ABSTRACT

INTRUSIVE THINKING IN OLDER ADULTHOOD:
THE INFLUENCE OF SUBJECTIVE COGNITIVE CONCERNS

By Annika Sophia Goldman

Intrusive thoughts are common across the lifespan, but older adults differ from other age groups in their sense of control over intrusive thoughts, interpretations of these thoughts, and emotional responding. Maladaptive responses to intrusive thoughts are important predictors of generalized anxiety and obsessive-compulsive disorders, particularly damaging for older adult's health. The current study examines subjective cognitive concerns (SCCs) as a risk factor heightening the likelihood of negative consequences after intrusive thoughts. To evaluate the role of SCCs in older adults' responding to intrusive thoughts, we used a psychoeducational article to attempt to decrease SCCs. We hypothesized that individuals receiving the psychoeducational article would report less cognitive and emotional difficulties with intrusive thoughts than those in the control condition. No difference was found in SCCs between conditions. Across conditions, fewer interpretations of intrusive thoughts as a sign of cognitive decline mediated the relationship between lower SCCs and less difficulty suppressing intrusive thoughts. However, this pattern did not translate to additional responses. This study clarifies the relationship between SCCs, thought interpretations, and maladaptive cognitive outcomes that partially underpin late life obsessive-compulsive and anxiety disorders. This study supports SCCs being a crucial risk factor for maladaptive responses to intrusive thoughts requiring novel interventions.

INTRUSIVE THINKING IN OLDER ADULTHOOD: THE INFLUENCE OF SUBJECTIVE COGNITIVE CONCERNS

A Thesis

Submitted to the

Faculty of Miami University

in partial fulfillment of

the requirements for the degree of

Master of Arts

by

Annika Sophia Goldman

Miami University

Oxford, Ohio

2021

Advisor: Joshua C. Magee, Ph.D.

Reader: Elise M. Clerkin, Ph.D.

Reader: April R. Smith, Ph.D.

This thesis titled

INTRUSIVE THINKING IN OLDER ADULTHOOD:
THE INFLUENCE OF SUBJECTIVE COGNITIVE CONCERNS

by

Annika Sophia Goldman

has been approved for publication by

The College of Arts and Sciences

and

Department of Psychology

_____

Joshua C. Magee, Ph.D.

_____

Elise M. Clerkin, Ph.D.

_____

April R. Smith, Ph.D.

Table of Contents

List of Tables

List of Figures

Acknowledgments

I would like to wholeheartedly thank Dr. Joshua Magee for his intellectual and emotional support for this project from start to finish. If it weren't for his expertise and past research in intrusive thinking over the lifespan, this project wouldn't have been possible. Thank you also to my committee members, Dr. Elise Clerkin and Dr. April Smith for their feedback and insight that directly strengthened this project. Thank you to the SCOUT and ACE lab members for their mentorship and for the exceptional personal and professional examples they have set for me. A big thank you for the moral support provided for me by my cohort "family" and biological family alike. Finally, thank you to my grandparents, George and Lorraine Meyers, and Sue Goldman, who are my endless inspiration to study healthy aging and to serve older adults.

Introduction

Anxiety disorders are common and debilitating in older adults, yet are understudied and underdiagnosed (Wolitzky-Taylor, Castriotta, Lenze, Stanley, & Craske, 2010). In addition to diagnosable levels of anxiety, a full 27% of community-dwelling older adults have subclinical symptoms of anxiety that significantly impact their functioning (Grenier et al., 2011). Worldwide, the older adult population is rapidly growing (He, Goodkind, & Kowal, 2015), making the need for addressing anxiety disorders in older adults increasingly critical. Untreated, anxiety disorders have been linked to higher rates of cognitive decline, depression, mortality, and lower quality of life in older adults (Petkus, Reynolds, Wetherell, Kremen, & Gatz 2017; Goldberg et al., 1990; Lenze et al., 2001; De Beurs, Beekman, Van Balkom, Deeg, & Van Tilburg, 1999; Hout et al., 2004).

Intrusive thoughts are a central feature of both anxiety disorders and obsessive compulsive disorder (OCD) across the adult lifespan. Intrusive thoughts are thoughts, images, and/or urges that are spontaneous, unwanted, interrupt ongoing activity, and difficult to control (Rachman, 1981). Interestingly, most people across cultures and age groups experience intrusive thoughts but many don't develop clinical levels of impairment (Langlois, Freeston, & Ladoucer, 2000; Magee & Teachman, 2012; Radomsky et al., 2014; Rachman, 1998). To distinguish between harmful and benign outcomes tied to intrusive thoughts, a growing body of research suggests that negative subjective interpretations of intrusive thoughts drive some of the distress and reoccurrence characterizing OCD and generalized anxiety (Bouvard, Fournet, Denis, Sixdenier, & Clark, 2017; Frost & Steketee, 2002; Rachman, 1998). For instance, perceiving that one has failed at controlling an intrusive thought is associated with greater distress than the frequency of the intrusive thoughts themselves (Najmi, Riemann, & Wegner, 2009; Purdon, 1999). Further, when an intrusive thought is interpreted as incompatible with a valued belief ("I love my child, why did I think about hurting them?"), it may lead to a vicious cycle of increased maladaptive thought suppression, intrusive thought recurrence, and distress (Rachman, 1998; Rowa & Purdon, 2003; Wegner 1994). To evaluate models of intrusive thinking and improve quality of care for older adults, it is important to understand this cycle and the unique protective and risk factors among older adults when they encounter common intrusive thoughts.

Existing research about intrusive thoughts across the lifespan, while sparse (Calamari, Janeck, & Deer, 2002), points to similarities and differences in responses, interpretations, and emotional consequences following intrusive thoughts. Specifically, older adults parallel or differ from younger and middle aged adults in their sense of control over intrusive thoughts, interpretations of what these thoughts mean, and emotional responding (Magee & Teachman, 2012, Magee & Teachman, 2014; Calamari et al., 2002). In terms of similarities, older and younger adults do not differ in the reported frequency or duration of intrusive thought recurrences (Brose et al., 2011; Beadel et al., 2013; Magee & Teachman, 2012). When intrusive thoughts do arise, older adults report less perceived control over these thoughts compared to younger adults (Beadel, Green, Hosseinbor & Teachman, 2013; Magee & Teachman, 2012). Existing explanations have accounted for this discrepancy by suggesting that increased effort and perceptions of difficulty may stem from age-related declines in cognitive functioning (Brewin & Beaton, 2002; Gailliot, Baumeister, DeWall, Maner & Plant, 2007). However, it is surprising that declines in cognitive functioning would not also result in increased intrusive thought recurrences for older adults when attempting to control intrusive thoughts (relative to younger adults) (Beadel et al., 2013; Magee & Teachman, 2012).

One intriguing possibility for these age discrepancies are subjective cognitive concerns (SCCs), which are threatening perceptions of one's own decline in cognition, often memory, in the absence of objectively measured cognitive deficits (Jessen et al., 2014). It may be that older adults tend to perceive common intrusive thoughts as a threat to their cognitive abilities, rather than perceiving a threat to other self-aspects like their morality, a common focus of younger adults (Magee & Teachman, 2012). Thus, SCCs may motivate older adults to make more maladaptive interpretations of their intrusive thoughts (i.e., I'm losing control of my mind, I must be getting dementia!), which result in greater emotional distress, more cognitive effort controlling intrusive thoughts and, in line with their concerns, greater perceptions of difficulty with control. The current study will examine this causal relationship that begins with SCCs.

A number of constructs have been named to describe the phenomenon of negative cognitive-focused attention, such as Cognitive Self-Consciousness, dementia worry, memory self-efficacy, and SCCs. Many of these constructs predict anxiety, negative affect, and OCD symptoms in older adults (Prouvost, Calamari, & Woodward, 2015; Kessler & Bowen, 2012; Sinoff & Werner, 2003). SCCs overlap with all of these constructs, possess the core features that may be most likely to influence responses to intrusive thinking, and capture cognitive aging broadly, not just concerns about memory (Teachman, 2007). Importantly, they are also fairly independent of objective cognitive functioning; Jorm et al., (1994) found that concern about cognitive decline is highly prevalent among older adults but often does not reflect objective cognitive functioning. For these reasons, we believe SCCs represent a highly relevant construct to understanding older adults' interpretations, and cognitive and emotional responses to intrusive thoughts.

The Influence of Subjective Cognitive Concerns on Intrusive Thought Interpretations

Among the many ways experiences with intrusive thoughts may shift with age, SCCs appear to have a high likelihood of influencing the way older adults interpret intrusive thoughts. Broadly, over the course of normative lifespan development, individuals' concerns tend to shift from main themes of work, finances, and family to physical health and concerns about memory and cognitive decline (Brenes et al., 2005; Person & Borkovec, 1995; Teachman, 2007). When applied to intrusive thoughts, only one study has directly investigated the meanings that younger and older adults assign to their intrusive thoughts. This study found that relative to younger adults, older adults were more prone to interpreting the recurrence of intrusive thoughts as a sign of cognitive decline (as opposed to a moral failure or emotional dysregulation) (Magee & Teachman, 2012). To better treat OCD and anxiety in late life, it is important to understand how older-adult relevant interpretations tied to SCCs impact the consequences of intrusive thoughts.

Subjective Cognitive Concerns Influence on Cognitive Response to Intrusive Thoughts

There are several ways that SCCs are thought to have negative effects relating to intrusive thoughts. Calamari (2002) theorized that SCCs may lead to greater monitoring of thoughts, simultaneously limiting attentional resources, providing more opportunities to assign negative interpretations, and making individuals more reactive to common intrusive thoughts (i.e., "I keep having this thought, it must mean I am losing my mind!"). Calamari predicts that this process would lead older adults to exert more effort to control intrusive thoughts and perceive controlling their thoughts to be more difficult, exacerbating OCD symptoms. Focusing on the development of Generalized Anxiety Disorder (GAD), Wells (1999) proposed a similar theory in which negative thought-focused attention and negative interpretation of intrusive

thoughts leads to heightened worry over time. These theories are consistent with empirical evidence: Hanninen et al. (1994) found that older adults with average memory functioning but higher SCCs reported higher anxiety, lower perceived competence, and more OCD symptoms compared to older adults with lower SCCs. Finally, in terms of perceived control over intrusive thoughts, older adults report greater expended effort and perceived difficulty putting intrusive thoughts out of mind compared to younger adults (Beadel, Green, Hosseinbor & Teachman, 2013; Magee & Teachman, 2012). Although a direct test is needed, these studies all lend support to the theory that SCCs influence maladaptive cognitive reactions to intrusive thoughts eventually exacerbating anxiety and OCD-related problems.

Subjective Cognitive Concerns Influence on Emotional Response to Intrusive Thoughts

Another way SCCs may lead to maladaptive responses to intrusive thoughts is by their direct impact on affect. Past findings about older and younger adults' emotional responses to their intrusive thoughts, although complex, leave unanswered whether SCCs may play a role. Several converging studies have found that negative affect increases across age groups when interacting with an intrusive thought, but older adults have more persistent negative affect (Beadel et al., 2013; Magee & Teachman, 2012). These findings only partially align with lifespan aging models that suggest older adults are motivated to decrease negative affect (and increase positive affect; Carstensen, 1993, 1995). While older adults generally have better emotional regulation compared to other age groups, highly negative stimuli do elicit substantial changes in older adults' negative affect once encountered (Charles, 2010). Therefore, there is evidence for strong and adaptive emotional regulation in older adulthood; however the negative and age relevant nature of SCCs may elicit enough of a maladaptive response to intrusive thoughts to threaten emotional stability and are in need of further investigation.

Causes of Subjective Cognitive Concerns

To understand how SCCs fit into models of intrusive thinking, it is important to understand *why* this phenomenon is more prevalent in older versus younger adults. First, SCCs likely result from stereotypes about cognitive aging. For instance, in American culture negative stereotypes of old age are pervasive and lead to greater perceptions of cognitive incompetence among older adults uniquely; however, this effect is not present in cultures that experience less age-related stereotype exposure (Hertzog et al., 1990b; Hess, Auman, Colcombe, & Rahhal, 2003; Levy, 1996; Levy & Langer, 1994; Luszcz & Hinton, 1995). A second possible cause of SCCs is a lack of knowledge of cognitive aging. For example, many older adults believe there is nothing that they can do to mitigate cognitive aging, when in fact, there are a number of promising lifestyle changes that may slow down the effects of cognitive aging (Lachman, 1991, 2000; Dumas, 2017). One study found that greater knowledge about memory and aging was associated with fewer reported memory failures, and those that did occur were rated as less serious (Cherry, Brigman, Reese-Melancon, Burton-Chase, & Holland, 2013). Thus, both aging stereotypes and knowledge of cognitive aging can influence cognitive control beliefs that result in SCCs. While it is true that many older adults experience age-related declines in processing and attention, the significant desynchrony between subjective and objective appraisals of memory suggests that lower subjective appraisals are at least partially attributable to higher anxiety and social stereotypes, rather than solely reflecting one's objective state (McDonald-Miszczak, Hertzog & Hultsch, 1995). Overall, SCCs are complex but they seem to begin with social

stereotypes and lack of knowledge about cognitive aging, influence general cognitive control beliefs, and eventually become internalized and affect self-appraisals.

Interventions Targeting Subjective Cognitive Concerns

Existing interventions targeting constructs similar to SCCs often focus on cognitive aging stereotypes, knowledge, and/or control beliefs. For instance, psychoeducational interventions targeting memory aging knowledge or contradicting negative stereotypes and control beliefs about memory and aging both resulted in less memory complaints (Fairchild & Scogin, 2010; Turner & Pinkston, 1993; Best, Hamlett, and Davis 1992). Similarly, implicit priming of negative age stereotypes seems to decrease reports of self-efficacy for test performance in older adults, while implicit priming of positive age stereotypes has the opposite effect (Levy, Hausdorff, Hencke, Wei, 2000; Hess, Auman, Colcombe, & Rahhal, 2003). Finally, cognitive restructuring aimed at reducing negative beliefs about memory aging appears to diminish worry about memory failure and alter beliefs about memory ability (Lachman, Weaver, Bandura, Elliott, and Lewkowicz 1992; Schmidt, Zwart, Berg & Deelman, 1999). Together, these studies show robust support that interventions targeting aging stereotypes, knowledge of cognitive aging processes, and cognitive control beliefs can successfully decrease SCCs.

The Current Study

In the current study, we tested the potential of a SCCs intervention as a method for improving older adults' reactions to intrusive thoughts. To achieve this goal, we introduced a brief psychoeducational article based on previous interventions that have led to improvements in SCCs (Fairchild & Scogin, 2010; Turner & Pinkston, 1993; Schmidt, Zwart, Berg & Deelman, 1999; Best, Hamlett, and Davis, 1992). Building on prior research, we tested whether older adults receiving the brief SCCs intervention would experience fewer maladaptive cognitive (increased suppression effort and difficulty) and emotional (increased negative affect and decreased positive affect) responses to intrusive thoughts compared to a control article. Further, we expected that across conditions, decreased interpretations of intrusive thoughts as signs of cognitive decline would mediate the relationship between lower SCCs and fewer maladaptive cognitive and emotional responses to intrusive thoughts. This study attempts to experimentally manipulate SCCs to determine their causal role in driving maladaptive responses to intrusive thoughts in older adults.

The Pilot Study

In a preliminary study, we first piloted two psychoeducational articles using the data collection platform Amazon Mechanical Turk (mTurk). The goals of this study were to assess the feasibility of recruiting sufficient older adults and to determine the comparability of a psychoeducational *cognitive article* and a matched control *cardiovascular article*. Both articles were also compared to a no article *control condition.* As desired, we were able to recruit sufficient older adults efficiently (N=245, *M* Age=65, 65% Female, 92% White), demonstrating the feasibility of this recruitment method for the main study. In terms of the two psychoeducational articles, as desired participants did not differ in their ratings of relevance, novelty, or informativeness between the *cognitive* and *cardiovascular* articles. However, unexpectedly there were also no differences in the key experimental variable, SCCs, across the three groups. To explore whether the manipulation may have affected SCCs among particular subsets of older adults, we conducted a supplemental analysis using generalized linear models.

We explored whether age and relevance ratings of the article moderated the effect of condition on the SCC measure "how concerned are you about losing control of your thoughts?". We found a three-way interaction such that when there was a combination of older age and higher levels of relevance, individuals in the *cognitive condition* reported fewer concerns about "losing control of thoughts" compared to the no article *control condition*. At other combinations of age and relevance, there were no differences between the two conditions.

In response to these preliminary findings, we made several adjustments for the main In response to these preliminary findings, we made several adjustments for the main study. The *cardiovascular condition* was removed to 1) maximize the chances of successfully manipulating SCCs and 2) streamline the study design. Additionally, because the manipulation was relatively more effective with older age in the exploratory analyses, we increased the minimum age of participants from 60 to 65. Finally, based on the results of the pilot study we made a distinction between state and trait SCCs, anticipating that measures of state SCCs would be the most sensitive to detecting changes as a result of the brief article manipulation. Therefore, a state specific SCCs measure, the SEQ, was added to the protocol as the primary dependent variable assessing the impact of the intervention on SCCs.

Method

Sample

416 older adults over the age of 65 were recruited from an online survey platform, Amazon's Mechanical Turk (mTurk). Participants were included if they did not report any previous or current neurological disease (e.g., Alzheimer's disease, dementia (of any kind), Mild Cognitive Impairment, Parkinson's disease, or any others), were over 65 years old, and were residents of the United States. Of the 416 recruited, 265 qualified for the study. See Table 1 for sample demographics, including gender, ethnicity and age. All qualifying participants were informed of the study's goals and risks and asked to sign an IRB-approved informed consent.

Materials

Psychoeducational manipulation. Participants were randomly assigned to one of two conditions, either the *cognitive article* condition or the *control condition.* Participants in the *cognitive article* condition were instructed to read a mock news article designed to lower subjective cognitive concerns (specifically by increasing participants' sense of control and self-efficacy concerning cognitive ability). The content of the mock article was informed by Hess's (2003) mock newspaper article study and by a successful psychoeducational program for increasing subjective cognitive functioning (Hoogenhout, Groot & Jolles, 2010). This choice is consistent with evidence that mock newspaper articles activating vs. relieving age-memory stereotypes demonstrate effects on subjective cognitive concern in older adults (Jordano & Touron, 2017; Hess, Auman, Colcombe & Rahhal, 2003). This article was one page in length and discussed cognitive aging (e.g., the difference between normal and pathological cognitive decline), the influence of several contextual factors (e.g., mental health, control beliefs, and negative aging stereotypes), and finally several skills and strategies to help compensate for perceived cognitive deficits (e.g. ways older adults can compensate for cognitive decline). The *control article* condition was about the history of furniture and was matched in length and reading level. See Appendix C for copies of the articles.

Subjective cognitive concerns. SCCs were assessed using two well validated measures. To measure state SCCs, the primary dependent variable, we used the Self-Efficacy Questionnaire (SEQ). The SEQ instructs participants "If you were to complete a cognitive task later on in this survey assessing your memory and thinking abilities, how would you feel about completing this task? Please indicate how much you agree or disagree with each of the statements below." The SEQ consists of 5 statements (e.g. I am unsure if I have the ability to do well on this task, I am uncertain I have the knowledge to do well on this task) in which the participant rated how much they agree or disagree using a five-point scale (1) strongly disagree to (5) strongly agree. In previous studies, the SEQ had good internal consistency with a Cronbach's $\alpha = .78$ (Chasteen, Bhattacharyya, Horhota, Tam & Hasher, 2005). To measure trait beliefs about SCCs, we used a composite of three subscales of the Metamemory in Adulthood (MIA): the Locus of Control (perceived control over memory), Change (perceived change in memory capacity), and Achievement (achievement motivation regarding memory) subscales. The MIA Locus, Change, and Achievement scales were chosen because they are highly sensitive to age differences and have demonstrated good construct validity with memory self-efficacy, memory-related affect, and control beliefs (Hertzog, Hultsch, & Dixon, 1989; Hertzog, Dixon, Schulenberg, & Hultsch, 1987). Each scale is comprised of 9, 18, and 16 items respectively and items are rated on a five-point scale (1) strongly disagree to (5) strongly agree. The MIA demonstrates good psychometric properties and is a consistent and reliable measure (Gilewski, Zelinski, & Schaie, 1990; Dixon et al., 1988).

The intrusive thought suppression task. The Worry Behavioral Approach Test (WBAT) is intended to simulate someone's tendencies when interacting with distressing worries (similar to intrusive thoughts). The WBAT was adapted from a standard behavioral measure of worry originally developed by Borkovec et al. (1983) and later refined by Ruscio and Borkovec (2004) (Hirsch, Mathews & Hayes, 2009). First, during the Practice Period participants were instructed to practice focusing on their breathing and responding to probes for 45 seconds. Then the main task began with a prompt to focus on their breathing for 2 minutes while responding to each instance of a probe (i.e., a pop up on their screen). During this Period One, the probes appeared at randomized intervals of 20 to 30 seconds, totaling 4-5 probes per period. For each probe, participants were prompted to indicate if they were focused on their breathing or a thought intrusion. If they had a thought intrusion, they were asked to rate whether their thought was positive, negative, or neutral, and to briefly describe their thought.

At the end of Period One, participants completed affect ratings (using the PANAS, described below) and answered the two cognitive response questions rating suppression effort and difficulty. Participants then completed two additional 2-minute thinking periods, Period Two and Period Three. For Period Two, participants were instructed to worry about a self-selected topic for 2 minutes without probes. For Period Three, participants were asked again to focus on their breathing for 2 minutes while completing thought probes. After Period Two and after Period Three, participants were again instructed to rate their affect and suppression effort and difficulty.

The WBAT along with the cognitive effort and difficulty rating scales have been used in past studies investigating worry in the context of GAD (Hirsch, Mathews & Hayes, 2009), with interrater reliabilities of Cohen's Kappa = 0.86 for thought valence and $k = .73 - .78$ for categorization of worry into particular topic areas (Hirsch et al., 2009). The paradigm and ratings collected also closely resemble a popular thought suppression paradigm, which has been used

successfully in multiple studies with older adults (Beadel et al., 2013; Magee & Teachman, 2012).

Emotional difficulties. The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) is a 20-item self-report scale with 10 item subscales to measure positive and negative affect using the "in the present moment" time frame. It was used to assess emotional experience after each of the three WBAT periods. This scale demonstrates good psychometric properties, and has been validated in a sample aged 18-91 (Crawford & Henry, 2004). Cronbach's alpha values for the positive and negative affect scales are 0.86 and 0.87, respectively. For the current study, our interest was in the change in positive and negative affect before (Period One) and after (Period Three) participants were asked to worry about their selected topic. To calculate change, we computed standardized residual change scores that capture the variability remaining in affect at Period Three after accounting for Period One scores.

Cognitive difficulties. Within the WBAT task, participants rated their suppression effort by answering the question "Rate how hard you tried not to think about this thought during the period" on a scale of 1 (no effort) to 10 (extreme effort). They then rated their perceived difficulty controlling the intrusive thought by answering the question "Rate how much difficulty you experienced keeping this thought out of your mind" on a scale of 1 (no difficulty) to 10 (extreme difficulty). This scale was administered after each of the three WBAT periods. Again, the standardized residual change score from Period One to Period Three was of primary interest in our analysis to determine change in effort and difficulty before and after attempts to keep an intrusive worry thought out of mind.

Age-relevant meaning of intrusive thoughts. The Age-relevant Meaning of Intrusive Thoughts (AMIT; Magee, Buck, Viar, Laughinghouse, & Teachman, 2009) self-report scale assesses participants' beliefs about the meaning of their everyday intrusive thoughts. We used the AMIT subscale assessing meanings about intrusive thoughts related to cognitive decline (e.g, "Are these thoughts a sign that your cognitive functioning is deteriorating?"). In Magee and Teachman's (2009) study excellent reliability was found for this subscale, with Cronbach's alpha being 0.95.

Procedure

All procedures were approved by the Institutional Review Board. Participants were informed that we are studying how older adults respond to intrusive thoughts. Research was conducted online through mTurk. After excluding participants that reported a history of neurodegenerative related diseases, and reporting their baseline affect (PANAS), participants were randomly assigned to either the *cognitive article* condition or the *control condition*. After reading the article, participants rated their SCCs and affect, then participated in the WBAT which included additional affect and cognitive response ratings after each of the three periods. After Period Three in the WBAT, participants reported their interpretations of their intrusive thoughts (AMIT). Finally, participants were compensated $3, extensively debriefed, provided with accurate information about signs and symptoms that differentiate normal and abnormal cognitive aging, and resources to learn more about cognitive aging and intrusive thinking, and thanked for their time.

Power Analysis

Using Schoemann, Boulton, & Short's (2017) online R app that conducts power and sample size monte carlo simulations for mediation models, we estimated an *a priori* required sample size across a variety of assumptions. First, we simulated correlations across the three variables in the mediation model ranging from 0.2 to 0.3, using conservative estimates based partially upon similar data from Magee & Teachman (2012). Second, we examined changes in the sample sizes required according to whether these variables' standard deviations were assumed to be equivalent, or varied in a ratio of 1 to 1.25 to 1.5. Across these models, sample sizes ranging from 170 to 369 provided 80% estimated power, suggesting that we should be able to detect a small to medium sized indirect effect size. In addition, we used G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) to estimate the sample size necessary to detect small to medium effects for the repeated measures ANOVA analyses. Based on previous research (Beadel et al., 2013; Magee & Teachman, 2012), we again expected our effect size to be in the small-medium range for all dependent variables. To detect a medium effect size (f = 0.25), with $\alpha = .05$ and power at 0.80, G*Power estimated a requirement of 24 participants. For small effect sizes, a range of effects (f = 0.20, 0.15, 0.10) yielded a wide range of 34, 60, and 130 participants necessary. Thus, based on mediation power estimates, we sought out participants in the range of 170 – 369 completed cases, with participants split evenly between the two psychoeducational groups.

Data Cleaning

There were no outliers across time points for the effort, difficulty, and positive affect factors, as assessed by examination of studentized residuals for values greater than +-3. However, there were outliers across all 3 time points of the negative affect variable with studentized residuals greater than 3. These outliers were retained for the analysis. Main outcome variables were evaluated for skewness and kurtosis by examining the data, histograms, and Shapiro-Wilk tests. The variables State SCCs, Difficulty, and Positive Affect were approximately normally distributed across time points and condition; however, Effort was negatively skewed, Negative Affect was positively skewed, and AMIT had an unexpectedly bimodal distribution as assessed by visual inspection of distribution graphs. Therefore, a "reflect and square root" transformation was applied to Effort at all three time points to correct for a moderately negative skew, and an "inverse" transformation was applied to Negative Affect at all three time points to correct for an extreme positive skew. To normalize the data, AMIT scores were dummy coded into an ordinal variable with three values reflecting scores of zero (0), lower (1), and higher scores (2). Finally, all of the variables violated the assumption of sphericity via Greenhouse-Geisser's test of sphericity $p>.05$.

Analytic Plan

To evaluate our main hypothesis that SCCs vary by condition, an independent samples t-test was conducted. Next, to assess whether the conditions might have differential effects on our key cognitive and emotional responses to intrusive thoughts over three time points, we ran a series of 2 (condition) by 3 (timepoints) repeated measures ANOVAs. To follow-up significant interactions, we ran additional ANOVAs, t-tests, and LSD pairwise comparisons. To assess if lesser interpretations of intrusive thoughts as signs of cognitive decline mediated the relationship between lower SCCs and less intrusive thought difficulties, we conducted a mediation analysis using Hayes' (2018) PROCESS model in SPSS. This approach allowed us to evaluate the

hypothesized relationships by estimating the size and significance of the indirect effect (Rucker, Preacher, Tormala, & Petty, 2011). While OLS regression has limitations when handling ordinal variables, we checked these models using the original, bimodal variable, and the results turned out the same, suggesting the overall pattern was rather robust to dummy coding the AMIT variable.

Results

Sample Characteristics

First, we checked whether demographics variables differed by the randomly assigned conditions. Chi-square tests indicated that there were no significant differences between the condition groups for gender X^2 (1, N = 265) = .64, p = .43 or race X^2 (1, N = 265) = 1.03, p = .41. with race coded as white versus all other racial/ethnic identities. A chi-square test also showed that differences between condition groups for level of education did not quite reach significance, X^2 (4, N = 265) = 9.56, p = .05. There was also not a significant difference in age between the two condition groups, t (263) = 1.38, p = .17, d = .17, further indicating that randomization was successful. Means and standard deviations for the measures of demographic variables are listed in Table 1 by condition.

Differences in Subjective Cognitive Concerns by Condition

For our primary hypothesis, we expected that participants in the *cognitive article* condition would report less state SCCs compared to those in the *control article* condition. A t-test showed that unexpectedly, there was no significant differences in SCCs state scores, t (263) = 1.07, p = .64, d = 0.13. Providing convergent support, there were not significant differences for any of the three exploratory SCC trait subtests (ps > .10). Together, these results suggest that that the two articles did not have a meaningfully differential impact on SCCs.

Responses to Intrusive Thoughts

While we did not see the expected effects of condition on SCCs, we nonetheless still tested whether the conditions might have differential effects on our key cognitive and emotional responses to intrusive thoughts over three time periods. Therefore, we ran a series of 2 (condition) by 3 (time period) repeated measures ANOVAs. To follow-up significant interactions, we used additional ANOVAs, t-tests, and LSD pairwise comparisons as appropriate.

Cognitive Difficulties.

For cognitive difficulties, we first examined difficulty. There was a significant effect of time, F (2, 256) = 29.44, p < .001. Follow-up LSD tests indicated that perceived difficulty increased from Period One to Period Two and then decreased from Period Two to Period Three, with perceived difficulty at Period Three remaining above Period One (ps < .001). However, there was no significant two-way interaction between condition and time F (2, 265) =1.97, p = .15. For effort, there were no main or interaction effects (ps > .10).

Emotional Difficulties.

For emotional difficulties, we first examined positive affect. There was a main effect of time, F (2, 256) = 66.29, p < .001, indicating that positive affect did shift across the time points. Follow-up LSD tests indicated that positive affect decreased from Period One to Period Two, and increased from Period Two to Period Three, with Period Three ending below where Period One started (ps < .01). However, there was no significant two-way interaction between condition

and time, F (2, 256) = 1.92, p = .15. We next examined negative affect. Again, there was a significant effect of time, F (2, 256) = 128.00, p < .001. Follow-up LSD tests indicated that negative affect increased from Period One to Period Two and then decreased from Period Two to Period Three, ending above where negative affect was at Period One to Period Three (ps < .001). However, again there was no significant two-way interaction between condition and time on negative affect, F (2, 256) = 0.39, p =.64. Thus, there did not appear to be any differential cognitive or emotional difficulties related to article condition.

Mediation of SCCs to Intrusive Thought Response via Interpretation

Finally, we hypothesized that regardless of condition, the relationship between lower SCCs and lower cognitive and emotional difficulties with intrusive thoughts would indirectly flow via decreased interpretations of intrusive thoughts as a sign of cognitive decline. To test this pattern across the cognitive and emotional difficulty variables, we conducted a series of simple mediation analyses using model 4 in PROCESS (Hayes, 2012). Again, we organize results according to cognitive and emotional difficulties. The outcome variables in the mediation analysis were the standardized residual change scores from Period One to Period Three for Difficulty, Effort, and Positive and Negative Affect. The predictor variable for this analysis was State SCCs scores, and the mediator was the dummy coded appraisal of intrusive thoughts assessment (AMIT) score.

Cognitive Difficulties

Difficulty.

As expected, interpretations of intrusive thoughts as a sign of cognitive decline significantly mediated the association between state SCCs and decreases in difficulty suppressing intrusive thoughts, indirect effect [β= .016, 95% CI (.005, .028)]. Specifically, lower state SCCs were associated with lower interpretations of intrusive thoughts as a sign of cognitive decline (path *a*: [β= .072, 95% CI (.050, .094)]). In turn, lower interpretations of intrusive thoughts as a sign of cognitive decline were associated with greater decreases in difficulty suppressing intrusive thoughts (path *b*: [β= .219, 95% CI (.065, .374)]). Neither the total (path *c*: [β= .021, 95% CI (-.007, .049)]) nor the direct effect (path *c'*: [β= .005, 95% CI (-.025, .035)]) differed from zero. Together, as hypothesized, lower SCCs were related to greater decreases in difficulty suppressing intrusive thoughts, with this relationship flowing through decreased interpretations of intrusive thoughts as a sign of cognitive decline.

Effort.

Unexpectedly, interpretations of intrusive thoughts as a sign of cognitive decline did not significantly mediate the association between state SCCs and effort suppressing intrusive thoughts [indirect effect = .003, 95% CI (-.007,.012)]. Lower state SCCs were significantly associated with lower interpretations of intrusive thoughts as a sign of cognitive decline (path *a*: [β= .072, 95% CI (.05, .094)]). However, both interpretations of intrusive thoughts as a sign of cognitive decline (path *b*: [β= .034, 95% CI (-.123, .192)]) and state SCCs (direct effect, path *c*: [β= -.004, 95% CI (-.034, .012)]) were unrelated to changes in effort suppressing intrusive thoughts.

Emotional Difficulties

Negative Affect.

Counter to our hypothesis, interpretations of intrusive thoughts as a sign of cognitive decline did not significantly mediate the association between SCCs and negative affect while suppressing intrusive thoughts, indirect effect [β = .001, 95% CI (-.012, .013)]. Lower state SCCs were significantly associated with lower interpretations of intrusive thoughts as a sign of cognitive decline (path *a*: [β= .072, 95% CI (.05, .094)]). However, both interpretations of intrusive thoughts as a sign of cognitive decline (path *b*: [β= .014, 95% CI (-.143, .172)]) and state SCCs (direct effect, path *c*: [β= -.001, 95% CI (-.032, .029)]) were unrelated to changes in negative affect while suppressing intrusive thoughts.

Positive Affect.

Interpretations of intrusive thoughts as a sign of cognitive decline also did not significantly mediate the association between SCCs and positive affect while suppressing intrusive thoughts, indirect effect [β= -.001, 95% CI (-.013, .01)]. Lower state SCCs were significantly associated with lower interpretations of intrusive thoughts as a sign of cognitive decline (path *a*: [β= .072, 95% CI (.05, .094)]). However, both interpretations of intrusive thoughts as a sign of cognitive decline (path *b*: [β= -.016, 95% CI (-.173, .141)]) and state SCCs (direct effect, path *c*: [β= .02, 95% CI (-.01, .05)]) were unrelated to changes in positive affect while suppressing intrusive thoughts.

Together, it appears that there was an indirect effect flowing via interpretations of intrusive thoughts for difficulty, but not for the other three cognitive and emotional difficulties.

Discussion

In the current study, we designed a psychoeducational cognitive aging article intended to decrease subjective cognitive concerns among older adults. We expected that the *cognitive* condition, compared to the *control* condition, would result in decreased SCCs, and that participants with decreased SCCs would report less cognitive and emotional difficulties with intrusive thoughts. We also expected that across conditions, beneficial effects of decreased SCCs would be mediated by decreased interpretations of intrusive thoughts as a sign of cognitive decline. Partial support for our hypotheses were found. The psychoeducational article in this study did not have most of its intended effects; however, there was support for the underlying theoretical model. Specifically, for older adults, interpretations of intrusive thoughts as a sign of cognitive decline mediated the relationship between SCCs and perceived difficulty suppressing an intrusive thought, a maladaptive response to intrusive thinking. The results of this study lend support for existing theory that suggests higher SCCs may drive maladaptive factors that perpetuate intrusive thinking among older adults.

There were not significant decreases in SCCs, cognitive difficulties, or emotional difficulties for the *cognitive* condition compared to the *control* condition. While the lack of results for SCCs were consistent with the pilot study, there are several important reasons why the psychoeducational article may not have had the intended results. First, the intervention was relatively brief compared to prior interventions and participants' lifelong experiences with SCCs. This study was the first of its kind to use a psychoeducational article to reduce SCCs. The psychoeducational article, while informed by interventions proven to reduce SCCs, may have contained less than the dosage that is required to influence SCCs. Indeed, the interventions that the article was based upon were typically multi-session psychoeducational interventions. Like other belief structures, a short intervention article may have been too brief to influence negative

beliefs about aging and cognitive ability that have been accumulated over a lifetime (Levy, 1996).

Second, the article may not have been as effective as expected because the article's intention to decrease SCCs and the subsequent measures of SCCs was explicit. Several past studies explicitly induced negative cognitive aging beliefs and successfully influenced cognition and behavior (Hess, Auman, Colcombe, & Rahhall, 2003; Levy, 2003; Levy, 1996). However, it has been suggested that positive cognitive aging beliefs may be more strongly altered when presented implicitly because such messages have a greater likelihood of changing baseline concerns about cognitive aging which are typically implicit themselves (Levy, 2003; Levy, 1996). Finally, it is possible that the cognitive aging article may have inadvertently activated cognitive aging concerns by noting the high prevalence of cognitive concerns, or by demanding more cognitive effort compared to the control condition (i.e., requiring the participant to read and remember the article content). If this were the case, positive effects of the article via decreasing SCCs could have been counteracted and not apparent when comparing the article to the control condition.

The current study was informed by Hess, Auman, Colcombe, & Rahhall (2003)'s use of brief, positive and negatively valenced articles to reduce implicit stereotype threat of cognitive aging among older adults and facilitate memory recall. The current study's article intervention might be improved if, more similarly to Hess's 2003 study, dose was increased by presenting two or more different articles with the same underlying positive message. Further, greater differences might have been evident between article conditions if one condition aimed to induce and the other aimed to reduce SCCs. While this design was considered, we ultimately decided not to induce SCCs due to the risk of psychological harm in increasing older adult's SCCs. Finally, despite the hopes for this study, it is a possibility that SCCs may not be a fruitful area for psychoeducational intervention.

As expected, fewer interpretations of intrusive thoughts as a sign of cognitive decline mediated the relationship between lower SCCs and less difficulty suppressing intrusive thoughts. These results suggest that SCCs may motivate older adults to first make maladaptive interpretations of their intrusive thoughts, then in line with their concerns, perceive more difficulty when putting personally relevant negative thoughts out of mind. Calamari (2002) theorized that SCCs lead to greater thought monitoring, simultaneously limiting attentional resources, providing more opportunities to assign negative interpretations, and making individuals more reactive to common intrusive thoughts, thus perpetuating OCD symptoms. Wells (1999) proposed a similar theory explaining the perpetuation of GAD, in which negative thought focused attention and negative interpretation of intrusive thoughts lead to heightened worry over time. Our results lend support to both of these theories, that SCCs are related to a maladaptive cognitive outcome via thought interpretation.

While we found the anticipated pattern for perceptions of suppression difficulty, it remains unclear as to why thought interpretation did not significantly mediate the relationship between SCCs and emotional responses to intrusive thoughts, or the amount of cognitive effort that participants exerted in suppressing intrusive thoughts. The socioemotional selectivity theory of healthy aging (Carstensen, 1994, 1995) offers one possible explanation for these null findings. Socioemotional selectivity theory posits that older adults often display better emotional regulation capabilities than younger adults and are more motivated to preserve cognitive resources. In this case, it may have been that older adults successfully adjusted emotion regulation capabilities according to perceived threat of intrusive thoughts, limiting other effects

of their threat perception. For instance, even if our older adult sample interpreted their inability to suppress an intrusive thought as a sign of cognitive decline, they may have reappraised the overall emotional importance of suppressing intrusive thoughts, and/or acted to preserve their cognitive effort for other goals (John & Gross, 2004). Perceptions of difficulties suppressing an intrusive thought may have stood out because it may be most reflective of actual normative cognitive changes in older age, namely impairment in the inhibitory processes needed for thought suppression (Butler & Zacks, 2006; Wegner, 1994). Alternatively, whether or not suppression is normatively more difficult, interpretations of thought suppression difficulty are indicative of subjective cognitive appraisals that are aligned with older adults' level of concern and self-efficacy. A limitation of this study is that this distinction between actual and perceived difficulty suppressing intrusive thoughts remains unclear. The significance of this mediation model, though, further validates the role SCCs play in perpetuating maladaptive cognitive decline interpretations of intrusive thoughts, and remains a promising avenue for intervention.

This study establishes the association between SCCs, interpretation of intrusive thoughts, and a maladaptive cognitive response to intrusive thought suppression, an association that has been theorized but not explicitly tested (Calamari, 2002). This association may specify the mechanisms by which older adults with heightened SCCs reported higher anxiety, lower perceived competence, and more OCD symptoms compared to older adults with lower SCCs (Sinoff & Werner, 2003; Cohen & Calamari, 2004; Bensadon, 2010; Teachman, 2007; Hanninen et al, 1994). More specifically, we found that increased SCCs lead to an increase in interpretation of intrusive thoughts as a sign of cognitive decline, which results in greater perceived difficulty in suppression. Studies suggest that greater perceived difficulty controlling intrusive thoughts predicts negative cognitive and affective consequences such as thought reoccurrence, distress, and ultimately a cycle that heightens worry and obsessive compulsive symptoms over time (Liberman & Forster, 2000; Wells, 1999; Calimari 2002). Finally, the results of this study align with well-established theories positing that interpretations of intrusive thoughts, at least cognitively, can be more harmful than the intrusive thoughts themselves (Rachman, 1997).

The current study is limited in its sample in that participants were mostly in their late 60s, representing a younger subset of the older adult population. Further, we sampled older adults who use the platform mTurk. It is possible that those who have taken on the challenging task of internet proficiency later in life, and who are assessed frequently on this platform, may have more confidence in their cognitive abilities compared to older adults who are not using this platform. Future studies might benefit from recruiting an older sample of community members in person who are more likely to have elevated SCCs, and who better represent the older adult population. A future study might also consider measuring actual cognitive ability and comparing it with subjective cognitive ability in order to better disentangle actual vs. subjective cognitive concerns.

The findings of this study illustrate that SCCs indeed may impact how older adults interpret their intrusive thoughts, and that such interpretations may help to account for why older adults with high SCCs perceive more cognitive difficulties with intrusive thoughts. The current study evaluates well-established theories of OCD and GAD in an under researched population, older adults, while identifying age specific risk and protective factors for maladaptive responses to intrusive thoughts.

References

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: W. H. Freeman

Bensadon, B. (2010). *Memory self-efficacy and stereotype effects in aging.* University of Florida.

Best, D., Hamlett, K., & Davis, S. (1992). Memory complaint and memory performance in the elderly: The effects of memory skills training and expectancy change. *Applied Cognitive Psychology*, *6*, 405–416.

Bouvard, M., Fournet, N., Denis, A., Sixdenier, A., & Clark, D. (2017). Intrusive thoughts in patients with obsessive compulsive disorder and non-clinical participants: a comparison using the International Intrusive Thought Interview Schedule. *Cognitive Behaviour Therapy*, *46*(4), 287-299.

Brenes, G., Guralnik, J., Williamson, J., Fried, L., Simpson, C., Simonsick, E., & Penninx, B. (2005). The influence of anxiety on the progression of disability. *Journal of the American Geriatrics Society*, *53*(1), 34-39.

Brewin, C., & Beaton, A. (2002) Thought suppression, intelligence, and working memory capacity. *Behaviour Research and Therapy, 40*(8), 923–930.

Brose, A., Schmiedek, F., Lövdén, M., & Lindenberger, U. (2011). Normal aging dampens the link between intrusive thoughts and negative affect in reaction to daily stressors. *Psychology and Aging*, *26*(2), 488.

Carstensen, L. L. (1993, January). Motivation for social contact across the life span: A theory of socioemotional selectivity. In *Nebraska symposium on motivation* (Vol. 40, pp. 209-254).

Carstensen, L. L. (1995). Evidence for a life-span theory of socioemotional selectivity. *Current Directions in Psychological Science*, *4*(5), 151-156.

Calamari, J. E., Janeck, A. S., & Deer, T. M. (2002). Cognitive processes and obsessive-compulsive disorder in older adults. In *Cognitive Approaches to Obsessions and Compulsions*, 315-335.

Charles, S. T. (2010). Strength and vulnerability integration: A model of emotional well-being across adulthood. *Psychological Bulletin*, *136*(6), 1068.

Chasteen, A. L., Bhattacharyya, S., Horhota, M., Tam, R., & Hasher, L. (2005). How feelings of stereotype threat influence older adults' memory performance. *Experimental aging research*, *31*(3), 235-260.

Cherry, K. E., Brigman, S., Reese-Melancon, C., Burton-Chase, A., & Holland, K. (2013). Memory aging knowledge and memory self-appraisal in younger and older adults. *Educational Gerontology*, *39*(3), 168-178.

Cohen, R. J., & Calamari, J. E. (2004). Thought-focused attention and obsessive-compulsive symptoms: an evaluation of cognitive self-consciousness in a nonclinical sample. *Cognitive Therapy and Research, 28*, 457–471.

Cougle, J. R., & Lee, H. J. (2014). Pathological and non-pathological features of obsessive-compulsive disorder: Revisiting basic assumptions of cognitive models. *Journal of Obsessive-Compulsive and Related Disorders*, *3*(1), 12-20.

Crawford, J. R., & Henry, J. D. (2004). The Positive and Negative Affect Schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, *43*(3), 245-265.

De Beurs, E., Beekman, A. T. F., Van Balkom, A. J. L. M., Deeg, D. J. H., & Van Tilburg, W. (1999). Consequences of anxiety in older persons: its effect on disability, well-being and use of health services. *Psychological Medicine, 29*(3), 583-593.

Dixon, R. A., Hultsch, D. F., & Hertzog, C. (1988). The Metamemory in Adulthood (MIA) questionnaire. *Psychopharmacology Bulletin, 24*, 671–688.

Fairchild, K. J., & Scogin, F. R. (2010). Training to Enhance Adult Memory (TEAM): an investigation of the effectiveness of a memory training program with older adults. *Aging & Mental Health, 18*(3), 326-339.

Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). "Mini-mental state": a practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research, 12*(3), 189-198.

Frost, R. O., & Steketee, G. (Eds.). (2002). *Cognitive approaches to obsessions and compulsions: Theory, assessment, and treatment*. Elsevier.

Gailliot, M. T., Baumeister, R. F., DeWall, C. N., Maner J. K., Plant E. A., et al. (2007) Self-control relies on glucose as a limited energy source: willpower is more than a metaphor. *Journal of Personality and Social Psychology, 92*, 325–336.

Goldberg, R., Morris, P., Christian, F., et al. (1990). Panic disorder in cardiac outpatients. *Psychosomatics, 31*, 168–173.

Gilewski, M. J., Zelinski, E. M., & Schaie, K. W. (1990). The Memory Functioning Questionnaire for assessment of memory complaints in adulthood and old age. *Psychology and Aging, 5*(4), 482.

Grenier, S., Préville, M., Boyer, R., O'Connor, K., Béland, S. G., Potvin, O., & Brassard, J. (2011). The impact of DSM-IV symptom and clinical significance criteria on the prevalence estimates of subthreshold and threshold anxiety in the older adult population. *The American Journal of Geriatric Psychiatry*, *19*(4), 316-326.

Hayes A.F. The PROCESS Macro for SPSS and SAS. http://processmacro.org/. Published 2018. Accessed March 9, 2019.

He, W., Goodkind, D., & Kowal, P. R. (2016). *An aging world: 2015* (pp. 95-16). Washington, DC: United States Census Bureau.

Hertzog, C., Dixon, R. A., Schulenberg, J. E., & Hultsch, D. F. (1987). On the differentiation of memory beliefs from memory knowledge: The factor structure of the Metamemory in Adulthood scale. *Experimental Aging Research*, *13*(2), 101-107.

Hertzog, C., Hultsch, D. F., & Dixon, R. A. (1989). Evidence for the convergent validity of two self-report metamemory questionnaires. *Developmental Psychology*, *25*(5), 687.

Hess, T. M., Auman, C., Colcombe, S. J., & Rahhal, T. A. (2003). The impact of stereotype threat on age differences in memory performance. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *58*(1), 3-11.

Hirsch, C. R., Hayes, S., & Mathews, A. (2009). Looking on the bright side: accessing benign meanings reduces worry. *Journal of Abnormal Psychology*, *118*(1), 44.

Hoogenhout, E. M., de Groot, R. H., & Jolles, J. (2010). A new comprehensive educational group program for older adults with cognitive complaints: background, content, and process evaluation. *Educational Gerontology*, *37*(1), 51-73.

John, O. P., & Gross, J. J. (2004). Healthy and unhealthy emotion regulation: Personality processes, individual differences, and lifespan development. Journal of Personality, 72, 1301–1334. doi:10.1111/j.1467- 6494.2004.00298.x

Jorm, A. F., Christensen, H., Henderson, A. S., Korten, A. E., Mackinnon, A. J., & Scott, R. (1994). Complaints of cognitive decline in the elderly: a comparison of reports by subjects and informants in a community survey. *Psychological Medicine*, *24*(2), 365-374.

Kaci Fairchild, J., & Scogin, F. R. (2010). Training to Enhance Adult Memory (TEAM): an investigation of the effectiveness of a memory training program with older adults. *Aging & Mental Health*, *14*(3), 364-373.

Lachman, M. E., Weaver, S. L., Bandura, M., Elliot, E., & Lewkowicz, C. J. (1992). Improving memory and control beliefs through cognitive restructuring and self-generated strategies. *Journal of Gerontology*, *47*(5), 293-299.

Lachman, M. E. (1991). Perceived control over memory aging: Developmental and intervention perspectives. *Journal of Social Issues*, *47*(4), 159-175.

Langlois, F., Freeston, M. H., & Ladouceur, R. (2000). Differences and similarities between obsessive intrusive thoughts and worry in a non-clinical population: Study 1. *Behaviour Research and Therapy*, *38*(2), 157-173.

Lenze, E. J., Mulsant, B. H., Shear, M. K., Alexopoulos, G. S., Frank, E., Reynolds, C.F. (2001). Comorbidity of depression and anxiety disorders in later life. *Depression and Anxiety 14*, 86–93.

Levy, B. (1996). Improving memory in old age through implicit self-stereotyping. *Journal of Personality and Social Psychology*, *71*(6), 1092.

Levy, B., & Langer, E. (1994). Aging free from negative stereotypes: Successful memory in China among the American deaf. *Journal of Personality and Social Psychology*, *66*(6), 989.

Levy, B. R., Hausdorff, J. M., Hencke, R., & Wei, J. Y. (2000). Reducing cardiovascular stress with positive self-stereotypes of aging. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *55*(4), 205-213.

Lineweaver, T. T., & Hertzog, C. (1998). Adults' efficacy and control beliefs regarding memory and aging: Separating general from personal beliefs. *Aging, Neuropsychology, and Cognition*, *5*(4), 264-296.

Luszcz, M., & Hinton, M. (1995). Domain-and task-specific beliefs about memory in adulthood: A microgenetic approach. *Australian Journal of Psychology*, *47*(1), 54-59.

Magee, J. C., & Teachman, B. A. (2012). Distress and recurrence of intrusive thoughts in younger and older adults. *Psychology and Aging*, *27*(1), 199.

McDonald-Miszczak, L., Hertzog, C., & Hultsch, D. F. (1995). Stability and accuracy of metamemory in adulthood and aging: A longitudinal analysis. *Psychology and Aging*, *10*(4), 553.

Mehta, K. M., Yaffe, K., Brenes, G. A., Newman, A. B., Shorr, R. I., Simonsick, E. M., & Covinsky, K. E. (2007). Anxiety symptoms and decline in physical function over 5 years in the health, aging and body composition study. *Journal of the American Geriatrics Society*, *55*(2), 265-270.

Najmi, S., Riemann, B. C., & Wegner, D. M. (2009). Managing unwanted intrusive thoughts in obsessive–compulsive disorder: Relative effectiveness of suppression, focused distraction, and acceptance. *Behaviour Research and Therapy*, *47*(6), 494-503.

Newkirk, L. A., Kim, J. M., Thompson, J. M., Tinklenberg, J. R., Yesavage, J. A., & Taylor, J. L. (2004). Validation of a 26-point telephone version of the Mini-Mental State Examination. *Journal of geriatric psychiatry and neurology*, *17*(2), 81-87.

Person, D. C., & Borkovec, T. D. (1995, August). Anxiety disorders among the elderly: Patterns and issues. In *103rd annual meeting of the American Psychological Association, New York, NY*.

Petkus, A. J., Reynolds, C. A., Wetherell, J. L., Kremen, W. S., & Gatz, M. (2017). Temporal dynamics of cognitive performance and anxiety across older adulthood. *Psychology and Aging*, *32*(3), 278.

Purdon, C. (1999). Thought suppression and psychopathology. *Behaviour Research and Therapy*, *37*(11), 1029-1054.

Purdon, C., & Clark, D. A. (1999). Metacognition and obsessions. *Clinical Psychology and Psychotherapy*, *6*, 102–110.

Rachman, S. (1981). Part I. Unwanted intrusive cognitions. *Advances in Behaviour Research and Therapy*, *3*(3), 89-99.

Rachman, S. (1998). A cognitive theory of obsessions. In Sanavio, E., *Behavior and cognitive therapy today* (pp. 209-222). Vancuver, Canada: Pergamon.

Radomsky, A. S., Alcolado, G. M., Abramowitz, J. S., Alonso, P., Belloch, A., Bouvard, M., & Garcia-Soriano, G. (2014). Part 1—You can run but you can't hide: Intrusive thoughts on six continents. *Journal of Obsessive-Compulsive and Related Disorders*, *3*(3), 269-279.

Rassin, E., Merckelbach, H., Muris, P., & Spaan, V. (1999). Thought–action fusion as a causal factor in the development of intrusions. *Behaviour Research and Therapy, 37*(3), 231-237.

Rowa, K., & Purdon, C. (2003). Why are certain intrusive thoughts more upsetting than others?. *Behavioural and Cognitive Psychotherapy*, *31*(1), 1-11.

Rucker D. D., Preacher K. J., Tormala Z. L. & Petty R. E. (2011). Current Practices and New Recommendations: Mediation Analysis in Social Psychology. *Social Personality Psychology Compass*, *5*(6), 359-371. doi:10.1111/j.1751-9004.2011.00355.x

Salkovskis, P. M. (1999). Understanding and treating obsessive—compulsive disorder. *Behaviour Research and Therapy*, *37*, 29-52.

Schmidt, Joskha, Zwart, Berg, Betto, & Deelman (1999). Evaluation of an intervention directed at the modification of memory beliefs in older adults. *Educational Gerontology*, *25*(4), 365-385.

Schuurmans, J., Comijs, H., Emmelkamp, P. M., Gundy, C. M., Weijnen, I., Van Den Hout, M., & Van Dyck, R. (2006). A randomized, controlled trial of the effectiveness of cognitive–behavioral therapy and sertraline versus a waitlist control group for anxiety disorders in older adults. *The American Journal of Geriatric Psychiatry*, *14*(3), 255-263.

Sinoff, G., & Werner, P. (2003). Anxiety disorder and accompanying subjective memory loss in the elderly as a predictor of future cognitive decline. *International Journal of Geriatric Psychiatry*, *18*(10), 951-959.

Teachman, B. A. (2007). Linking obsessional beliefs to OCD symptoms in older and younger adults. *Behaviour Research and Therapy*, *45*(7), 1671-1681.

Teachman, B. A., & Clerkin, E. M. (2007). Obsessional beliefs and the implicit and explicit morality of intrusive thoughts. *Cognition and Emotion*, *21*(5), 999-1024.

Tombaugh, T. N., & McIntyre, N. J. (1992). The mini-mental state examination: a comprehensive review. *Journal of the American Geriatrics Society*, *40*(9), 922-935.

Turner, M. L., & Pinkston, R. S. (1993). Effects of a memory and aging workshop on negative beliefs of memory loss in the elderly. *Educational Gerontology: An International Quarterly*, *19*(5), 359-373.

Van Hout, H. P., Beekman, A. T., De Beurs, E., Comijs, H., Van Marwijk, H., De Haan, M., & Deeg, D. J. (2004). Anxiety and the risk of death in older men and women. *The British Journal of Psychiatry*, *185*(5), 399-404.

Van Mierlo, L. D., Wouters, H., Sikkes, S. A., Van der Flier, W. M., Prins, N. D., Bremer, J. A., ... & Van Hout, H. P. (2017). Screening for mild cognitive impairment and dementia with automated, anonymous online and telephone cognitive self-tests. *Journal of Alzheimer's disease*, *56*(1), 249-259.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of personality and social psychology*, *54*(6), 1063.

Wegner, D. M., & Zanakos, S. (1994). Chronic thought suppression. *Journal of personality*, *62*(4), 615-640.

Wells, A. (1999). A metacognitive model and therapy for generalized anxiety disorder. *Clinical Psychology and Psvchotherapy, 6*, 86-95.

Wells, A., & Matthews, G. (1996). Modeling cognition in emotional disorder: The S-REF model. *Behaviour Research and Therapy, 34*, 881–888.

West, R. L., Bagwell, D. K., & Dark-Freudeman, A. (2008). Self-efficacy and memory aging: The impact of a memory intervention based on self-efficacy. *Aging, Neuropsychology, and Cognition*, *15*(3), 302-329.

Wolitzky-Taylor, K. B., Castriotta, N., Lenze, E. J., Stanley, M. A., & Craske, M. G. (2010). Anxiety disorders in older adults: a comprehensive review. *Depression and Anxiety*, *27*(2), 190-211.

Appendix

Appendix A

Table 1
Sociodemographic Characteristics of Participants

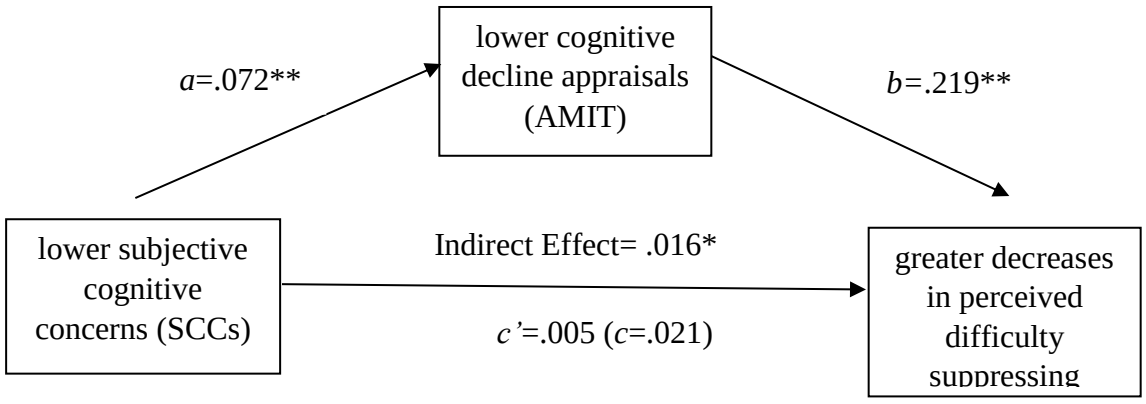
Condition	Memory (N=138)		Furniture (N= 127)		Full Sample (N=265)	
	M or *n*	*SD* or *%*	*M* or *n*	*SD* or *%*	*M* or *n*	*SD* or *%*
Gender						
Female	87	63%	86	67.70%	173	65.30%
Male	51	37%	41	32.20%	92	34.60%
Age	68.1	3.18	69.69	3.77	68.38	3.48
Race and Ethnicity						
White / Caucasian	122	88.40%	117	92.10%	239	89.80%
Black or African American	13	9.40%	3	2.40%	16	6%
Asian	1	0.70%	1	0.80%	2	0.80%
American Indian or Alaska native	0	0	1	0.80%	1	0.40%
Race other than one listed	0	0	2	1.60%	2	0.80%
More than one race	1	0.70%	2	1.60%	3	1.10%
Don't know or prefer not to answer	1	0.70%	1	0.80%	2	0.80%
Hispanic / Latino	3	2.20%	5	3.90%	8	3%
Education						
High school graduate	11	8%	7	5.50%	18	6.80%
Some college	33	23.90%	34	26.80%	67	25.30%
Associate's and/or Bachelor's degree	59	42.80%	42	33.10%	101	38%
Master's degree	33	23.90%	33	26%	66	24.90%
Doctorate or professional degree	2	1.40%	11	8.70%	13	4.90%

Note. The totals may not sum to the actual number of participants as some participants did not complete all of the items

Appendix B

Figure 1

Standardized Regression Coefficients for the Relationship Between SCCs and Perceived Difficulty Suppressing an Intrusive Thought as Mediated by Cognitive Decline Appraisals



*p<.05 **p<.01

Appendix C

Positive Outlook on Aging and Memory

Recent studies show that many older adults may be confusing normal cognitive aging with dementia. Many changes in memory and speed of information processing are normal and to be expected as individuals age. For instance, needing longer to remember things, or finding it harder to multitask are common changes that don't affect most people's daily functioning.

Numerous studies have shown that it is common for older adults to have concerns about their mental functioning and memory, but these self-evaluations tend to be inaccurate in predicting their actual memory and actual risk for developing dementia. Thomas Hess, a professor at the University of North Carolina, suggests that this is due to misleading negative age stereotypes about memory. For example, common media portrayals of older adults as having Alzheimer's may cause many older adults to have lower self-esteem and pessimism related to their memory. A recent study by researchers at Harvard University demonstrated how cultural views on aging may actually effect memory performance. They found that older adults in China, a culture with more positive views of aging, performed at the same level as younger adults on memory tests. "Our findings provide strong support for the idea that memory loss is not an inevitable aspect of old age." Additionally, psychologists have found that language ability, vocabulary, and knowledge acquired through education and experience remains stable in older adults and can even increase with age.

Some great news is that there is a lot that you can do to promote healthy aging and adapt to normal age related memory changes. For example, positive attitudes towards aging, reduced worry related to memory, and mental well-being are all factors that scientists have demonstrated are linked to normal cognitive aging and possibly even lower rates of dementia. Older adults have a lot more control over their memory than they think!

Baltes and Baltes (1990) suggests that healthy aging can be achieved by adjusting and selecting goals that are satisfying and realistic, engaging in behaviors that optimize your strengths, and compensate for discrepancies between goals and performance. With more knowledge about healthy cognitive aging and some skills and strategies, you can improve your memory confidence, worry less, and enjoy your golden years.

See How the Design of Chairs, Beds and Sofas Have Evolved Through History

Evidence suggests that furniture was used as far back as the Neolithic period and daily life without it is unimaginable. So how has furniture changed through the ages? From the exclusive and luxury furniture of Ancient Egypt, to the functional and streamlined design of the Bauhaus, Angie's List will take you on a fascinating journey through the evolution of furniture design. Furniture as we now know it was rare in Ancient Egypt. Most regular people used woven baskets to store their few belongings and would sit on mats or blankets. Furniture was an exclusive luxury saved for the rich and powerful. Between 1919 and 1933 The Bauhaus movement reinvented furniture design forever. The clean-lines we see in today's furniture were first established by this influential German design studio. Bauhaus rejects unnecessary stylistic affections – instead prioritizing function, neutral colors and clean shapes.

During the early 18th century in Paris, the wealthy social elite were busy rejecting the regal seriousness of Baroque design for something more fun. The exuberant new Rococo style furniture opted for dense ornamentation, fluid lines, and pastel colors. At the other end of

the spectrum is minimalism which rejects the lavish styles of the past. Utilizing few materials and clear lines – minimalism grew out of the New York art scene in the 1960's. Whether it's furniture or home products, in minimalism less is more. Mid-Century Modern valued functionality, elegance and simplicity. Furniture from this era usually combines only two materials such as a vibrant color fabric paired with a rich wood. Furniture in this style was mass-produced and designed to be affordable to average homeowners, making it a hugely popular style.

Renaissance furniture was heavily influenced by the classical antiquities of the past. At the end of the 15th century, trade brought immense wealth to Italy and the growing bourgeoisie demanded more high-quality furniture. Instead of looking to the past for inspiration, Art Deco design celebrated modern life in the 1920s and 30s with all of its luxury and sophistication. New materials of the time such as chrome, Bakelite and plate glass were combined with ivory, mahogany and dark lacquered surfaces to create classic furniture and architecture.

Positive Outlook on Aging and Heart Health

Recent studies show that many older adults may be confusing normal cardiovascular aging with heart disease. Many changes in the efficiency by which your heart pumps blood is normal and to be expected as individuals age. For instance, changes in the timing between your heartbeats are a common shift that doesn't affect most people's daily functioning.

Studies have shown that it is common for older adults to have concerns about their cardiovascular health, but health evaluations of oneself may not be accurate because they are influenced by social comparisons and expectations. Rebecca Levy, a professor at Yale University, suggests that this is due to misleading negative age stereotypes about physical health. For example, common media portrayals of older adults as having poor physical health and the publicized fear of having a heart attack may cause many older adults to have lower self-esteem and pessimism related to cardiovascular health. Dr. Levy's study demonstrated that older adults who were exposed to negative aging stereotypes had heightened cardiovascular responses compared to those exposed to positive aging stereotypes. This hopeful study provides evidence that exposure to positive aging stereotypes can reduce cardiovascular stress which is associated with heart disease. Additionally, researchers have found that many older adults' healthy resting heart rate persists with normal aging, and with some life style changes, may even improve as we get older.

Some great news is that there is a lot that you can do to promote healthy aging and adapt to normal age related cardiovascular changes. For example, positive attitudes towards aging, reduced worry related to health, and mental well-being are all factors that scientists have demonstrated are linked to normal heart aging and are possibly even related to lower rates of heart disease and cardiovascular mortality. Older adults have a lot more control over their cardiovascular health than they think!

Baltes and Baltes (1990) suggests that healthy aging can be achieved by adjusting and selecting goals that are satisfying and realistic, engaging in behaviors that optimize your strengths, and compensate for discrepancies between goals and performance. With more knowledge about healthy cardiovascular aging, lifestyle changes, and some skills and strategies, you can improve your cardiovascular health confidence, worry less, and enjoy your golden years.