17

Table 2

Means and Standard Deviations for Dependent Measures as a Function of Condition

Measure	Minority	Alone	Majority
Categorizable recall			
M	.49	.47	.49
SD	.16	.14	.16
Noncategorizable recall			
M	.34	.33	.33
SD	.14	.14	.11
Mathematical performance			
M	.35	.42	.37
SD	.12	.12	.13
SCQ			
M	3.73	3.58	3.33
SD	.74	.83	.77
MIA			
M	3.84	3.97	3.96
SD	.63	.48	.34
EAQ			
M	5.33	5.08	5.13
SD	2.20	2.41	2.05
STAI-S			
M	1.31	1.19	1.27
SD	.33	.30	.34
Clustering (ARC scores)			
M	.56	.58	.61
SD	.32	.32	.27

Table 3

Pre-test and Post-test Scores on the Memory Controllability Inventory as a Function of Condition

MCI Scale	Minority		Alone		Majority	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
Present Ability						
M	5.48	5.00	5.72	5.17	5.40	5.24
SD	1.17	1.10	.92	1.19	1.25	.94
Potential Improvement						
M	5.15	5.22	5.81	5.73	5.38	5.26
SD	1.13	.87	.82	1.03	1.11	1.04
Effort Utility						
M	5.22	5.31	5.65	5.69	5.78	5.42
SD	1.11	.87	.97	.96	.90	.97
Inevitable Decrement						
M	4.94	4.46	5.35	5.34	5.18	4.90
SD	1.35	.99	1.14	1.14	1.43	1.32

Table 4

Pre-test and Post-test Scores on the Memory Controllability Inventory as a Function of Condition and Gender

MCI Scale	Minority		Alone		Majority		Total	
	Men	Women	Men	Women	Men	Women	Men	Women
			Pre-test					
Present Ability								
M	5.44	5.50	5.86	5.58	5.42	5.39	5.57	5.49
SD	1.34	1.04	.95	.92	1.12	1.41	1.13	1.12
Potential Improvement								
M	5.08	5.22	5.52	6.12	5.00	5.75	5.20	5.69
SD	1.14	1.16	.67	.87	1.21	.89	1.03	1.03
Effort Utility								
M	5.44	5.00	5.81	5.48	5.42	6.14	5.55	5.54
SD	.99	1.21	.87	1.09	.95	.70	.93	1.10
Inevitable Decrement								
M	4.84	5.03	5.11	5.61	4.19	6.17	4.71	5.60
SD	1.38	1.37	1.12	1.15	1.18	.86	1.26	1.21

Table 4 (continued)

	Men	Women	Men	Women	Men	Women	Men	Women
				Post-test				
Present Ability								
M	4.97	5.02	4.94	5.31	5.03	5.44	5.10	5.14
SD	1.18	1.07	1.27	1.16	.99	.88	1.09	1.07
Potential Improvement								
M	5.31	5.14	5.63	5.79	4.86	5.67	5.26	5.52
SD	.94	.83	1.14	.99	1.08	.86	1.07	.92
Effort Utility								
M	5.36	5.25	5.93	5.33	5.17	5.67	5.49	5.42
SD	.73	1.03	.86	.99	1.08	.83	.94	.94
Inevitable Decrement								
M	4.58	4.33	5.34	5.24	4.02	5.78	4.65	5.11
SD	1.13	.86	1.12	1.23	1.03	.96	1.20	1.17

Table 5

Memory and Math Performance as a Function of Condition and Gender

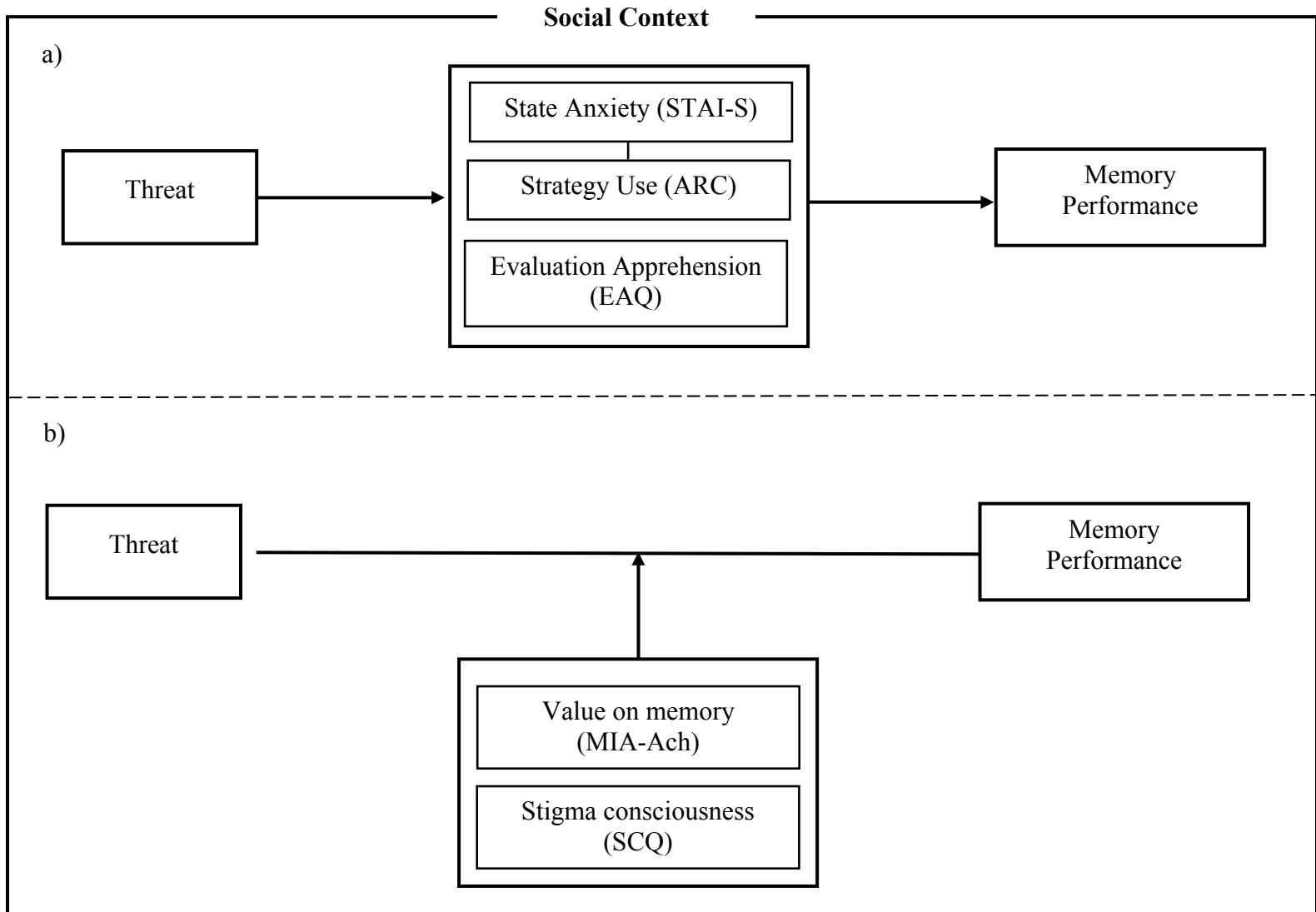| MCI Scale	Minority		Alone		Majority	
	Men	Women	Men	Women	Men	Women
Categorizable recall						
M	.40	.57	.44	.50	.41	.56
SD	.13	.15	.14	.14	.17	.10
Noncategorizable recall						
M	.26	.42	.31	.36	.31	.35
SD	.11	.13	.12	.16	.12	.11
Mathematical performance						
M	.37	.33	.41	.43	.36	.38
SD	.11	.13	.11	.13	.15	.10

Figure 1. The relationship between threat condition and memory performance including a) hypothesized mediators and b) hypothesized moderators.