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Do Negative Affect Characteristics and Subjective Memory Concerns Increase Risk for Late Life Anxiety?

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Abstract

To better understand the development and exacerbation of late-life anxiety, we tested a risk model positing that trait negative affect (NA) characteristics would interact with cognitive functioning, thereby increasing some older adults' risk for increased anxiety symptoms. The moderator-mediator model consisted of measures of NA, cognitive functioning, and their interaction, as predictors of later Hamilton Anxiety Rating Scale scores (HARS) via a mediational process, subjective memory concerns (SMCs). Older adults (aged 65-years and over; M_{age} = 76.7 years, *SD* = 6.90 years) completed evaluations four times over approximately 18 months. A latent growth curve model including Anxiety Sensitivity Index total score (ASI), Mattis Dementia Rating Scale-2 (DRS) total raw score, the ASI x DRS interaction, a SMC measure as mediator, HARS intercept (scores at times 3 and 4), and HARS slope provided good fit The ASI x DRS-2 interaction at Time 1 predicted HARS slope score (β = −.34, p <.05). When ASI score was high, stronger cognitive functioning was associated with fewer anxiety symptoms. The indirect effect of ASI score predicting HARS score 18-months later through the SMC mediator was statistically significant (β = .08, p < .05). Results suggest that the cognitive functioning changes associated with aging might contribute to the development of anxiety symptoms in older adults with specific NA traits. Implications for predicting and preventing late life anxiety disorders are discussed.

Keywords

older adults; aging; risk factors; anxiety symptoms; cognitive functioning; memory complaints

Anxiety disorders are the most prevalent mental health problem in the general adult population (Kessler, Ruscio, Shear, & Wittchen, 2009). In the National Comorbidity Survey Replication study anxiety disorders decreased with age, yet the lifetime prevalence of all anxiety disorders in adults 60 and older was over 15% (Kessler et al., 2005). Furthermore, incidence of anxiety disorders among adults age 67 and older might be as high as 6% (Samuelsson, McCamish-Svensson, Hagberg, Sundström, & Dehlin, 2005). Additionally,

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[4]At Time 1 (T1) there was a total of 201 cognitively intact participants; at Time 2, 150; at Time 3, 111; and at Time 4, 97. Missing data was as follows for specific measures: ASI, T1 = 2, T2 = 4, T3 = 0, T4 = 2; PANAS-N, T1 = 1, T2 = 46, T3 = 4, T4 = 2; STAI-T, T1 = 3, T2 = 4, T3 = 6, T4 = 2; MFQ frequency, T1 = 9, T2 = 13, T3 = 9, T4 = 9; HARS, T1 = 0, T2 = 0, T3 = 0, T4 = 0; AVLT Sum of Trials, T1 = 1, T2 = 0, T3 = 3, T4 = 1; and AVLT Delay of Recall, T1 = 3, T2 = 1, T3 = 7, T4 = 8.

the decrease in anxiety disorder prevalence associated with aging is slight, and these conditions typically persist throughout the life span (Kessler et al., 2009). Finally, certain factors related to aging may present unique risks for increased anxiety symptoms or the development of anxiety disorders in late life. Anxiety disorders appear to occur more often among older adults living in supported living settings including nursing homes (Junginger, Phelan, Cherry, & Levy, 1993) or with older adults experiencing significant medical problems (e.g., de Beurs et al., 2001; Mroczek & Spiro, 2007).

Given the frequent occurrence of anxiety disorders in late life, it is surprising these conditions have received limited study (Ayers, Thorp, & Wetherell, 2009). The lack of attention to late life anxiety disorders might result from beliefs that these conditions almost always begin much earlier in life, and therefore, elucidation of etiologic mechanisms is best achieved through studies with young adults (Calamari, Janeck, & Deer, 2002). Age at onset of anxiety disorders appears more variable than once assumed, and researchers suggest that some anxiety disorders might have a distinct late onset subgroup with symptoms appearing for the first time after age 60 (Calamari et al., 2002; Carmin, Calamari, & Ownby, 2012). Most importantly, anxiety symptoms and disorders in older adults are associated with significant disability and diminished quality of life (Richardson, Simning, He, & Conwell, 2011; Wetherell et al., 2004). Even at subclinical levels, anxiety symptoms are correlated with significant impairment among older adults (Pietrzak et al., 2012) and subclinical symptoms are often antecedent to full disorder development (Murphy et al., 1989). In the current study, a risk model of late life anxiety was evaluated in a sample of community dwelling older adults. The identification of factors predicting older adults' future anxiety symptoms was posited to be important because of the disability associated with even subclinical symptoms, and because increasing symptoms might be antecedent to later anxiety disorder development.

Risk Factors for Late-Life Anxiety Symptoms

Identification of the risk processes responsible for the development or exacerbation of anxiety symptoms is crucial to understanding causal mechanisms and for designing effective treatments and prevention programs (cf. Ingram & Price, 2010). Although empirical studies of risk factors for late life anxiety symptoms are few, Ayers et al. (2009) concluded from a review of the literature that several factors are reliably associated with increased anxiety symptoms in older adults. These risk factors included specific personality characteristics (e.g., neuroticism or negative affectivity); diminished coping ability, which might be related to cognitive functioning decline; and additionally, the unique stressors of late life including increasing health problems and diminished cognitive functioning.

A brief review of the limited empirical literature on factors associated with late life anxiety symptoms and disorders follows with a focus on longitudinal studies. Reviewed are findings related to the three constructs used as the basis of the current risk model: (1) negative affect, including general negative affectivity or neuroticism as well as specific lower-order personality constructs (e.g., anxiety sensitivity); (2) cognitive functioning; and (3) subjective perceptions of cognitive or memory dysfunction.

Negative Affectivity

de Beurs et al. (1999) tested a vulnerability-stress model in a longitudinal study of risk for anxiety disorders in community dwelling older adults. Results indicated that high neuroticism was one of the best predictors of becoming anxious, while female gender, specific health problems, and stressful life-events were other strong predictors. Stress and neuroticism had additive effects in the prediction of anxiety symptoms, although findings did not support the interaction predicted by the diathesis-stress model tested. Using a

longitudinal design, de Beurs et al. (2001) subsequently evaluated predictors of both late life anxiety and mood disorders. In addition to the severity of initial anxiety symptoms and female gender, both self-efficacy and neuroticism predicted anxiety disorder development in several of the models evaluated. The investigators again did not find interactions between specific stressors and personality variables. Cognitive functioning, measured with the Mini-Mental State Examination (Folstein, Folstein, & McHugh, 1975), was unrelated to later anxiety disorder onset. de Beurs et al. (2005) also evaluated a risk model for late life anxiety that included neuroticism, mastery beliefs, stressful life events, and their interactions. The investigators found that low mastery and high neuroticism predicted increases over time in negative affect and anxiety symptoms. Similarly, Vink et al. (2009) found that higher neuroticism prospectively predicted anxiety disorder onset.

Anxiety sensitivity (AS), defined as fear of the physical and emotional symptoms associated with the experience of anxiety (Reiss, Peterson, Gursky, & McNally, 1986), has been prospectively associated with the emergence of panic attacks, although the relationship to panic disorder development is less clear (Reese, Najmi, & McNally, 2010). There have been very few evaluations of AS in older adults. In an evaluation of an older adult sample, Mohlman and Zinbarg (2000) found that the latent structure of AS consisted of a general, higher-order factor and three lower-order factors (physical concerns, mental incapacitation concerns, and social concerns), a finding consistent with investigations in general adult samples (Zinbarg, Mohlman, & Hong, 1999). Bravo and Silverman (2001) examined the relationships between AS, trait anxiety, depression, and older adults' hypochondriacal concerns. Results indicated that AS was strongly associated with hypochondriacal concerns and was a better predictor of these concerns than depression or trait anxiety. Deer and Calamari (1998) evaluated relationships between panic symptoms and AS in older adults. AS predicted significant unique variance in panic symptoms even after controlling for stress and depression.

In summary, studies with older adult samples found that negative affect, a higher-order personality construct, and several related constructs (e.g., mastery beliefs, self-efficacy), were prospectively associated with increasing anxiety symptoms. Negative affect exerted a direct effect on anxiety symptom trajectories but did not moderate older adults' reactivity to stressful life events. Study of lower-order personality characteristics considered to be nested under the broader negative affect construct (Lilienfeld, 1999) has been limited. In several cross sectional studies, AS correlates with older adults' anxiety or anxiety-related symptoms.

Cognitive Decline and Anxiety Symptoms

Although not well understood, there is often an association between late-life anxiety disorders or symptoms and cognitive functioning (Wolitzky-Taylor, Castriotta, Lenze, Stanley, & Craske, 2010). Gallacher et al. (2009) prospectively evaluated the relationships between anxiety and incidents of dementia and mild cognitive impairment. After adjustment for age, vascular risk factors, and premorbid cognitive functioning, higher initial scores on the Spielberger State Trait Anxiety Inventory (Spielberger, Gorsuch, Luchene, Vagg, & Jacobs, 1983) predicted mild cognitive impairment or the development of dementia. In another study, Wilson, Begeny, Boyle, Schneider, and Bennett (2011) followed a large, cognitively intact older adult sample. Dependent measures included incidence of diagnosed Alzheimer's disease (AD) and changes in general or specific cognitive functions. Results indicated that higher initial levels of anxiety were associated with increased risk of AD and more rapid decline in global cognitive functioning. A measure of neuroticism predicted decline in episodic memory, working memory, and perceptual speed, but not in semantic memory or visuospatial ability.

Finally, Potvin, Forget, Grenier, Préville, and Hudon (2011) found that gender moderated relationships between anxiety and cognitive functioning. Results indicated that cognitive impairment was associated with baseline anxiety disorders in men and anxiety symptoms in women after controlling for depression. Further, for women, anxiety symptoms were more strongly associated with memory impairment, whereas anxiety disorders in men were associated with development of non-amnestic cognitive impairment. The authors concluded that anxiety appears to affect cognitive functioning differently for men and women.

To summarize, elevated anxiety might place older adults at risk for more rapid cognitive decline or development of dementia, although little is known about the process through which anxiety might affect cognitive functioning. There might be important moderators of the relationship between anxiety and cognitive functioning including gender, although additional studies are needed.

Perceived Memory Dysfunction

Studies of older adults' perceptions of cognitive dysfunction often focus on memory and on a construct referred to as subjective memory concerns (SMC; Smith, Petersen, Ivnik, Malec, & Tangalos, 1996).[1] SMCs have received extensive study with older adults (e.g., Pearman & Storandt, 2004) and have more recently been investigated in relationship to the development of mild cognitive impairment and dementia (Tsai, Green, Benke, Silliman, & Farrer, 2006). Relationships between SMCs, objective cognitive functioning, and mood symptoms are complex, and findings have been inconsistent (Pearman & Storandt, 2004). Of greatest relevance to the present study, Dux et al. (2008) found that specific negative affect variables moderated the relation between objective memory functioning and SMCs in a cross-sectional study of healthy older adults.[2] Higher scores on some negative affect measures were associated with increased levels of SMCs in the absence of objective memory impairment. Specifically, scores on an AS measure moderated the relation between objective memory functioning and SMCs even after controlling for higher order measures of general negative affect. Participants with lower cognitive functioning scores and higher AS scores reported higher levels of SMCs. The investigators concluded that negative affect, particularly AS, distorts the subjective appraisal of one's own memory even in the absence of objective cognitive impairment.

The Present Study

Several factors have emerged in studies of risk factors for late life anxiety disorders. These factors include general or specific negative affect constructs and some of the unique stressors occurring in late life. Further, cognitive functioning changes appear to be related to anxiety, although prior longitudinal investigations have only evaluated anxiety symptoms as a precipitant to later cognitive decline. The risk model evaluated in this study tested whether cognitive functioning might predict later anxiety symptoms. Further, it was predicted that older adults with higher scores on general or specific negative affect measures might experience cognitive changes related to aging as more distressing and report more SMCs. While the relationships between SMCs, objective cognitive functioning, and emotional functioning are complex, the model tested included SMCs as a mediational process. Although prior studies that evaluated diathesis-stress models found little support for the

[1]Throughout the manuscript we use the term Subjective Memory Concerns (SMCs) to describe older adults' level of concern about their memory functioning and use scoring on the Memory Functioning Questionnaire (MFQ; Gilewski, Zelinski, & Shaie, 1990) to operationalize the construct.

[2]Dux et al. (2008) evaluated a preliminary sample of the participants included in the present study. Dux et al. tested 130 of the Time 1 participants included in the present analyses. Dux et al. evaluated the causes of Subjective Memory Concerns using regression modeling and a cross sectional design.

expected trait characteristic-stress interaction, in the risk model presently tested, the moderator was an important developmental stage stressor, which could prove more useful.

The model tested posited that negative affect characteristics would interact with changes in cognitive functioning associated with aging. Older adults with elevated negative affect and weaker cognitive functioning were predicted to experience age-related cognitive changes as more significant and distressing, leading to excessive concerns about cognitive functioning in the form of SMCs, which would lead to increased anxiety symptoms. General cognitive functioning indicators and memory functioning measures were tested in the moderator-mediator model, as both types of measures were importantly related to SMCs in prior research (Dux et al., 2008). Although the model tested is congruent with general diathesis-stress models, it differs in its prediction that negative affectivity will interact with normative developmental stage changes in cognitive functioning leading to stress reactivity in the form of SMCs. Therefore, older adults with lower cognitive functioning and higher scores on negative affect variables were predicted to experience increasing anxiety symptoms over time and SMCs were predicted to mediate the relationship. To test these relationships, anxiety was examined as a developmental growth process with both the anxiety level at later time points and change in anxiety scores over time treated as outcomes.

Method

Participants

Participants were older adults aged 65 years and over (*M* age = 76.7 years, *SD* = 6.9; *N*= 204 at initial assessment) recruited as part of a larger longitudinal study examining risk factors for anxiety disorders in late-life. Recruitment sites included churches, senior centers, retirement communities, and social organizations for seniors located in the Chicago metropolitan and southeastern Wisconsin areas. As part of the larger longitudinal study, participants completed cognitive functioning assessments, psychiatric disorder symptom measures, and physical functioning and adaptive behavior evaluations.[3] Participants completed evaluations up to four times at approximately six-month intervals.

To be eligible for this study, participants were required to perform within age-appropriate limits (described further in the Cognitive Functioning Assessment description below) on the Mattis Dementia Rating Scale – Second Edition (DRS-2; Jurica, Leitten, & Mattis, 2001) and the Rey Auditory Verbal Learning Test (AVLT; Rey, 1958). Scoring below age-appropriate limits on these measures suggests moderate or more significant cognitive impairment. Of the 204 participants who completed Time 1 (T1) assessment, three participants were excluded from analyses because of low scores on the DRS-2. Demographic characteristics of the sample at each time point are reported in Table 1.

Measures

Anxiety symptoms and negative affect—A clinical interview validated with older adults, the Hamilton Anxiety Rating Scale (Hamilton, 1959), was used to measure anxiety symptoms. To evaluate the role of negative affect in the risk model, older adults completed measures of both broad emotional functioning (e.g., Positive and Negative Affect Scale) and specific affective characteristics posited to play a role in anxiety disorder development (e.g., Anxiety Sensitivity Index; Spielberger State-Trait Anxiety Inventory). These negative affect measures are considered hierarchically related and important to understanding anxiety disorder etiology (Lilienfeld, 1999).

[3]A complete list of the assessment battery is available from the corresponding author upon request.

The Hamilton Anxiety Rating Scale (HARS, Hamilton, 1959)—The HARS is a clinician-rated measure of anxiety symptoms. Interviewers administered this structured interview at each of the four assessment time points. The HARS consists of 14 items designed to assess the somatic or psychological symptoms of anxiety. Interviewers can probe participants' responses for clarification, and each item is rated on a Likert-type scale ranging from 0 (not present) to 4 (very severe). Using an older adult clinical sample, Diefenbach, Stanley, and Beck (2001) found that HARS scores demonstrated good internal consistency (α = .85) and correlated significantly with depression scores on the Geriatric Depression Scale (GDS) and Trait scale scores of the State-Trait Anxiety Inventory. In our sample, HARS scores demonstrated good internal consistency (α = .83).

Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988)—The 20-item PANAS is composed of two mood scales, one measuring positive affect, and the other measuring negative affect. Each item is rated on a 5-point Likert-type scale that ranges from 1 (very slightly or not at all) to 5 (extremely). In the present study, participants were prompted to indicate the way they felt at the present time. With the current older adult sample, internal consistency at Time 1 was high for both the Positive Affect scale (α = .86) and the Negative Affect scale (α = .89).

Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gursky, & McNally, 1986)—The ASI is a 16-item self-report scale designed to assess fears about the negative consequences of experiencing anxiety symptoms. Respondents rate the distress associated with specific anxiety related experience on a five point Likert-type scale from 0 (very little) to 4 (very much). Latent structure evaluations of the ASI most often identify three subscales that reflect fear of the physical sensations of anxiety, fear of mental incapacitation or cognitive dyscontrol (e.g., fear of going "crazy") that might result from intense anxiety, and fear of the public display of anxiety symptoms (Naragon-Gainey, 2010). Although there has been limited evaluation of the ASI with older adults, an evaluation of an older adult sample found the latent structure of the ASI to be generally the same as the latent structure found with general adult samples (Mohlman & Zinbarg, 2000). In the present sample, Time 1 ASI total score demonstrated good internal consistency (α = .88), and evaluation of the four-item ASI mental dyscontrol subscale score (ASIm) revealed acceptable internal consistency (α = .78). The internal consistency levels found with the present older adult sample were congruent with prior studies (Mohlman & Zinbarg, 2000; Vujanovic, Arrindell, Bernstein, Norton, & Zvolensky, 2007). ASI total score and ASIm subscale score were used in analyses in the current study.

Spielberger State-Trait Anxiety Inventory – Trait Scale (STAI-T; Spielberger et al., 1983)—The STAI-T consists of 20 items that assess stable individual differences in anxiety proneness. Respondents are asked to rate the frequency of specific feelings on a 4-point Likert scale ranging from 1 ("almost never") to 4 ("almost always"). The STAI-T is a well-established general anxiety measure that has demonstrated good reliability and validity (Spielberger et al., 1983). Despite the strong psychometric properties of the STAI-T, the scale has been criticized for its lower discriminant validity as evidenced by its high correlation with measures of depression (Beiling, Antony, & Swinson, 1998). Internal consistency in the present sample at Time 1 was high (α = .92).

Obsessive Compulsive Inventory- Revised (OCI-R; Foa et al., 2002)—The OCI-R is an 18-item self-report measure of distress related to obsessive-compulsive symptoms. Respondents are asked to rate the degree to which they have been bothered by obsessive and/or compulsive symptoms within the past month using a 0 (not at all) to 4 (extremely) scale. The measure has six subscales: washing, checking, ordering, obsessing, hoarding, and

neutralizing. Cronbach's alpha for the OCI-R total score was high (α = .90) and scoring, successfully differentiated those with and without OCD (Foa et al., 2002).). Internal consistency in the present sample at Time 1 was high (α = .87).

Physical Health

Medical Outcomes Study-Short Form (SF-36; Ware, Snow, Kosinski, & Gandek, 1993)—The SF-36 is a 36-item self-report questionnaire designed to assess physical, mental, and general health. Three composite measures are calculated: physical health, mental health, and general health. Most studies of the SF-36 subscales find reliability coefficients exceed .80 (McHorney, Ware, Lu, & Sherbourne, 1994; Ware et al., 1993). The physical health composite scale was used in the present study.

Cognitive Functioning Assessment: Cognitive functioning was assessed with the Rey Auditory Verbal Learning Test (AVLT; Rey, 1958) and the Mattis Dementia Rating Scale-2 (DRS-2; Mattis, 1988; Jurica et al., 2001). Alternate forms of the AVLT (Schmidt, 1996) and the DRS-2 (Schmidt, 2004) were administered across the four evaluations. The AVLT consists of a 15-word list that is repeatedly presented across five study-test trials. This measure assesses the ability to learn the word list over repeated trials, to resist interference effects, and to recall the word list after a 20–30 minute delay. Performance indexes from the AVLT have demonstrated good test-retest reliability and construct validity (Woodard, 2006).

The DRS-2 is a brief cognitive screening instrument that assesses multiple aspects of cognitive functioning including attention, initiation and perseveration, construction, conceptualization, and memory. One week test-retest reliability coefficients for the total score and subscale scores in a sample of 30 patients with Alzheimer's disease generally ranged between .83 and .97, although scores for the Attention subscale demonstrated somewhat lower (.67) test-retest reliability (Coblentz, 1973). Internal consistency reliability coefficients for DRS-2 scores have been reported for community dwelling patients with mild or moderate Alzheimer's disease and healthy controls (Vitaliano et al., 1984) and ranged between .75 and .95. Alternate form reliability coefficients ranged between .66 and .82 (Schmidt, Mattis, Adams, & Nestor, 2005). Scores from this measure also have acceptable construct validity (Green, Woodard, & Green, 1995).

Using age and education-corrected Mayo Older American Normative Studies data (Lucas et al., 1998), DRS-2 total scaled scores of 5 or greater (i.e., within 2 *SDs* of the average age and education-corrected level of performance) and AVLT performance within 1.5 *SDs* of the age-appropriate mean (Ivnik et al., 1990) were required for entry into the study. Competence in performing instrumental activities of daily living was also required and was assessed using the Lawton Instrumental Activities of Daily Living Scale (Lawton & Brody, 1969). The DRS-2 has been shown to be sensitive to variations in cognitive functioning, even in healthy older adults (Woodard & Axelrod, 2008; Green et al., 1995; Woodard, Dorsett, Cooper, Hermann, & Sager, 2005; Freidl et al., 2002). Both the DRS-2 and the AVLT were sensitive to longitudinal changes in cognitive functioning in healthy older adults over 18 months (Woodard et al., 2010). The AVLT was selected because it is a rigorous measure of episodic memory functioning and is also sensitive to cognitive impairment and longitudinal cognitive changes that could herald the onset of Alzheimer's disease.

Subjective Memory Concerns: Participants completed the Memory Functioning Questionnaire (MFQ; Gilewski, Zelinski, & Shaie, 1990) as a measure of subjective memory concerns (SMCs). The assessment was specifically designed to evaluate perception of

everyday memory functioning in older adults. The scale has four factors: general frequency of forgetting, seriousness of forgetting, retrospective functioning, and mnemonics usage. Internal consistency for each of the subscales was good, ranging from .83 to .94 (Gilewski et al., 1990). For the current older adult sample at Time 1, internal consistency was α = .92 for the frequency of forgetting subscale, α = .96 for the seriousness of forgetting subscale, α = .90 for the retrospective functioning subscale, and α = .89 for the mnemonics usage subscale. Frequency of forgetting was used to measure SMCs in the current study. Testing the risk model using the seriousness of forgetting subscale produced similar results.

Study Attrition

Attrition in the longitudinal study was significant but congruent with other longitudinal studies with older adults (Chatfield, Brayne, & Matthews, 2005). One hundred and fifty-three participants completed Time 2 (T2) assessments, and 147 scored above the DRS-2 and AVLT cutoffs. At Time 3 (T3), 114 participants were evaluated, and 111 scored above the DRS-2 and AVLT cutoffs; while at Time 4 (T4), 97 participants completed assessments, and 96 scored above the DRS-2 and AVLT cutoffs. Attrition was evaluated by comparing the characteristics of participant who completed all four evaluations to those that did not, and further, by dividing study dropouts into three categories: refusal to participate, loss of contact, and illness or death (Socha, Calamari, & Woodard, 2012). There were no meaningful differences between study completers and dropouts in gender (47% women vs 53%; $\chi^2 = .93$, $df = 1$, $p > .10$), age (76.04 vs 77.44; $t(200) = 1.44$, $p > .10$), or household income ($t(199) = 1.058$, $p > .10$). Participants who completed the study reported an initial HARS score ($M = 8.28$, $SD = 7.22$) that did not differ from dropouts ($M = 9.41$, $SD = 6.66$, $t(200) = 1.15$, $p = .25$).

Using multinomial logistic regression, analyses revealed that higher scores on a self-report measure of physical functioning predicted completion status ($\chi^2 = 19.202$, $df = 3$, $p < .001$). Physical functioning measure scores differentiated individuals dropping out due to illness or death from study completers, $Wald = 12.672$, $df = 1$, $p < .001$. Participants' age and scores on a measure of obsessionality (Obsessive-Compulsive Inventory –Revised; Foa et al., 2002) were marginally related to completion status (age: $\chi^2 = 7.554$, $df = 3$, $p = .056$; obsessionality: $\chi^2 = 7.774$, $df = 3$, $p = .051$). No other significant relationships were found.

Procedure

Individuals indicating their willingness to participate in the study were first mailed self-report measures to complete prior to the first in-person appointment with an assessor. Participants were provided a phone number to call if they had questions about the completion of self-report measures. Participants provided written informed consent prior to acceptance of their self-report measures and initiation of clinical interview evaluations. All assessors were advanced doctoral students in clinical psychology who completed extensive psychological assessment training. Two senior clinical psychologists (the third and fourth authors), experts in the diagnosis of anxiety and mood disorders and the evaluation of older adults, supervised the evaluation of study participants. All assessment results were reviewed with the senior clinicians in a case evaluation conference for verification of results. All study procedures were approved by the Institutional Review Boards at the authors' university, and were additionally reviewed as required by the data collection sites.

Statistical Analyses

The hypothesized relationships in our moderator-mediator model were examined with latent curve modeling (LCM) using MPlus 5.1. LCM employs a structural equation modeling (SEM) framework to test models with latent growth factors (i.e., intercept and slope) reflecting the level of and change in a variable across multiple points in time (Bollen &

Curran, 2006). This approach incorporates both developmental change and within-subject variation. LCM analyses proceeded in two primary stages. The first stage involved testing separate growth curve models reflecting overall patterns of change from Time 1 (T1) to Time 4 (T4; unconditional models) for each of the dependent variables (HARS and MFQ frequency scores [MFQf]). In these models, the intercept factor represented the level at T1, and the slope factor represented change (e.g., increase or decrease) across the four time points. Mean and variance estimates for both the intercept and slope factors were examined to determine the overall pattern of development for each outcome and to estimate within participant variability.

In the second stage, conditional models were examined with baseline negative affect variable scores, baseline DRS-2 scores, and their interaction, to predict HARS growth factors, with MFQ frequency at T2 included as a mediator. Separate models were tested with four different negative affect variables (ASI total score [ASItotal], ASIm subscale score, STAI-T, and PANAS negative affect subscale score [PANAS-N]). To evaluate the relationship between baseline negative affect and future level of anxiety, models were tested with the HARS intercept set at T3 and T4. Thus, the relationship between the predictor and HARS intercept represented the relationship between the predictor and level of anxiety at T3 or T4. The relationship between the predictor and the HARS slope reflected the relationship between negative affect variable score, cognitive functioning, or MfQf scores and the increase or decrease in anxiety measure score across the four time points. Statistical significance of relationships was determined through z-score transformation of raw path coefficients, and standardized coefficients (β) indicated the magnitude of effects. R^2 was examined to determine the percent of variance explained in dependent variables. The moderating effects of negative affect variables on the relationships between cognitive functioning (DRS-2 or AVLT scores) and HARS scores were examined by including an interaction term (multiple of the mean-centered baseline DRS-2 or AVLT scale scores and negative affect variable scores) as a predictor variable. Significant interactions were probed with multiple group analysis in Mplus. The significance of indirect effects (mediated relationships) was tested by calculating bias-corrected bootstrapped confidence intervals (MacKinnon, 2008).

Robust maximum likelihood estimates (MLR), equivalent to the Yuan-Bentler T2* test statistic, were used to adjust for deviations from normality. Full information maximum likelihood (FIML) estimation was used due to the presence of missing data. This method uses all data available for each case and thus avoids biases and loss of power associated with traditional approaches to missing data (Allison, 2003; Schlomer, Bauman, & Card, 2010). For both unconditional and conditional models, multiple indices of overall model fit were evaluated (Barrett, 2007; Bollen & Curran, 2006). The χ^2 test of overall fit reflects the difference between observed relationships in the dataset and estimated relationships based on the specified model. A low χ^2 and non-significance ($p > .05$) are desirable, but χ^2 can be overly sensitive in samples of 200 or more, and a χ^2 to degrees of freedom (*df*) ratio of less than 3 is considered adequate. A comparative fit index (CFI) and Tucker-Lewis index (TLI) of close to .95 or higher indicate good fit (Tabachnick & Fidell, 2007; Hu & Bentler, 1999). Root mean square error of approximation (RMSEA) of less than .05 is considered a close fit and less than .08 adequate, and standardized root-mean-square residual (SRMR) of .08 or less indicates a good fit (Hu & Bentler, 1999).

Results

Missing Data

Several participants failed to complete all or part of one or more measures at various time points. Missing data patterns were as follows: (T1) three participants failed to complete one

or more measure; (T2) MFQ frequency scores were available for 134 participants, and other measures were missing for five participants; (T3) six participants were missing one or more measure score; and (T4) eight participants were missing one or more measure scores. See Table 1 for sample sizes available for each variable at each time point.

Descriptive Information and Bivariate Relationships

Demographic information and descriptive statistics for dependent and independent variables are presented in Table 1. Mean anxiety symptom and negative affect variable scores remained relatively stable over time or evidenced a small decrease. Evaluation of predictor variable intercorrelations at T1 revealed that all negative affect measures were moderately correlated with HARS scores, (r = .56, STAI-T to r = .37, ASIm, all ps < .05). Objective cognitive functioning measures were not correlated with HARS scores (r = .01, DRS-2; to r = .03, AVLT Sum of Trials, all ps> .05). As expected, a negative association was found between the frequency of forgetting subscale score of the MFQ (MFQf) and HARS score, r= −.43, p < .001, as lower scores on the MFQf indicate greater subjective memory concerns. ASItotal score was moderately correlated with STAI-T (r = .43, p < .001) and with the PANAS-N scores (r= .32, p < .001), while STAI-T and PANAS-N were also correlated, r = .63, p < .001. All negative affect measures were negatively correlated with T1 MFQf score (r = −.44, ASItotal score; r = −.44, ASIm score; −.47, STAI-T; −.35, PANAS-N; all ps < .05).

Unconditional Growth Models

Evaluations of the unconditional growth models for HARS and MFQf score dependent variables are presented in Table 2. The variance of HARS and MFQf slope factors were constrained to 0 in analyses to improve model fit due to minimal heterogeneity and a negative estimated variance. The unconditional model for HARS provided a good fit. The HARS intercept indicated a nonclinical level of anxiety at baseline, similar to levels reported for other older adult samples (Diefenbach et al., 2001), with moderate within subjects variability around the anxiety score intercept (estimate/se = 5.24). A negative slope indicted that mean HARS scores decreased over time (M= −0.41, p < 0.05). The model explained 62%% (T1) to 69%% (T2) of variance in anxiety symptoms.

Overall fit for the MFQf unconditional model was good. The mean intercept indicated subjective memory complaints at baseline similar to levels reported previously for older adult community samples (e.g., Gilewski et al., 1990). The negative mean slope for MFQf scores indicated increasing subjective memory complaints as a lower score on the MFQf denotes greater perceived memory problems (Table 2). The model explained 75% (T2) to 82% (T3) of variance in MFQf scores.

Conditional Growth Models with Moderated Mediation

The full moderated mediation model was tested with T1 negative affect and cognitive functioning variables and a static T2 MFQf score as the mediator. Initial model evaluations suggested that analyses with MFQf score as a growth process were underpowered. Results of the evaluations of the full moderated mediation models tested are shown in Table 3. Overall fit of conditional models was good with most indices in the desired range. All four negative affect variables directly predicted HARS intercept at T3 and T4, indicating that greater negative affect scores at baseline predicted a greater level of anxiety symptoms one to one-and-a-half years later. None of the T1 negative affect variable scores directly predicted HARS slope, although HARS score change was minimal in the nonclinical, older adult sample.

Moderation: As shown in Table 3, the STAI-T X DRS-2 and PANAS-N X DRS-2 interactions predicted HARS score at T3 and at T4, and the ASItotal X DRS-2 and STAI-T X DRS-2 predicted HARS slope. To evaluate significant interactions, negative affect variables were treated as the moderator and multiple group analysis was conducted using Mplus. That is, high and low groups were formed based on median moderator variable scores, and the relationship between DRS-2 score and HARS slope and intercept were evaluated separately for high and low negative affect variable score groups to elucidate relationship differences.

Evaluations of STAI-T score as the moderator predicting HARS slope revealed that for the low STAI-T group, as DRS-2 scores increased from low to high, HARS scores increased ($\beta = 1.04$, $p < .001$). For the high STAI-T score group, as DRS-2 scores increased from low to high, HARS scores decreased ($\beta = -1.05$, $p < .001$). Evaluations of the STAI-T moderator in models predicting HARS score intercept at T3 and T4 suggested that for the low STAI-T group there was a small positive relationship between DRS-2 score and later HARS scores (T3, $\beta = .15$; T4, $\beta = .23$). For the high STAI-T score group, DRS-2 score and later HARS scores were unrelated (T3, $\beta = .09$; T4, $\beta = -.01$). A similar pattern of differences was seen in evaluations of PANAS-N score as the moderator, although effect size differences estimated using multiple group analyses were smaller: low group, T3, $\beta = .08$; T4, $\beta = .07$; high group, T3, $\beta = .03$; T4, $\beta = -.03$. Evaluation of the models that included ASI total score as the moderator predicting HARS slope indicated that for the low ASI total score group, as DRS-2 score increased there was a small increase in HARS over time ($\beta = .28$), while for the high ASI total score group, as cognitive functioning score increased HARS score decreased ($\beta = -.85$).

In summary, when negative affect variable scores were low, higher cognitive functioning was associated with a small to moderate increase in later anxiety symptoms, in particular for the lower order negative affect variables STAI-T and ASI total. When negative affect variable score was high, higher cognitive functioning was associated with less anxiety symptoms or there was no relationship between cognitive functioning and later anxiety symptoms.

Mediation: As shown in Table 3, all of the negative affect variables (T1) predicted subjective memory complaints at T2 (MFQf score) with higher negative affect variable scores associated with greater levels of subjective memory complaints (lower MFQf score indicating more complaints). In evaluations of the full moderated mediation models, T2 MFQf score predicted T3 HARS score in the models tested using ASIM, ASItotal and PANAS-N. T2 MFQf predicted T4 HARS score only in the ASItotal model. Contrary to predictions, none of the negative affect variable X DRS-2 score interactions were associated with T2 MFQf score.

Indirect effects were tested using bias-corrected 95% confidence intervals generated in separate bootstrapped analyses of models (Preacher, Zhang, & Zyphur, 2011; Preacher Zyphur, & Zhang, 2010). A significant indirect effect predicting HARS score at T3 through the T2 MFQf mediator was found in evaluations of all the negative affect variable models except the model that included STAI-T. In each case, higher negative affect variable scores predicted higher scores on the MFQf mediator, and the MFQf score was associated with higher HARS scores at T3 (Table 3). This pattern of relationships was the same for the mediational model that included ASItotal score predicting T4 HARS.

Model Evaluation with the Rey Auditory Verbal Learning Test

We tested our moderator-mediator model substituting Rey Auditory Verbal Learning Test (AVLT) Sum of Trials 1–5 score or the Delayed Recall Scale score for the DRS-2 total raw score. As was seen in the evaluations of models with the DRS-2 score, overall fit of conditional models was good with most fit indices again in the desired range. For example, for the model that included ASItotal score and the Sum of Trials score, model fit was as follows: $\chi^2 = 19.59$, $df = 17$, $p = .30$; CFI = 0.989; TLI = 0.984; RMSEA = 0.03; SRMR = 0.04. For the model including ASItotal and the Delayed Recall scores, fit was similar: $\chi^2 = 19.49$, $df = 17$, $p = .30$; CFI = 0.990; TLI = 0.985; RMSEA = 0.03; SRMR = 0.04.[5] Again in these models, all four negative affect variables directly predicted HARS intercept at T3 and T4 indicating that greater negative affect scores at baseline predicted a greater level of anxiety symptoms later.

Evaluations of the cognitive functioning by negative affect variable interaction resulted in only one significant finding. The STAI-T X Delayed Recall interaction predicted HARS slope ($\beta = -0.98$, $p < .001$). Again, to evaluate significant interactions, we conducted multiple group analysis using Mplus. For the low STAI-T group, as AVLT Delayed Recall scores increased indicating better recall, HARS scores increased ($\beta = 1.03$). For the high STAI-T group, as AVLT Delayed Recall scores increased HARS scores decreased ($\beta = -1.01$). These results were very similar to the findings with DRS-2 total raw score as the cognitive functioning measures.

Discussion

The investigation longitudinally tested a moderator-mediator risk model for late-life anxiety. In our sample of older adults, initial symptoms of anxiety varied considerably at baseline and on average tended to decrease over time. Based on prior studies, it was predicted that higher-order negative affect personality traits or specific lower-order traits would predict the future anxiety symptoms of older adults. Congruent with predictions, the initial scores on all negative affect variables evaluated in the study reliably predicted anxiety symptoms 18-months later. Anxiety symptoms were measured by the HARS, a well-validated clinical interview assessment. Higher levels of all negative affect measures at baseline predicted greater anxiety symptoms at the 1-year and the 18-month evaluations. These relationships were particularly robust for the STAI-T, which taps a stable individual difference characteristic reflecting anxiety proneness in response to stress experiences (Spielberger et al., 1983).

This study adds to the limited literature on risk processes for the development of late-life anxiety symptoms by including an important late-life developmental stage concern, SMCs, as a mediational process in the risk models evaluated. When SMC scores were tested as a mediator, a statistically significant indirect effect between ASI total, ASIm, and PANAS-N scores and anxiety symptoms one year later was found, although effect sizes were modest. A direct relationship between SMCs and later anxiety symptoms was also identified. These findings suggest that a specific developmental stage form of distress (e.g., worries about memory loss or cognitive impairment broadly) could play an important role in late-life anxiety.

The risk model also emphasized a specific interaction effect that was posited to play an important role in the development of late-life anxiety. Negative affect characteristics were predicted to interact with cognitive functioning change, even changes well within the range

[5]The complete results of risk model evaluations using the AVLT are available from the corresponding author.

expected for normal aging. Individuals with elevated negative affect trait scores and weaker cognitive functioning were predicted to be at greater risk to perceive their memory functioning as impaired and experience related distress. In turn, increased perceptions of memory dysfunction were predicted to result in higher scores on the anxiety symptom measure. Support was found for this mediational process in models that included anxiety sensitivity, trait anxiety, and general negative affectivity (PANAS-N scores). In evaluations of models that included trait anxiety and anxiety sensitivity, when participants scored higher on these negative affect measures, higher cognitive functioning was associated with lower anxiety symptom measure scores. Possibly better cognitive functioning protected these participants from the anxiety symptom development more generally associated with elevated scores on these negative affect characteristics. Stillman, Rowe, Arndt, and Moser (2012) also found that cognitive functioning and anxiety symptoms were inversely related. Possibly better cognitive functioning might exert a positive effect on coping skills by allowing individuals to curtail negative appraisal tendencies. Congruent with this idea, Mohlman (2008) found that older adults who received cognitive-behavioral therapy (CBT) plus an executive skills training intervention experienced better anxiety symptom reduction than older adults receiving CBT alone.

Contrary to predictions, the negative affect by objective cognitive functioning interaction, when found, was unrelated to the mediator tested in this study, a measure of SMCs that has been extensively studied with older adults. Thus, support was not found for the full moderation-mediation model we tested. Several aspects of the study design and analytic strategy might have worked against identifying these relationships. To obtain meaningful scores on many of the study measures, it was necessary to restrict the range of study participants' cognitive functioning by excluding individuals with significant cognitive deficits at baseline assessment. Further, although the model posits relationships between cognitive functioning change and related increases over time in memory concerns, sample size and related statistical power problems substantially limited the number of change processes we could effectively model. Thus, only an approximation of the risk model using static time point cognitive functioning and SMC scores could be tested.

There have been attempts to prevent development of late-life anxiety disorders using stepped care interventions with older adults with subclinical anxiety or depression symptoms (van't Veer-Tazelaar et al., 2011; van't Veer-Tazelaaret al., 2010). van't Veer-Tazelaar et al. (2011) randomly assignedolder adults with subclinical anxiety or depression symptoms to care as usual or to a stepped-care intervention involving briefcognitive -behavior therapy related bibliotherapy, brief cognitive-behavioral treatments, or problem -solving skills training. The preventative intervention reduced later incidents of late life anxiety disorders or depression by approximately half. While limited information can be garnered from the investigations on the effective mechanisms of successful prevention interventions, findings suggest that very limited treatment could promote important changes in older adults' behavior or cognition.

While the current study was not a prevention study, aspects of the risk model tested could prove useful for prevention. Our approach to identifying older adults at risk differed from van't Veer-Tazelaar et al. (2011). Whereas van't Veer-Tazelaar et al. (2011) used subclinical symptoms to identify at-risk older adults, our risk model focused on trait negative affect characteristics as diathases for anxiety symptoms. The results of the present study suggest that general or more specific negative affect characteristics might represent important risk processes. Elevated negative affect characteristics likely promote the misappraisals of aging related stressful life experiences (e.g., misinterpreting increased forgetfulness as looming Alzheimer's disease). These negative affective characteristics appear modifiable using contemporary cognitive therapies(Parrish et al., 2009). Negative affect scores could function

as early indicators of older adults who are at risk for increasing anxiety symptoms or disorder development. Interventions based on assessment of the level of negative affect could be initiated to prevent the development of even subclinical anxiety symptoms. Additionally, the results of the current study suggest that subjective concerns about cognitive functioning might be importantly related to late-life anxiety symptoms. Such concerns could be ameliorated through psycho-educational approaches as well as by using cognitive therapies. Some older adults might benefit from information on normative age related memory or cognitive functioning, which could prevent excessive worries about the predictable and expected changes in these domains.

In addition to the limited ability to fully test our risk model with the present older adult sample, the study has several other limitations. The participant sample was relatively small even at initial assessment, and study attrition over the 18 months of the investigation was approximately half of the sample. Further, although significant efforts were made to recruit a diverse older adult sample, we had limited success. Study participants were predominantly Caucasian, and our sample was better educated and more affluent than nationally representative samples of the current cohort of older adults. Older adults' level of education and income are positively correlated, and both factors appear related to health problem development in general (Murrell & Meeks, 2002) as well as to cognitive decline specifically (Long, Ickovics, Gill, & Horwitz, 2001). It is unclear if results would have been different with a more representative older adult sample. Attempts to replicate and extend testing of this and other risk models for late life anxiety difficulties are needed with larger samples that are more diverse and who are followed over a longer time period. Although the costs associated with such studies are substantial, the public health impact of late life anxiety disorders warrants such investments.

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Highlights

- Older adults commonly experience anxiety disorders, yet little is known about risk factors.
- A risk model for the development of late-life anxiety disorders was tested.
- A latent growth curve model that included negative affect, cognitive functioning, their interaction, and subjective memory concerns fit the data acceptably.
- When participants anxiety fears were high, stronger cognitive functioning predicted less anxiety symptoms.
- Implications for predicting and preventing late-life anxiety disorders are discussed.

Table 1

Sample Characteristics and Descriptive Statistics for Dependent and Independent Variables

	Time 1		Time 2		Time 3		Time 4	
	N	*M (SD)*	*N*	*M (SD)*	*N*	*M (SD)*	*N*	*M (SD)*
Demographic Variables								
Age	202	76.75 (6.90)	152	77.59 (6.80)	114	77.94 (6.62)	99	77.72 (6.58)
Percent female	202	73%	152	72%	114	73%	99	70%
Estimated	201	$114,160					99	$105,631
Household income[a]		(112,599)						(105,402)
Dependent Variable								
HARS	202	8.86 (6.95)	152	8.86 (6.95)	114	7.92 (6.68)	99	7.28 (7.28)
Predictor Variables								
ASIm	200	2.14 (2.59)	151	1.93 (2.34)	112	1.74 (2.57)	98	1.74 (2.20)
ASItotal	200	16.93 (9.88)	151	16.05 (10.57)	113	15.96 (10.73)	98	15.33 (8.75)
STAI-T	199	33.76 (10.30)	148	33.11 (9.73)	108	30.65 (7.97)	97	33.22 (9.88)
PANAS-N	201	15.10 (5.88)	107	15.36 (6.27)	110	14.54 (5.78)	99	15.47 (6.14)
PANAS-P	200	31.47 (8.47)	106	31.33 (7.99)	110	32.84 (7.24)	98	31.90 (7.42)
DRS	199	137.94 (5.46)	151	137.67 (5.21)	113	139.10 (4.94)	96	138.06 (4.85)
MFQf	193	164.86 (29.93)	139	164.05 (28.56)	105	163.55 (26.60)	90	160.57 (28.04)

Note. HARS = Hamilton Anxiety Rating Scale; ASIm = Fear of Mental Dyscontrol subscale of the Anxiety Sensitivity Index; ASItotal = Anxiety Sensitivity Index total score; STAI-T = Spielberger State-Trait Anxiety Inventory – Trait Scale score; PANAS-N = Negative Affect Scale score of the Positive and Negative Affect Schedule; DRS-2 = Mattis Dementia Rating Scale 2 total raw score; MFQf = the Memory Functioning Questionnaire general frequency of forgetting subscale score.

[a]Income level was estimated using average tax return data reported by the Internal Revenue Service for zip codes.

Table 2

Unconditional Growth Curve Models

Outcome Variable	Fit Statistics	Intercept Factor		Slope Factor[a]
		Mean	Var (SE)	Mean
HARS	χ^2 = 2.40, *df* = 7, *p* > .10 CFI = 1.000 TLI = 1.04 RMSEA = 0.00 (90% C. I. 0.00 – 0.02) SRMR = 0.03	8.20***	33.50*** (5.82)	−0.41*
MFQf	χ^2 = 3.92, *df* = 7, *p* >.10 CFI = 1.000 TLI = 1.02 RMSEA = 0.00 (90% C. I. 0.00 – 0.06) SRMR = 0.11	165.15***	636.01*** (78.40)	−1.60**

NOTE. χ^2 = chi-square statistic reflecting overall model fit (*p* > .05 indicates a good fit); CFI = Comparative Fit Index (≥ .90 indicates a good fit); TFI = Tucker-Lewis Index (≥ .90 indicates a good fit); RMSEA = Root Mean Square Error of Approximation (≤ .05 is considered a very close fit; .05 – .10 is considered a moderate fit); SRMR = Standardized Root-Mean-Square Residual (used for continuous outcomes, ≤ .08 is considered a good fit). β = fully standardized coefficient. Statistical significance is based on z-score transformations of raw estimates. HARS = Hamilton Anxiety Rating Scale; MFQf = the Memory Functioning Questionnaire general frequency of forgetting subscale.

[a]The HARS and MFQf slopes were constrained to 0 in analyses.

*$p \leq .05$

**$p \leq .01$

***$p \leq .001$

Table 3

Conditional Mediator-Moderator Growth Models

Model Parameter	ASIm β	ASItotal B	STAI-T β	PANAS-N β
IV predicts HARS intercept (set at T3)	0.36***	0.27**	0.63***	0.43***
IV predicts HARS intercept (set at T4)	0.30**	0.22*	0.61***	0.43**
IV X DRS-2 predicts HARS Intercept (T3)	0.12	−0.10	−0.19*	−0.22*
IV X DRS-2 predicts HARS intercept (T4)	0.05	−0.15	−0.25*	−0.26*
IV predicts HARS slope	−0.23	−0.20	0.08	0.14
IV X DRS-2 predicts HARS slope	−0.32	−0.34*	−0.42*	−0.25
IV predicts MFQfrq	−0.31**	−0.25**	−0.42***	−0.34***
IV X DRS-2 predicts MFQfrq	−0.12	−0.01	0.09	0.10
MFQfrq predicts HARS intercept (T3)	−0.29*	−0.33*	−0.17	−0.28*
MFQfrq predicts HARS intercept (T4)	−0.27	−0.31*	−0.14	−0.24
MFQfrq predicts HARS slope	0.05	0.04	0.07	0.13
Unexplained HARS intercept (T3) variance	0.76***	0.78***	0.51***	0.68***
Indirect Effects				
IV indirect effect to HARS intercept (T3)[a]	0.09*	0.08*	0.07	0.10*
IV indirect effect to HARS intercept (T4)[a]	0.08	0.08*	0.06	0.08
IV indirect effect to HARS slope[f]	−0.01	−0.01	−0.03	−0.05
Fit Statistics				
Chi-Square	16.99	20.26	11.07	20.10
CFI	0.98	0.96	1.00	0.96
TLI	0.95	0.92	1.00	0.93
RMSEA	0.05	0.06	0.00	0.06
SRMR	0.04	0.04	0.03	0.04

NOTE. HARS = Hamilton Anxiety Rating Scale; ASImental =Fear of Mental Dyscontrol subscale of the Anxiety Sensitivity Index; ASItotal = Anxiety Sensitivity Index total score; STAI-T = Spielberger State-Trait Anxiety Inventory – Trait Scale; PANAS-N = Negative Affect Scale of the Positive and Negative Affect Schedule; DRS-2= Mattis Dementia Rating Scale total raw score; MFQ frequency = the Memory Functioning Questionnaire general frequency of forgetting subscale. χ^2 = chi-square statistic reflecting overall model fit (p > .05 indicates a good fit); CFI = Comparative Fit Index (≥ .90 indicates a good fit); TFI = Tucker-Lewis Index (≥ .90 indicates a good fit); RMSEA = Root Mean Square Error of Approximation (≤ .05 is considered a very close fit; .05 – .10 is considered a moderate fit); SRMR = Standardized Root-Mean-Square Residual (used for continuous outcomes, ≤ .08 is considered a good fit). β = fully standardized coefficient. Statistical significance is based on z-score transformations of raw estimates. Estimates reported are standardized coefficients, and statistical significance (p) is based on z-score transformations of raw estimates.

*p ≤ .05

**p ≤ .01

***p ≤ .001

[a]Significance of the indirect effect was determined by examining bootstrapped bias corrected 95% confidence intervals.