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How subjective and objective memory, family history, and knowledge of Alzheimer's disease influence older adults' fear of developing Alzheimer's disease

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HOW SUBJECTIVE AND OBJECTIVE MEMORY, FAMILY HISTORY, AND
KNOWLEDGE OF ALZHEIMER'S DISEASE INFLUENCE
OLDER ADULTS' FEAR OF DEVELOPING
ALZHEIMER'S DISEASE

by

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Bachelor of Science
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2001

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A dissertation submitted in partial fulfillment
of the requirements for the

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Department of Psychology
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Samantha Lyn French

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**How Subjective and Objective Memory, Family History, and Knowledge of
Alzheimer's Disease Influence Older Adult's Fear of Developing
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Doctor of Philosophy in Psychology

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ABSTRACT

How Subjective and Objective Memory, Family History, and Knowledge of Alzheimer's Disease Influence Older Adults' Fear of Developing Alzheimer's Disease

by

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It is projected that by the year 2050, the number of Americans with Alzheimer's disease (AD) will rise to approximately 13.2 million. And, because AD is on the rise, apprehension about developing the degenerative disease (anticipatory dementia or fear of developing AD) has become a topic of study in the past few years. However, most studies focusing on anticipatory dementia have used a sample of individuals younger than age 65 and have used a single item questionnaire to explore their apprehension. The current study utilized 50 adults ages 65 and older to examine anticipatory dementia and its relationship with subjective and objective memory, family history, and knowledge of AD. Fear of developing AD was assessed using a new 30-item, psychometrically sound instrument titled the Fear of Alzheimer's Disease Scale (FADS). Results of the study revealed that: (1) in-line with existing research, subjective memory complaints was positively associated with fear of developing AD, (2) family history, knowledge of AD, and objective memory were not significantly correlated with fear of developing AD, (3) subjective memory was the only significant predictor of fear of developing AD; neither

family history, knowledge of AD, nor objective memory predicted fear of developing the disease, (4) knowledge of AD was not associated with anxiety, (5) there was no significant relationship between subjective and objective memory, and (6) the relationship between subjective memory and fear of developing AD was still significant after controlling for participants' negative mood.

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to laugh even when laughing seems unbearable. Mike, I can't wait to spend my life with you.

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I have truly been blessed.

CHAPTER 1

INTRODUCTION

“It’s not me currently with Alzheimer’s disease. But any time I misuse a word, forget a name I have and should have known, momentarily lose the car in a parking lot, I scare the bergeebers out of me! I fear becoming a victim of Alzheimer’s disease,..” (as cited in Cutler & Hodgson, 2001).

The Bureau of the Census (2005) reports that there are approximately 35.9 million people 65 years and older currently living in the United States. It is projected that in twenty-five years the number of elderly will reach 72 million. Additionally, there are 4.5 million Americans with Alzheimer’s disease. This number is expected to dramatically increase to 13.2 million by the year 2050 (Hebert, Scherr, Bienias, Bennett, & Evans, 2003).

Alzheimer’s disease (AD) is a degenerative disease affecting predominantly individuals over the age of 60 and in rare cases, individuals as young as 30 (Small et al., 1997). The onset of AD is gradual, but the progression is continuous. Early symptoms of AD are often overlooked, being attributed to normal aging. “Senility,” and/or normal aging are not as severe or as progressive as AD, however. Symptoms of AD include memory impairment, which is typically one of the earliest symptoms, aphasia, apraxia, agnosia, and executive functioning impairment (APA, 2000).

Currently there is no test that can diagnose AD; diagnosis can only be confirmed postmortem through autopsy. However, when Alzheimer’s disease is suspected, several tests can be conducted to increase the likelihood of an accurate diagnosis. These tests

may include, but are not limited to, computed tomography (CT), magnetic resonance imaging (MRI), blood tests, lumbar puncture, neuropsychological evaluation, office-based clinical assessment, and an informant interview (APA, 2000; Small et al., 1997). If a diagnosis of AD is made, there are several pharmacotherapy options that can help slow the progression of the disease. Presently there is no cure for AD. It is, however, extremely important to detect AD early and accurately so that medication can be taken while symptoms are still mild, costs associated with AD can be reduced, and families can prepare for the challenges that may lay ahead (Small et al., 1997).

Alzheimer's disease is becoming an increasing health concern due to the recent rise in the number of dementia cases. And, the fact that genetics can play a large role in the development of AD and other dementias, especially in individuals having family members diagnosed with early-onset AD (Heston, 1991; Swearer, O'Donnell, Parker, Kane, & Drachman, 2001), there may be cause for more concern among those with a family history of the disease. For these and many other reasons, apprehension about developing the degenerative disease has become a topic of studies in the past few years. There have been relatively few studies, however, looking at the relationship between fear of developing AD and other variables, namely subjective memory, objective memory, family history of Alzheimer's and other dementias, and knowledge of Alzheimer's disease.

For some people, experiencing a memory problem may evoke thoughts of developing AD or another type of dementia. Thoughts for this group of people are usually only fleeting. They generally do not take the idea very seriously nor do they allow it to cause much distress. However, for other people, experiencing episodes of forgetfulness can

lead to significant distress and worry about developing AD (Ponds, Commissaris, & Jolles, 1997). In 1996, Cutler and Hodgson described a phenomenon termed “anticipatory dementia,” that explains these latter individuals. Anticipatory dementia is the basic fear that normal memory problems associated with aging are an indication of dementia. One study revealed that approximately 92% of individuals with a parental history of AD experienced anticipatory dementia (Cutler & Hodgson, 2001).

Anticipatory dementia is a relatively new concept and there is much to learn about it. For this reason, we have generated several hypotheses related to fear of developing AD that are based upon results and limitations of prior studies.

1. Subjective memory complaints, family history of AD, and knowledge of AD will be positively correlated with fear of developing AD. Objective memory will not be correlated with fear of developing AD.
2. Subjective memory complaints, family history, and knowledge of AD will significantly predict fear of developing AD. Subjective memory complaints will emerge as the best predictor of fear of developing AD followed by family history and knowledge of AD. Family history of AD and knowledge of AD will emerge as predictors which offer unique contributions to predicting fear of developing AD above and beyond subjective memory. Objective memory will not significantly predict fear of developing AD.
3. Knowledge of AD will be positively correlated with levels of anxiety.
4. There will be no significant relationship between subjective memory complaints and objective memory.

5. The relationship between subjective memory complaints and fear of developing AD will be significant even after controlling for negative mood.

CHAPTER 2

LITERATURE REVIEW

Fear of Developing Alzheimer's Disease

The onset of symptoms consistent with certain diseases is disconcerting for many individuals. While some studies have addressed concern about developing specific diseases with genetic underpinnings like Huntington's disease (Hunt & Walker, 1991) and hypertrophic cardiomyopathy (Siebert, 1995), relatively few studies have looked at the fear associated with developing AD.

The first study evaluating older adults' fear of developing AD was performed in 1986 (Price, Price, Shanahan, & Desmond, 1986). Researchers found that 84% of participants described their perceptions of developing AD using words such as "concerned" (24%), "frightened" (22%), "scared stiff" (20%), and "worried" (19%). Researchers noted that at least one participant made the following comment: "I would rather have cancer than Alzheimer's" (Price et al., 1986, p. 420).

Researchers in the Netherlands also found that individuals were afraid of developing AD. While conducting informational meetings about the differences between normal forgetfulness and dementia, Commissaris and colleagues found that 46% of individuals reported attending the informational meetings because they were worried about their memory and incipient dementia (Commissaris, Verhey, Jr., Ponds, Jolles, & Kok, 1994).

Although the previous studies were influential in introducing the new research area of fear of developing AD, it wasn't until Cutler and Hodgson's studies were published that research on the topic became recognized. In 1996, Cutler and Hodgson coined the term, "anticipatory dementia," to refer to the concern individuals have about age-associated memory impairments being indicative of AD. Since 1996, Hodgson and Cutler have published five articles that look at the relationship between anticipatory dementia and other variables (Cutler & Hodgson, 1996; Cutler & Hodgson, 2001; Hodgson & Cutler, 1997; Hodgson & Cutler, 2003; Hodgson, Cutler, & Livingston, 1999).

Cutler and Hodgson (1996) hypothesized that memory problems, once associated with normal aging, now cause fear, and are being seen as early symptoms of AD or other dementias. Their hypothesis was accurate. Using a single question (i.e., "I'd like to ask how concerned you are about personally developing Alzheimer's disease. Would you say you are very concerned, somewhat concerned, not very concerned, or not at all concerned about developing Alzheimer's?"), to measure anticipatory dementia, they found that 10% of participants were "very concerned," 44% were "somewhat concerned," 32% were "not very concerned," and 14% were "not at all concerned."

After determining that anticipatory dementia was, in fact, a valid fear for adults, Hodgson and Cutler (1997) explored the construct further by examining its relationship with well-being, as measured by life satisfaction, depression, psychiatric symptomatology, and self-reported health status. Researchers found that, for participants with a family history of AD, life satisfaction was significantly related to anticipatory dementia. In the control group (i.e., no family history of AD), a significant relationship was found between anticipatory dementia and both psychiatric symptomatology and self-

reported health. Hodgson and Cutler (1997) concluded that individuals experiencing anticipatory dementia may perceive their lives more negatively than those who do not fear developing AD.

To further explore fear of developing AD, Hodgson et al. (1999) examined anticipatory dementia in both individuals with a family history of AD and those without a family history. Using their single-item question, they found that individuals with a family history of AD exhibited high levels of symptom-seeking behavior in addition to reporting anxiety about developing the disease: 67% reported being “very” or “somewhat” concerned while only 40% of controls reported being “very” or “somewhat” concerned. Additionally, controls were unlikely to report symptom-seeking behavior. Based upon the results, the researchers suggested that individuals having parents with AD search for AD symptoms as a result of experiencing anticipatory dementia.

In 2001, Cutler and Hodgson, conducted a follow-up study to their 1996 study and found similar results. Ninety-two percent of participants who had a parent with AD reported being either “very” or “somewhat” concerned about developing AD. In the matched control group, only 47% of the participants expressed the same concern.

In their last study, to date, Hodgson and Cutler (2003) examined symptom-seeking behavior in both individuals with a family history of AD and in those without a family history. Results were similar to those found in their 1999 study: a significant relationship existed between symptom-seeking behavior and anticipatory dementia.

The research conducted by Cutler, Hodgson, and colleagues (Cutler & Hodgson, 1996; Cutler & Hodgson, 2001; Hodgson & Cutler, 1997; Hodgson & Cutler, 2003; Hodgson et al., 1999) expanded the modest literature on anticipatory dementia. Although

influential, the research was not flawless. All of their research utilized individuals between the ages of 40 and 60. Although this is an important age group to assess, these individuals are not in the typical age range for the development of AD. One would conjecture that fear of AD would increase as the age of onset approaches. Therefore, assessing individuals after the typical age of onset (i.e., 65 years and older), may reveal distinct fear.

Cutler, Hodgson, and colleagues' other major flaw resided in their methodology. In assessing anticipatory dementia, all of their studies utilized a single-item question: "I'd like to ask you how concerned you are about personally developing Alzheimer's disease. Would you say you are very concerned, somewhat concerned, not very concerned, or not at all concerned about developing Alzheimer's?" A single-item questionnaire threatens reliability and validity. A multiple-item questionnaire would not only reduce these threats, but would both better describe and better predict individuals' fear of developing AD.

During the time that Cutler, Hodgson, and colleagues were conducting various studies, other researchers began investigating the new field of anticipatory dementia as well. Reese, Cherry, and Norris (1999) addressed "memory fears" in older-adults. To measure "memory fears," eight questions were asked pertaining to "apprehensions that one has about the ways that memory loss can affect one's well-being and quality of life" (Reese et al., 1999, p. 233). The most frequent apprehension reported was the fear of losing one's independence. Participants also reported fear that they would inaccurately represent their memories. The third most frequent response was fear of developing dementia.

Roberts and Connell (2000) conducted a study that looked at attitudes, beliefs, and experiences regarding AD. Their research revealed that 74.3% of participants thought they would develop AD within their lifetime. Over half of the participants (52.2%) expressed concern over developing AD. And, 34.5% reported being more concerned about developing AD than another health problem.

To add to the anticipatory dementia literature, Werner (2002) conducted a study that looked at individuals without a family history of AD and their concerns about developing the disease. Twelve percent of participants reported no concern while 46% reported being very concerned about developing AD.

Laforce and McLean (2005) studied fear and knowledge of AD among young and older adults. Their sample consisted of 127 young adults ages 18-30 years and 119 older adults ages 55 to 90 years. To measure fear and knowledge of AD, a 40-item questionnaire designed specifically for the study was administered to participants. Of the 40 questions, only one question was devoted to measuring fear of AD: "How afraid are you of developing Alzheimer's Disease?" Participants rated their fear on a 5-point Likert scale ranging from "not at all" to "very afraid." Younger participants' fear of developing AD was significantly higher than that of the older adults.

To address the paucity of questions used to measure fear of AD, French (2005) created a scale, titled the Fear of Alzheimer's Disease Scale (FADS), to assess older adults' fear of developing AD. The FADS is a 30-item self-report measure used to assess anticipatory dementia across three different dimensions: older adults' basic and metamemory based fear of developing AD (General Fear), physical symptoms that older adults experience due to fear of developing AD (Physical Symptoms), and older adults'

catastrophic thinking associated with fear of developing AD (Catastrophic Attitude). Participants indicate their level of agreement with the statement using a 5-item Likert-type scale ranging from “never,” to “always.”

Researchers administered the FADS to 101 older adults ages 65-91. Results of the study illustrated that the FADS is a reliable and valid instrument in the evaluation of fear of developing AD among older adults. It is the first scale with good psychometric properties available to directly address fear of developing AD (French, 2005).

In addition to determining the psychometric properties of the FADS, French (2005) also found that both family history and subjective memory were significant predictors of fear of developing AD while objective memory was not a significant predictor. The research confirmed prior findings; older adults are afraid of developing AD. However, by using a 30-item questionnaire researchers were able to determine what specifically older adults were afraid of (e.g., losing their independence, not recognizing family members) rather than simply determining that the fear, in fact, exists.

In summary, previous research has found that individuals are afraid of developing Alzheimer’s disease. Only one study to date, however, has assessed this fear among older adults utilizing a multiple-item questionnaire (French, 2005). In this study, the researchers demonstrated that a multiple-item questionnaire may both better describe and better predict individuals’ fear of developing AD compared with a single-item question about such fear. The current study hopes to address older adults’ fear of developing AD and the relationship between this fear and subjective memory, family history of AD, knowledge of AD, and objective memory.

Relationship between Fear of Developing AD and Subjective Memory Complaints

Subjective memory, or metamemory as it is also commonly known, has been researched extensively, especially in the elderly population. It is “the knowledge one possesses about the functioning, development, use, and capacities of the human memory system in general, and one’s own memory in particular” (as cited in Dixon & Hultsch, 1983, p. 689).

Subjective memory complaints are common among the elderly, and refer to the awareness an individual has about his/her own memory decline. Many researchers have examined subjective memory complaints in an attempt to determine if complaints indicate the beginning of Alzheimer’s disease or other forms of dementia. To examine subjective memory complaints, a variety of questionnaires have been used. Some researchers use a single-item question, while others employ lengthy measures. Whereas many studies have looked at the relationship between subjective memory complaints and objective memory, only five studies to date have looked at the relationship between subjective memory complaints and fear of developing AD.

Cutler and Hodgson (1996) looked at the relationship between anticipatory dementia and subjective memory. To measure subjective memory, they used the Short Inventory of Memory Experiences (SIME; Herrmann, 1984), which consists of 24 items pertaining to experiences with memory. Additionally, they used six questions developed specifically for the study to measure subjective memory: four were closed-ended items and the other two were open-ended questions. The composite score from the six questions resulted in the Memory Assessment Index (MAI; Cutler & Hodson, 1996). The researchers found that subjective memory and anticipatory dementia were related.

Specifically, negative assessments of one's memory were related to greater concern about developing AD. Contrary to one of their hypotheses, Cutler and Hodgson did not find a difference between participants with family history and participants without family history with regard to the relationship between subjective memory and fear of developing AD. They did, however, discover that participants having a parent with AD were more fearful about developing AD than participants having no family members with either AD or another dementia.

Similar to their 1996 study, Cutler and Hodgson (2001) used the SIME and several ratings of memory functioning to assess subjective memory. They found that subjective memory complaints played a large role in fearing the development of AD in both participants with a family history of AD and in participants without a family history of AD. Furthermore, participants whose parents developed AD expressed far more concern over developing the disease than individuals without a family history of AD.

In addition to researching symptom-seeking behavior, Hodgson and Cutler (2003) looked at the relationship between subjective memory and anticipatory dementia. To measure subjective memory, they used the SIME and several questions pertaining to memory functioning. The researchers found that subjective memory and anticipatory dementia were significantly related.

Werner (2002) also examined the relationship between subjective memory and fear of developing AD. To assess subjective memory, she asked three questions about whether the individual had problems remembering things, names of relatives, and/or times and places. The questions were rated on a 4-point Likert-type scale ranging from "not at all" to "very frequently". A composite score was determined from the three questions.

Results revealed that the most significant predictor of anticipatory dementia was worrying about their memory problems. This finding was consistent with Cutler and Hodgson's studies (1996 & 2001).

To add to the scant literature, French (2005) looked at the relationship between fear of developing AD and subjective memory. Researchers utilized the 30-item Fear of Alzheimer's Disease Scale (FADS; French, 2005) to assess older adults' fear of developing AD, and the 64-item Memory Functioning Questionnaire (MFQ; Gilewski & Zelinski, 1986) to examine subjective memory. Like Werner (2002), they found that subjective memory was a significant predictor of fear of developing AD.

All studies, to date, have found a significant relationship between subjective memory and fear of developing AD. Two of these studies used a more powerful statistical analysis (i.e., multiple regression) to show that, not only does a significant relationship exist between subjective memory and fear of developing AD, but that subjective memory significantly predicts this fear; individuals who believe their memory is poor are more likely to fear developing AD than individuals who believe their memory is normal or above average. Based upon results from the literature, the current study is hypothesizing that subjective memory complaints will significantly predict fear of developing AD.

The current study is using an elderly population to look at fear of developing AD. The majority of studies examining anticipatory dementia looked at middle-age individuals. And, while they found significant results, it seems logical that, because the likelihood of developing AD dramatically increases after the age of 65 (Farrer, O'Sullivan, Cupples, Growdon, & Myers, 1989), elderly individuals would be even more

fearful of developing AD than middle-aged individuals based purely upon the probability of them developing the disease.

Relationship between Fear of Developing AD and Family History of AD

“Whenever I asked about the cause [of AD], I tried to look nonchalant, because by this point, every time I lost my keys or forgot someone’s first name, I thought that the disease was in the blood” (as cited in Hodgson et al., 1999).

AD was thought to have a genetic component as early as 1929 (as cited in Farrer, 1997). Since then, hundreds of studies have attempted to identify which genes play a role in the development of AD. More specifically, researchers have attempted to identify specific genes associated with both early-onset AD (diagnosis occurring before age 65) and late-onset AD (diagnosis occurring after age 65).

Individuals with early-onset AD account for a relatively small number of AD cases. It is an autosomal dominant transmitted disease that has been associated with four genes to date. Specifically, it has been linked with mutation at codons 670, 671, and 717 of the beta-amyloid precursor protein (APP) gene located on chromosome 21 (Goate, et al., 1991; Murrel, Farlow, Ghetti, & Benson, 1991), and the SMT2 gene located on chromosome 1 (Levy-Lahad, et al., 1995). More commonly, individuals with early-onset AD show a mutation on the AD3 gene located on chromosome 14 (Goate, et al., 1991; Schellenberg, et al., 1992; Sherrington, et al., 1995; St George-Hyslop, et al. 1992), or on the Apolipoprotein E (ApoE) gene, which is the most researched gene linked with both early- and late-onset AD. Because the current sample is comprised of individuals aged 65 and older, consequently falling into the late-onset AD category, research pertaining to the ApoE gene and its association with late-onset AD will be discussed in greater detail than the genes associated with early-onset AD.

ApoE is a plasma protein with 3 common alleles (allele-2, allele-3, and allele-4) encoded on chromosome 19. These 3 alleles correspond to 6-phenotypes (2/2, 3/3, 4/4, 2/3, 2/4, 3/4). Initially, it was thought that ApoE-4 occurred disproportionately more in individuals diagnosed with late-onset AD than in controls (Saunders, Strittmatter, Schmechel, 1993; Strittmatter et al., 1993). More recent studies, however, have revealed that ApoE-4 is more common in not only late-onset AD, but in early-onset AD as well (van Duijn et al., 1994).

Most molecular and epidemiological genetic studies determine the risk of developing AD by calculating an odds ratio (OR). To calculate an OR, researchers determine the population with AD (d), and the number of cases without AD (n), yielding an odds ratio of d/n (Jorm, 1990).

In 1997, Farrer et al. conducted a meta-analysis that looked at the relationship between the ApoE genotype and AD. Farrer and his colleagues compiled data from 40 out of 48 possible research groups, representing a total of 5930 patients with probable or definite AD and 8607 controls without dementia. Researchers found the ORs for Caucasian participants from clinic and autopsy based studies to be as follows: (1) participants with genotype 2/4 revealed an OR equal to 2.6 (95% confidence interval = 1.6-4.0), (2) for participants with 3/4, the OR equaled 3.2 (95% CI = 2.8-3.8), and (3) for 4/4, the OR was 14.9 (95% CI = 10.8-20.6). For participants with genotypes 2/2 and 2/3, ORs were decreased (OR=0.6, 95% CI = 0.2-2.0 and OR=0.6, 95% CI = 0.5-0.8 respectively). The results suggest that there is a significant relationship between ApoE-4 and AD. Other research supports this finding as well (Corder et al., 1993; Hall et al., 1998; Massaia et al., 2001).

Epidemiological studies are another approach when looking at family history of AD. In 1989, St. George-Hyslop and his colleagues did a review of the literature on epidemiological studies. The researchers investigated family history of AD using three approaches: (1) family studies in which pedigrees were analyzed (2) twin studies, and (3) survey studies where a variety of methods and test populations from various studies were compiled.

At the time of the review, 88 families reporting familial AD had been discussed in the literature. Out of the 88 pedigrees, family members developing AD equaled 48.6%. In order for a trait to be considered solely an autosomal dominant trait, the proportion of individuals affected with a particular disease must equal 50%. Results from the literature suggest that, although the percentage of AD cases did not equal the 50% level, it did approximate the percentage expected. St. George-Hyslop et al. (1989) discussed limitations of the family studies investigated in their review. Namely, only 26 of the 88 families tested were able to provide sufficient evidence for AD being an autosomal dominant trait. The other 62 did not have enough family members affected in multiple generations to support the notion of AD being an autosomal dominant trait. Nevertheless, while determining whether or not AD is an autosomal dominant trait is important, the fact remains that almost 50% of individuals with a family history of AD developed the disease at some point in their lifetime indicating a strong genetic component.

A review of twin studies revealed that 32 monozygotic (MZ) twin pairs and 7 dizygotic (DZ) twin pairs, with at least one individual in the pair being afflicted with AD, had been studied at the time of the review. Concordance rates were 44% for the MZ pairs

and 40% of the DZ pairs. Additionally, age of onset differed in MZ concordant twin pairs. These results are worth comparing to Huntington disease (HD), a purely autosomal dominant trait. In twin studies of HD, concordance rates for MZ pairs equals 100%. Additionally, the age of onset in HD twin pairs is very similar. Results from the AD twin studies suggest that AD is not a fully autosomal dominant trait; it may be caused by other genetic and environmental factors. Results from the AD twin studies should be interpreted with caution since the number of twin pairs studied was extremely small.

Survey studies are more accurate in looking at family history of AD because of their ability to determine both the likelihood of developing AD among relatives of AD patients and the ratio of AD revealing familial aggregation (St. George-Hyslop et al., 1989). In their review of survey studies, St. George-Hyslop and his colleagues found that, in earlier studies, increased risk to parents (10-14.4%) and siblings (3.8-13.9%) of AD patients was significant, yet somewhat unconvincing. More recent studies, using Kaplan-Meier life table methods, show more substantial results: (1) the likelihood of developing AD among first degree relatives of controls was 10%, (2) the likelihood increased to 50% when the individual has a first degree relative with AD. Results suggest an autosomal dominant trait. Of the six survey studies reviewed, only one found conflicting results (Farrer, O'Sullivan, Cupples, Growdon, & Myers, 1989).

Additional epidemiological studies have found that family history greatly contributes to an individual's increased risk of developing AD. In case-controlled studies, the risk of developing AD ranged from 39% to 64.3% in those with a family history of the disease (Farrer et al., 1990; Lautenschlager et al., 1996; Massaia et al., 2001; Van Duijin, Farrer, Cupples, & Hofman, 1993). Researchers using ORs found that the risk ranged from 2.62

to 13.0 (Broe & Henderson, 1990; Canadian Study of Health and Aging, 1994; Li et al., 1992; Prince, Cullen, & Mann, 1994; Salib, 2000).

Only one study found contradicting results. Launer et al. (1999) performed a meta-analysis of four European population-based studies. They found a nonsignificant increased risk of 1.6 for developing AD in individuals with two or more first degree relatives with the disease.

When looking specifically at fear of developing AD and family history, studies have shown that fear of developing AD tends to be greater when there is a family history of the disease (Cutler & Hodgson, 1996; Cutler & Hodgson, 2001). This fear can be further heightened when the individual's family member developed early-onset AD or when he/she has two parents with AD (Birkett, 1989).

French (2005) explored the relationship between family history of AD and fear of developing AD among older adults. Rather than using a correlational design, however, the study again used a more powerful statistical analysis (i.e., multiple regression) to show that family history of AD significantly predicted fear of developing AD. Results signified that individuals with a family history are more afraid of developing the disease than individuals without a family history. Again, French's study allowed researchers to not only explore the relationship between family history of AD and fear of AD, but the many facets of the fear as well.

Based upon genetic studies and other studies that have addressed the relationship between family history of and fear of AD, the current study is hypothesizing that family history of AD will be a significant predictor of anticipatory dementia.

Relationship between Knowledge of AD and both Fear of Developing AD and Anxiety

“A lot of knowledge can be a bad thing...sometimes people get scared of knowing too much.”

- Man with Cystic Fibrosis
(Chapman & Bilton, 2004, p. 369)

As evidenced by the above quote, sometimes knowledge can be scary. However, very few studies have investigated the relationship between fear of developing AD and knowledge of AD. Commissaris and colleagues (1994) were one of the first to address this relationship. Researchers conducted informational meetings to educate individuals on the differences between normal forgetfulness and dementia. Four hundred-fifty attended the meetings. Of the 450, 246 participants completed both pre-test and post-test questionnaires. The average age of participants was 58 years. To assess knowledge of AD, participants were asked 5 questions as both baseline and follow-up. Additionally, participants answered “yes” or “no” regarding whether or not they were afraid of dementia. Sixty-six percent of individuals that were afraid of their memory and incipient dementia were reassured after attending the meetings. However, contrary to researchers’ hypothesis, there was no correlation found between increased knowledge and anxiety about developing dementia.

Commissaris and colleagues (1995) conducted another study looking at the effect of knowledge on concern about dementia. In their previous study, they conducted informational meetings about the differences between normal forgetfulness and dementia. The current study utilized an informational brochure to educate individuals on this difference. Approximately 475 men and women participated in the study (M age = 66 years). At baseline, 25% of individuals reported being “very much concerned” about dementia, 52% reported “little concern” and 23% reported “hardly any/no concern.”

After reading the brochures, 77% of individuals reporting “much concern” said their concern decreased substantially. Researchers concluded that informational brochures on the differences between normal forgetfulness and dementia can help reduce individuals’ fear about developing dementia.

Commissaris and colleagues’ (1995) study provides useful information about the relationship between knowledge of AD and fear of developing dementia. However, they did not utilize a questionnaire to assess knowledge. They assumed that after reading the informational brochure about the differences between normal forgetfulness and dementia, individuals would be more knowledgeable about dementia. It is necessary to have both pre and post-tests to confirm this assumption. Additionally, both studies performed by Commissaris and colleagues (1994 & 1995) addressed fear of dementia utilizing a single question. As French (2005) demonstrated, a multiple-item questionnaire provides a better measurement of individuals’ fear of developing AD.

LaForce and McLean (2005) utilized a 40 item questionnaire specifically designed to assess fear of developing AD and knowledge of AD. Participants answered questions about general knowledge, risk factors, cognition, and personality with regard to AD. As with previous research, only one question expressly addressed participants’ fear of developing AD. Results of the study revealed that younger individuals (M age = 19.6, $SD = 3.1$) knew more about AD than older individuals (M age = 67.9, $SD = 7.9$). Covariance analysis indicated that the differences between the groups could not be accounted for by education. Additionally, the younger adults were more fearful of developing AD than older adults. Researchers concluded that the more knowledge individuals have about AD, the more fearful of the disease they are.

Although LaForce and McLean (2005) added to the pre-existing literature, the relationship between fear of developing AD and knowledge of AD needs to be further addressed. Specifically, much like other researchers, LaForce and McLean questioned participants about their fear using a single question. As explained previously, using a single item to address this construct possess a threat to validity and reliability. Additionally, it does not address the various aspects of fear of developing AD. The relationship between fear of AD and knowledge of AD should be examined using psychometrically sound instruments that incorporate multiple questions.

The previous studies specifically address how knowledge affects individuals' concern about AD or dementia. Other researchers, however, have addressed the relationship between knowledge of dementia using a more generic construct, anxiety. And, even though these studies do not assess fear of developing AD directly, previous research has shown that anxiety and fear of developing AD are significantly correlated (French, 2005).

Graham, Ballard, and Sham (1997a) examined the relationship between knowledge of dementia and anxiety among 109 caregivers of dementia patients ages 65 and older. Each participant was interviewed and administered the following assessment schedules relevant to the current study: (1) the Geriatric Mental State Schedule (Copeland, Kelleher, & Kellet, 1976) to assess psychiatric health; and (2) and the Dementia Knowledge Questionnaire (Graham, Ballard, & Sham, 1997b) to assess caregivers' level of knowledge of dementia. Researchers found that caregivers possessing greater knowledge of dementia had significantly higher rates of anxiety.

Proctor, Martin, and Hewison (2002) also looked at the relationship between knowledge about dementia and anxiety among caregivers. Fifty caregivers ages 65 and

older agreed to participate in the study. Caregivers' knowledge about dementia was assessed using the Dementia Quiz (Gilleard & Groom, 1994) and their levels of anxiety were measured using the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). The findings substantiated the research performed by Graham, Ballard, and Sham (1997a). Proctor and colleagues (2002) found that there was a significant relationship between increased knowledge and anxiety. Specifically, caregivers' biomedical knowledge was predictive of anxiety.

Medical Student Disease

The relationship between health knowledge and anxiety is not a new topic to psychology. Medical Students' Disease (MSD), also known as Medical Students' Syndrome (MSS), nosophobia, and medicalstudentitis, is a construct that can be found in the literature as early as 1945 (Wyler, 1945).

Woods and colleagues (1966) defined MSD as "the development of either symptoms or hypochondriacal anxiety about the disease being studied by the student" (p. 785). Two studies concluded that approximately 70% to 80% of medical students have a "positive history" of the disease at some point during their education (Hunter, Lohrenz, Schwartzam, 1964; Woods, Natterson, & Silverman, 1966). Sixty-two percent of individuals believed that the cause of their MSD was knowledge about the disease in question.

Since 1945, many studies have examined MSD. Most studies revealed that, while studying a particular illness, medical students focus on their bodily symptoms and falsely believe that they have the latest "deadly" disease being studied (Candel & Merckelbach, 2003; Howes & Salkovskis, 1998; Hunter, Lohrenz, Schwartzam, 1964; Moss-Morris &

Petrie, 2001; Woods, Natterson, & Silverman, 1966). Kellner, Wiggling, & Pathak (1986) found that, although medical students had an increased rate of health related anxiety, it was no different than that of controls. Additionally, Singh and colleagues (2004) found that medical students did not have higher levels of health anxiety. In fact, medical students in years 1 and 4 had significantly lower health-related anxiety than controls. Nonetheless, the majority of research has substantiated the notion of MSD.

Using the MSD concept, researchers have performed studies showing that MSD affects non-medical individuals possessing increased levels of knowledge as well. Ferguson (1996) based his study on the notion of MSD to hypothesize that the level of medical knowledge would be positively associated with the level of hypochondriacal concern. He assessed 40 female and 18 male undergraduate students (M age = 21.8 years, $SD = 3.6$). Ferguson found that the more individuals knew about disease etiology, the more concerned they were about developing that disease.

The concept of MSD was further broadened when Hardy and Calhoun (1997) examined students' perception of having a psychological disorder after learning about the various mental illnesses in an Abnormal Psychology course. Researchers questioned 119 students enrolled in Abnormal Psychology (M age = 20.56, $SD = 4.29$) about their concern over past and present psychological disorders in both themselves and family members. Hardy and Calhoun (1997) found that concern about both their own and their family members' psychological health was fairly low. However, individuals either majoring or planning to major in psychology reported significantly more concern about psychological dysfunction than non-psychology majors. Additionally, individuals were

more worried that someone in their family could be diagnosed with a personality disorder.

Although the concept of MSD has not been applied to the relationship between knowledge of AD and fear of developing the disease, it is not difficult to see that it could be relevant; the more individuals know about Alzheimer's disease, the more afraid they become of developing it. Based upon the concept of MSD and the previous literature examining the relationships between knowledge of AD and both fear of developing AD and anxiety, the current study is hypothesizing that knowledge of AD will significantly predict both fear of developing AD and anxiety.

Relationship between Fear of Developing AD and Objective Memory

AD is heterogeneous in its symptomatology and course. Each individual experiences AD somewhat differently. While one person may experience aphasia, for example, another individual may not. Regardless of the variants, however, everyone afflicted with AD experiences memory problems. Whether using diagnostic criteria from the International Classification of Diseases, 10th revision, (ICD-10; World Health Organization, 1992), the Diagnostic and Statistical Manual of Mental Disorders, 4th edition, (DSM-IV-TR; APA, 2000) or the Neurological and Communicative Disorders and Stroke – Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA; McKhann, et al., 1984), one criteria remains constant; in order to be diagnosed with AD, an individual must experience impairment in their memory.

Hundreds of studies have looked at objective memory in individuals diagnosed with AD. The ways in which researchers measure objective memory vary greatly. In general, researchers use neuropsychological tests that assess short and long term memory,

executive functioning, attention, temporal and spatial orientation, abstract reasoning, constructional abilities, language deficits, and activities of daily living (Bouchard & Rossor, 1999; Mohr, Dastoor, & Claus, 1999).

Scores on objective memory assessments fluctuate depending upon the stage of AD that the patient is in. Neuropsychological evaluations reveal that, in the early stages of dementia, many AD patients will experience difficulty with orientation, memory, judgment, and word-finding. In the intermediate stages, the impairments present in the early stages are amplified. Additionally, individuals with AD will begin having difficulty with activities of daily living. In the late stages, individuals are completely reliant upon help from others; all autonomy is lost (Mohr et al., 1999).

An interesting observation has been made by many clinicians about distinguishing pseudodementia from dementia. In pseudodementia, an individual generally presents in the clinician's office with subjective memory complaints. Typically the results of objective tests, however, reveal no memory impairments. Individuals with true dementia usually present in the clinician's office with family members. The patient frequently does not acknowledge experiencing any problems with memory. In fact, he/she may minimize or rationalize the memory impairments. Yet, family members recognize that a problem exists. In the case of true dementia, objective assessments of memory reveal an actual problem with memory as opposed to pseudodementia cases where subjective memory complaints are more prevalent than actual memory impairments (Bouchard & Rossor, 1999).

Because memory impairment is an essential criterion in the diagnosis of AD, one might conclude that objective memory would be highly related to fear of developing AD.

However, the researcher is hypothesizing that objective memory will not significantly predict fear of developing AD. One reason for this hypothesis is that individuals experiencing memory difficulties usually do not believe they have a problem with their memory. Family members initiate the testing. Therefore, it would seem that they would not be worried about developing it as much as if they had subjective memory complaints. The hypothesis is also based on research pertaining to the relationship between subjective and objective memory. Research has shown there to be a significant relationship between subjective memory and fear of developing AD. And, most studies found no relationship existing between objective and subjective memory (see section titled “Relationship between Objective and Subjective Memory in the Elderly”). Therefore, it seems logical to deduce that, because subjective memory is hypothesized to significantly predict fear of AD, objective memory would be hypothesized to not predict fear of developing AD. Although this relationship was directly assessed in only study, it was substantiated (French, 2005).

French (2005) also looked at the relationship between objective memory and fear of developing AD among older adults. To assess objective memory, the following tests were administered: (1) Logical Memory I & II from the Wechsler Memory Scale (WMS-III), (2) Digit Symbol-Coding from the Wechsler Adult Intelligence Scale (WAIS-III), (3) Digit Span from the WAIS-III, and (4) the Abbreviated Boston Naming Test. A composite score was created from these tests. The scores from each test were weighted so that one test score did not influence the composite score more than any other score. Results from the study revealed that, although subjective memory and family history

significantly predicted fear of developing AD, objective memory did not. The current study is hoping to replicate these findings.

Relationship between Objective and Subjective Memory in the Elderly

Between the years 1967 and 2006, over 70 studies looking at the relationship between objective memory and subjective memory have been published. It is a topic that has caused much controversy due to its inconsistent findings. Researchers are still attempting to determine whether or not individuals complaining of memory problems actually exhibit impaired memory performance.

Positive Relationship

Several studies have found a significant relationship between memory complaints and performance on memory tests in older adults (Dixon & Hultsch, 1983; Gagnon et al., 1994; Johansson, Allen-Burge, & Zarit, 1997; Jonker, Launer, Hooijer, & Lindeboom, 1996; Jonker, Lindeboom, & Hooijer, 1995; Riege, 1982; Wang et al., 2000; Zelinski, Gilewski, & Thompson, 1980). This relationship was also found to be significant in relatives of patients with early-onset AD (LaRue et al., 1996; McPherson, La Rue, Fitz, Matsuyama, & Jarvik, 1995). Additionally, while Wang et al. (2000) found that subjective memory did not predict dementia, Johansson, Allen-Burge, & Zarit (1997) did find that complaints about memory performance over a 2-year period were predictive of cognitive decline.

Weak/Modest Relationship

Several studies have found a positive, yet weak/modest relationship between subjective and objective memory despite some efforts to reduce previous methodological

problems (Hanninen et al., 1994; Hertzog, Park, Morrell, & Martin, 2000; Jorm et al., 1994; McDonald-Miszczak, Hertzog, & Hultsch, 1995; Schmidt, Berg, & Deelman, 2001; Zelinski, Burnight, & Lane, 2001). Additionally, Hanninen et al. (1994) looked at the relationship between depression and subjective memory. They found that the two variables were not related. On the converse, Hertzog et al. (2000) found that depression was significantly related to subjective memory.

Christensen (1991) and Bassett & Folstein (1993) found that the relationship between subjective and objective memory varied by group. Christensen's (1991) results revealed that memory performance was worse in elderly subjects who believed their memory impairment to be worse than other individuals of their same age. Bassett and Folstein (1993) discovered that individuals expressing memory complaints were more likely than individuals not complaining of their memory to have impaired memory performance.

Other researchers have found that, although there is a weak or modest relationship between memory complaints and memory performance, subjective memory is more associated with depression than with objective memory (Bolla, Lindgren, Bonaccorsy, Bleeker, 1991; O'Hara, Hinrichs, Kohout, Wallace, & Lemke, 1986).

No Relationship

An overwhelming number of studies have found no relationship existing between memory complaints and memory performance. One of the first of these studies was conducted by Kahn, Zarit, Hilbert, & Niederehe (1975). Kahn and his colleagues used both psychiatric patients and relatives for collateral information as participants. They found that although there was no relationship between subjective and objective memory, there was a strong positive relationship between subjective memory and depression.

Other studies using non-demented individuals also found that there was no relationship between objective and subjective memory (Best, Hamlett, & Davis, 1992; Derouesne et al., 1989; Flicker, Ferris, & Reisberg, 1993; French, 2005; McGlone et al., 1990; O'Connor, Pollitt, Roth, Brook, & Reiss, 1990; Rabitt & Abson, 1991; Riedel-Heller, Matschinger, Schork, & Angermeyer, 1999; Schofield et al., 1997; Sunderland, Watts, Baddeley, & Harris, 1986; Taylor, Miller, & Tinklenberg, 1992; Williams, Little, Scates, & Blockman, 1987; Zarit, Cole, & Guider, 1981; Zelinski, Gilewski, & Schaie, 1993). Several of these same studies found depression to be highly related to subjective memory (Derouesne et al., 1989; McGlone et al., 1990; O'Connor et al., 1990; Rabitt & Abson, 1991; Schofield et al., 1997; William et al., 1987). Conversely, Zarit et al. (1982) found that mood had only a minimal relationship with subjective memory.

The results from studies looking at the relationship between memory appraisals and memory performance are mixed. Few studies have found a positive significant relationship. The majority of studies on this topic have found either no relationship or a weak/modest relationship.

It seems that the disparity in the data can be attributed to the fact that subjective memory is based upon some psychological aspect whereas objective memory is a pure measurement of memory without the intrusion of individuals' personality/psychological traits. While objective measures remain fairly stable across studies, measurement of subjective memory varies greatly. Some subjective memory questionnaires use a variety of questions, including those that address the psychological/personality component of memory complaints. Others use a single question. The way in which subjective memory is measured could greatly affect the relationship between objective and subjective

memory. Regardless of the reasons for the disparity in the literature, the inconsistencies still exist. Based upon the majority of the results, the researchers hypothesize that there will not be a significant relationship between subjective and objective memory.

Additionally, because many studies have shown there to be a significant relationship between subjective memory and depression, it is possible that negative mood could significantly impact the relationship between subjective memory and fear of developing AD. Only one study has addressed the effects of negative mood on this relationship.

French, 2005) found that the relationship between subjective memory performance and fear of AD remained significant even after controlling for the effects of negative mood.

Based on these results and on the literature showing that subjective memory is significantly correlated with fear of developing AD, it is hypothesized that the relationship between subjective memory and fear of AD will remain significant even after the effects of negative mood have been removed.

CHAPTER 3

METHODS

Participants

The sample consisted of fifty, community dwelling, non-institutionalized, older adults (24 males and 26 females) ages 65-84 ($M = 72.24$; $SD = 5.37$). Of the 50 participants, 5 were single, 26 were married, 11 were divorced, and 8 were widowed. The sample was predominately Caucasian (92%) with African American (2%), Asian (4%), and Native American (2%) individuals comprising the remainder. With regard to education, 4% reported “some high school or less,” 14% “graduated high school or received their GED,” 4% earned either a “technical or associates degree,” 26% reported attending “some college,” 20% received their “Bachelor’s degree,” 2% attended “some graduate school,” 14% earned their “Master’s degree,” and 16% reported earning a “Doctoral degree (Ph.D. or other doctoral)” or another “professional degree (e.g., M. D., J. D.).” Participants were recruited from the general community by placing advertisements in local newspapers, some specifically targeting the elderly, and by word of mouth.

Design and Procedure

Interested persons contacted the primary researcher at the telephone numbers provided. Informed consent was obtained over the telephone from each interested person in accordance with the UNLV OPRS guidelines for the protection of human subjects.

The researcher spoke directly to the interested party, verified age, asked questions about neurological disorders and medications, and administered the Mental Status Questionnaire (MSQ; Kahn, Goldfarb, Pollack, & Peck, 1960) to rule out obvious dementia. A copy of the MSQ is in Appendix II. Persons with an MSQ score less than eight were told that they did not qualify for this study. Additionally, any individual with a known neurological disorder (i.e., Parkinson's disease, Huntington's disease, Alzheimer's disease, Pick's disease, Creutzfeldt-Jacobs disease, Vascular dementia, stroke, hydrocephalus, brain damage, delirium) were excluded, as these can significantly impact memory performance. Furthermore, any individual taking a medication for their memory (i.e., Aricept, Exelon, Razadyne, Namenda) were excluded from the study as these medications may cause individuals to perform better on the objective memory tests than they would without medication. Of the interested individuals, six were excluded from the study.

Before participating in the study, interested individuals were given the MSQ (Kahn et al., 1960) via the telephone to rule out obvious dementia. Additionally, other pertinent information (i.e., demographics, medical history, medications, psychological history, family history of AD, questions pertaining to personal experience with AD) was obtained. If an individual met the inclusion criteria explained above, an assessment was scheduled to be completed at the UNLV campus. Before testing commenced, the research procedures were explained to the participants and informed consent was obtained in accordance with the UNLV OPRS guidelines for the protection of human subjects.

Participants were evaluated by one of three trained graduate students. To ensure that the interviewers were highly qualified, each interviewer completed approximately five hours of training on administration of the instruments. Each interviewer observed a testing session completed by the primary researcher before he/she conducted his/her own testing session. After that, the primary researcher observed the interviewer. After observations were completed, the interviewer was able to administer the evaluations without the presence of the primary researcher.

Before completing any objective memory assessments, participants completed the Memory Functioning Questionnaire (MFQ; Gilewski, Zelinski, & Schaie, 1990) so that the participant's perception of his/her memory was not affected by performance on objective memory tests. The tests were administered in the following order:

1. Mental Status Questionnaire via the telephone prior to testing session to determine eligibility
2. Background Questionnaire via the telephone prior to testing session to determine eligibility
3. Fear of Alzheimer's Disease Scale (FADS)
4. Memory Functioning Questionnaire (MFQ)
5. Logical Memory I
6. Digit Symbol – Coding
7. Digit Span
8. Abbreviated Boston Naming
9. Geriatric Depression Scale (GDS)
10. Logical Memory II

11. California Verbal Learning Test – second edition (CVLT-II)

12. Knowledge about Alzheimer’s Disease (KADS)

13. State-Trait Anxiety Inventory – Form Y (STAI-Y)

After the interview was completed, scores from the individual objective memory assessments were compared to normative data for individuals of the same age. The primary researcher was supervised by a licensed clinical psychologist when participants obtained results outside the clinically normal range. The participant received notification either in person or via telephone of whether their test results were within a normal range or if additional testing was recommended. If the results suggested that a follow-up was necessary, the participant was given referrals to local neurologists, neuropsychologists, and psychologists. Referral information was available upon request to all participants regardless of the outcome of the assessment results. Of the 50 participants tested, three individuals received negative feedback and were subsequently provided with referrals.

Measures

Demographic questionnaire

Participants were given the demographic questionnaire via the telephone prior to the testing session to determine eligibility. Questions included information about age, gender, marital status, ethnicity, education, medical history, current medications related to memory decline, psychological history, and questions pertaining to experience with AD. Participants were also asked about family history of AD and/or other dementias. When the participant reported a family history of AD or other dementias, he/she was asked to reveal whether the family member diagnosed was a first or second degree

relative or if he/she has multiple family members diagnosed. The participant was also asked how emotionally close he/she is to the family member(s) diagnosed. The participant responded to this question on a 5-point Likert-type scale ranging from 1 (“Not at all Close”) to 5 (“Extremely Close”). A copy of the questionnaire is in Appendix III.

Assessment of Fear of Developing Alzheimer’s Disease

To examine levels of anticipatory dementia, participants were given the Fear of Alzheimer’s Disease Scale (FADS; French, 2005). The FADS is a 30-item self-report measure used to assess anticipatory dementia across three different dimensions: older adults’ basic and metamemory based fear of developing AD (General Fear), physical symptoms that older adults experience due to fear of developing AD (Physical Symptoms), and older adults’ catastrophic thinking associated with fear of developing AD (Catastrophic Attitude). Participants indicated their level of agreement with the statement using a 5-item Likert-type scale ranging from “never,” to “always.” The minimum and maximum scores possible on the FADS are 0 and 120, respectively. A copy of the FADS is in Appendix IV.

The FADS is a valid and reliable measure (French, 2005). Internal consistency was measured in a sample of 101 older adults ages 65 and older. Cronbach’s alpha for “General Fear,” “Physical Symptoms,” and “Catastrophic Attitude” was found to be .94, .85, and .80, respectively. Cronbach’s alpha for the entire instrument was .94. The FADS was also found to have good construct reliability; scores on the FADS were significantly correlated ($r = .216, p < .05$) with the total score on the State-Trait Anxiety Inventory – Form Y (French, 2005).

Assessment of Subjective Memory

The Memory Functioning Questionnaire (MFQ; Gilewski, Zelinski, & Schaie, 1990) was used to assess the participants' perceptions of their own memory. It is a 64-item self-rated scale designed to examine a person's metamemory, or perceived memory functioning, across three different dimensions: general frequency of forgetting (Frequency of Forgetting), the importance of what is forgotten (Seriousness of Forgetting), and the amount of effort made, through mnemonics, to avoid failures (Mnemonic Usage). Items are rated on a 7-point Likert scale ranging from 1 (frequently a problem) to 7 (never a problem). Scores on the MFQ can range from 64 to 448, with a lower score indicating greater perceived memory difficulty.

Metamemory is assessed by asking the participant to compare his/her memory now in comparison to how it was 1, 5, 10, and 20 years ago and at the age of 18. The lower the score an individual receives on this scale, the more the participant perceives his or her memory to be a problem. Therefore, higher scores on the MFQ factors are indicative of a low level of memory complaints, infrequent use of mnemonics, and the perception that memory is still intact. A copy of the MFQ is in Appendix V.

The MFQ has been tested extensively on an older adult sample. Three-year test-retest reliabilities of the subscales ranged between .22 and .64. When looking at internal consistency in a sample of 693 16 to 89 year olds, Cronbach's alpha was found to be between .82 and .93 (Gilewski & Zelinski, 1986).

Assessment of Knowledge of Alzheimer's Disease

The Knowledge about Alzheimer's Disease Scale (KADS; Carpenter, Balsis, Otilingam, Hansen, & Gatz, 2006) was used to assess participants' knowledge of

Alzheimer's Disease. The KADS is a 50-item questionnaire that assesses various aspects of knowledge about AD. Forty-nine of the 50 questions are presented in a true-false format. Question 50 asks participants to indicate how much knowledge they think they have about AD on a 10-point Likert scale ranging from "I know nothing at all" to "I am very knowledgeable." A copy of the scale is in Appendix VI. Scores on the KADS range from 0 to 49, with a higher score indicating greater knowledge of Alzheimer's disease. The KADS is currently in its pilot form. As such there are no data available to demonstrate the psychometric properties of the questionnaire.

The KADS is the revised version of the Alzheimer's Disease Knowledge Test (ADKT; Dieckmann, Zarit, Zarit, & Gatz, 1988). Scientific knowledge about AD has increased dramatically since the development of the ADKT. As such, the ADKT is an outdated measure of knowledge of AD. Nonetheless, the ADKT is a psychometrically sound measure as evidenced by coefficient alphas ranging from .71 to .92. Construct validity for the ADKT was also established (Dieckmann, Zarit, Zarit, & Gatz, 1988).

Assessment of Objective Memory

Logical Memory I and II Subscales of the Wechsler Memory Scale (WMS-III)

In Logical Memory I (LMI), the examiner reads two different stories (story A & B) aloud to the participant. Story B is read twice. After the stories are presented, the participant is asked to retell each of the stories from memory. If the participant inaccurately recalls or omits story and thematic units (e.g. units pertaining to main ideas presented in the story), he/she receives 0 points. The recall total score for Logical Memory I can range between 0 and 75 points. A higher score indicates better performance. The Psychological Corporation (1997) found that the reliability coefficient

for individuals between 65 and 80 averaged .87. Test-retest reliability analysis revealed a correlation coefficient of .77

In keeping with the administration guidelines, there was a 25-30 minute delay between Logical Memory I and II. In the current study, participants completed Digit-Symbol Coding, Digit Span, the Abbreviated Boston Naming, and the Geriatric Depression Scale (GDS) during the delay between Logical Memory I and II. In Logical Memory II (LMII), the examiner asks the participant to retell both stories A and B from the immediate condition. After the participant reports everything he/she remembers from the two stories, the examiner asks yes/no questions about both stories. On Logical Memory II, the participant can receive a recall total score anywhere between 0 and 50 with a greater score again indicating better performance. The Psychological Corporation (1997) performed a reliability analysis. The results of their analysis revealed a correlation coefficient of .81 for individuals aged 65 to 89. The correlation coefficient for test-retest reliability equaled .74. Both Logical Memory I and II showed good content, criterion, and construct validity.

California Verbal Learning Test – Second Edition (CVLT-II)

The California Verbal Learning Test – Second Edition (CVLT-II; Delis, Kramer, Kaplan, & Ober, 2000) measures memory for verbal information. The CVLT is composed of two word lists each comprising 16 words from four categories (Furniture, Vegetables, Ways of Traveling, and Animals). List A is the primary list and List B is the interference list. The examiner presents List A five separate times. Each word is spoken aloud by the administrator at a rate of just over 1 per second. After each list has been presented, the participant freely recalls the items on List A. After the five immediate free

recall trials of List A, the examiner presents List B. The participant is asked to recall all of the words from list B. This is followed by short delay free and cued recall trials of List A, 20-minute long delay free and cued recall trials of List A, a long delay recognition trial of List A, and a forced-choice recognition task of List A. Scores on the CVLT-II can range between 0 and 80 for total recall, and 0 and 16 for both short and long delay recall. The CVLT-II is a valid and reliable measure. Good internal consistency was evidenced by a coefficient alpha .82 and a test-retest study yielded $r = .82$. Its validity is based upon its relationship with the original CVLT, which was proven highly reliable and valid. The correlation between the CVLT and the CVLT-II ranged from .63 to .86 (as cited in Plake, Impara, & Spies, 2003, p. 177).

Digit Symbol – Coding Subscale of the Wechsler Adult Intelligence Scale (WAIS-III)

In Digit Symbol–Coding, the participant is asked to copy hieroglyphic-like symbols that are paired with numbers. Using the key provided, the participant finds the symbol that corresponds with the number and draws it in the box below the number. The participant has 120 seconds to fill in as many boxes as possible. The score is determined by the number of symbols correctly drawn. The maximum score possible is 133.

Additionally, participants completed both the Incidental Learning – Pairing, and Incidental Learning - Free recall subtests of Digit Symbol – Coding. In the Incidental Learning – Pairing subtest, the subject is asked to write down the symbol that corresponds to each number without looking at the symbol key. The maximum number of points is 18. In the Incidental Learning – Free Recall subtest, the subject is asked to write down all of the symbols that he/she can remember in any order. The participant can obtain a maximum of 9 points on this subtest. The Psychological Corporation (1997)

reports good psychometric properties for the WAIS-III. Specifically, it reports an average reliability coefficient for the Digit Symbol – Coding subscale of .87 in individuals between the ages of 65 and 89. Test-retest reliability for individuals between 55 and 74 was found to be .85 and .91 in individuals between 75 and 89. Digit Symbol-Coding was also shown to be valid, as measured by construct, criterion, and content validity (Psychological Corporation, 1997).

Digit Span Subtest of the Wechsler Adult Intelligence Scale (WAIS-III)

There are two sections to the Digit Span subtest: Digit Span forward and Digit Span backward. In both Digit Span forward and backward, the examiner reads a string of numbers aloud at a rate of one number per second. Each trial is comprised of two sub-trials consisting of equal numbers in the string. The string of numbers in each trial gets progressively longer. The participant continues until he/she inaccurately repeats both sub-trials of the trial. In digit span forward, which is administered first, the participant repeats the string of numbers in the order in which they were read. In digit span backward, the participant repeats the string of numbers in the reverse order of what was read. The maximum total score possible for both Digit Span forward and backward is 30 points. The Psychological Corporation (1997) reports an average reliability coefficient of .89 in individuals between the ages of 65 and 89 for both digits forward and backward. Test-retest reliability analysis shows an average reliability of .85 in individuals between the ages of 55 and 75, and .69 in individuals between the ages of 75 and 89. Digit Span was also shown to be valid, as measured by construct, criterion, and content validity (Psychological Corporation, 1997).

Abbreviated Boston Naming Test

The Boston Naming Test (BNT) is a naming vocabulary test (Kaplan, Goodglass, Weintraub, 1978). The 15-item shortened version of the BNT is from the Consortium to Establish a Registry for Alzheimer's Disease (CERAD) neuropsychological battery (Morris, Mohs, Rogers, Fillenbaum, & Heyman, 1988). In the BNT, the examiner presents 15 pictures from the original BNT to the participant. The pictures consist of five high frequency, five medium frequency, and five low frequency items. The participant has 10 seconds to respond. In this version of the BNT, no semantic or phonetic cues are given. The participant's score is based upon the number of correct responses. The maximum possible score is 15 with higher scores indicating better performance. One-month test-retest reliability was found to be .91 in patients and .77 in controls (Welsh-Bohmer, & Mohs, 1997). Additionally, longitudinal studies have shown that the abbreviated version of the BNT has good validity (Morris, Edland, Clark, & Galasko, 1993).

Negative Mood

The Geriatric Depression Scale (GDS; Yesavage et al., 1983) is a 30-item questionnaire measuring depression in older adults using a yes/no format. Scores on the GDS range from 0 to 30 with a higher score indicating more severe negative mood symptoms. A copy of the GDS is in Appendix VII. The initial validation study indicated high internal consistency, with an alpha of .94, and high convergent validity as indicated by a correlation of .83 with the Hamilton Rating Scale for Depression (Yesavage et al., 1983). One week test-retest reliability indicated a correlation of 0.85 (Burns, Lawlor, & Craig, 1999). Yesavage suggested using a score of 11 or higher as an indication of

depression. In fact, the sensitivity rate was 96% when using a cut-off score of 10, whereas the specificity rate was 96% (Olin, Schneider, Eaton, Zemansky, & Pollock, 1992). When a cut-off score of 14 was evaluated, the sensitivity rate decreased to 80% but the specificity rate increased to 100% (Burns, Lawlor, & Craig, 1999).

Anxiety

The State-Trait Anxiety Inventory – Form Y (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) is designed to measure anxiety in “normal” individuals. There are two 20-item sections. One section measures state anxiety (A-state), which is anxiety at a specific moment. This can change easily as a result of changes in the individual’s environment. The other section measures trait anxiety (A-trait). Trait anxiety does not change readily because it is considered the individual’s stable anxiety proneness. The state anxiety scale is scored along a 4-point Likert scale ranging from “not at all” to “very much so.” The trait anxiety scale is also scored along a 4-point Likert-type scale, only this scale ranges from “almost never” to “almost always.” Scores on the STAI-Y overall scale as well as both the state and trait anxiety subscales range from 40 to 160 and 20 to 80, respectively, with higher scores indicating more severe anxiety symptoms. In a study by Spielberger and Krasner (1988) the STAI was found to have high internal consistency (.86 to .95). The trait section was found to have good test-retest reliability of .65 to .86.

CHAPTER 4

RESULTS

Description of the Measures

Before computing descriptive statistics, the data were screened for completeness, accuracy in data entry, and outliers. Additionally, skewness and kurtosis were evaluated. According to Curran, West, and Finch (1996), acceptable kurtosis and skew values lie between ± 2 and ± 7 , respectively. All variables evaluated (i.e, Fear of Developing Alzheimer's Disease Scale - FADS, Memory Functioning Questionnaire - MFQ, Knowledge about Alzheimer's Disease Scale - KADS, composite score of objective memory, composite score of cognitive measures, Geriatric Depression Scale - GDS, and State-Trait Anxiety Inventory – Form Y - STAI-Y) approximated normality with regard to kurtosis and skew. Maximum scores, means, and standard deviations for these variables and their subscales are presented in Table 1. The total scores were used for the FADS, MFQ, STAI-Y, and GDS unless otherwise specified. Descriptive information about each variable will be provided later in this section.

Family history of AD was operationalized as the participants' total number of first and second degree relatives diagnosed with the disease. Participants were asked to report having a first-degree relative, a second-degree relative, or both with the disease. Twenty-four percent of the participants reported a family history of AD. Of these cases, 12% and 14% endorsed having a first-degree and second-degree relative diagnosed with the

disease, respectively. Participants reported, on average, .42 family members diagnosed with AD.

Description of the FADS

The average score on the FADS was 25.44 (SD = 20.91) with a maximum score of 120, which indicates that, on average, participants in the current study endorsed “Rarely” as the option for each statement. Specific rates of response for the FADS are presented in Table 2. With regard to the three factors of the FADS (General Fear, Physical Symptoms, and Catastrophic Attitude), the maximum scores possible were 68, 32, and 20, respectively. The average score was 18.02 (SD = 14.30) on the General Fear factor, indicating “Rare” responses on average, 1.42 (SD = 4.20) on the Physical Symptoms factor, indicating “Never” responses on average, and 6.0 (SD = 4.69) on the Catastrophic Attitude factor, indicating “Rare” responses on average. Most subjects ranked their fear relatively low overall. A much lower percentage of individuals endorsed the higher symptomatology categories, suggesting some restriction in range.

Description of the MFQ

On the MFQ, lower scores indicate greater perceived memory problems. Therefore, higher scores on the MFQ factors are indicative of a low level of memory complaints, infrequent use of mnemonics, and the perception that memory is still intact. The opposed coding of these variables is quite confusing with regard to data analysis and interpretation. To facilitate easier data analysis and interpretation, the data was recoded such that lower scores indicate a low level of memory complaints and higher scores indicate greater perceived memory problems.

The average score on the MFQ was 284.14 (SD = 48.62) with a maximum score of 448, which equates to an average response of “Sometimes” / “Fair” / “Somewhat Serious” / “Same” depending upon the dimension being evaluated. This suggests that participants neither perceived their memories as very good nor very poor.

Description of the KADS

The maximum number of points possible on the KADS equals 49. The mean number of points earned for the current study’s sample was 37.54 (SD = 3.80), which indicates that the average percentage of items correctly answered on the KADS was 76.6%. Assuming a normal distribution, the fact that participants responded much higher than chance (i.e., 50%), it can be concluded that participants were well above average in terms of their knowledge of Alzheimer’s disease.

Description of Objective Memory Tests

With regard to the objective memory tests, two composite scores were created: (1) a composite score of objective memory measures (i.e., Logical Memory I, Logical Memory II, CVLT-II recall total score, CVLT-II short-delay recall, CVLT-II long-delay recall), and (2) a composite score of cognitive measures (i.e., Logical Memory I, Logical Memory II, CVLT-II recall total score, CVLT-II short-delay recall, CVLT-II long-delay recall, Digit Symbol, Digit Span, Boston Naming Test). The two composite scores were created to address both memory specifically, and additional constructs (i.e., attention and concentration, processing speed, confrontational naming) that may reflect memory difficulties and a subsequent diagnosis of dementia.

Both composite scores were calculated using averages of z-scores for each measure. The first composite score, objective memory, is comprised of measures specifically used

in evaluating short-term and long-term memory. The second composite score, cognitive measures, encompasses cognitive measures often used in diagnosing dementia. These measures not only include memory measures, but also measures of attention, processing speed, and confrontational naming. The objective memory composite score is the score of vital importance to the hypotheses and subsequent analyses. However, the additional measures in conjunction with the true memory measures are necessary for providing adequate feedback about memory performance to each participant. To evaluate the relationship between the two composite measures, a Pearson product-moment correlation was calculated between the objective memory and cognitive measures constructs and was found to be significant ($r = .951, p < .001$).

When assessing performance on the memory tests (i.e., Logical Memory and CVLT tests), we found that participants scored an average of 120.92 points (SD = 28.76) out of a possible 237, which suggested that participants' memory in the current study was within the average range when compared to individuals of similar age, ethnicity, and education level (note: CVLT norms are based solely on age). When assessing performance on cognitive measures (i.e., Logical Memory, CVLT, Digit Symbol, Digit Span, and BNT), it was found that participants scored an average of 243.48 points (SD = 41.62) out of a possible 442, suggesting that, when taking all cognitive measures into account, participants again scored in the average range with regard to memory, attention and concentration, processing speed, and confrontational naming when compared to individuals of similar age, ethnicity, and education level (note: CVLT and BNT norms are based solely on age).

Description of the GDS

Participants can obtain a maximum of 30 point on the Geriatric Depression Scale (GDS). Researchers suggest that a score of 0-9 indicates “normal” levels of negative mood, 10-19 indicates “mild” depression, and 20-30 reveals “severe” depression (Yesavage et al., 1983). In the current study, participants received an average of 4.6 points (SD = 4.73), indicating “normal” levels of negative mood in general.

Description of the STAI-Y

On the STAI-Y, participants can receive a maximum of 160 points. Eighty of those points can be obtained on both the State and Trait Anxiety subscales. In the current study, participants received an average of 29.34 (SD = 10.20) and 31.28 (SD = 8.78) points on the state and trait anxiety subscales, respectively. On the STAI-Y, as a whole, participants scored an average of 60.62 points (SD = 17.23). Results indicate that participants, on average, were experiencing relatively low levels of anxiety at the time of testing.

Hypothesis Testing

The Relationship between Fear of Developing AD and Subjective Memory Complaints,

Family History of AD, Knowledge of AD, and Objective Memory

The correlations among family history, FADS, MFQ, KADS, GDS, STAI, and the objective memory and cognitive measures composite scores are presented in Table 3.

A central hypothesis to the current research was that fear of developing AD would be correlated with subjective memory, family history, and knowledge of AD, but not to objective memory. To test this hypothesis, Pearson product-moment correlations

between the MFQ, family history, KADS, objective memory composite score, cognitive measures composite score, and the FADS were computed. As hypothesized, subjective memory was positively associated with the FADS ($r = .33, p < .05$). Contrary to the hypothesis, however, significant correlations were not observed between family history of AD and the FADS ($r = .10, p > .05$), nor the KADS and the FADS ($r = -.10, p > .05$). Furthermore, emotional closeness with an afflicted family member, as experienced by the participant, was also not significantly correlated with the FADS ($r = .511, p > .05$). Lastly, as hypothesized, the FADS was not correlated with the objective memory ($r = -.13, p > .05$) or cognitive measure ($r = -.22, p > .05$) composite scores.

Predictors of Fear of Developing Alzheimer's Disease

Hierarchical regression was conducted to determine the degree to which subjective memory (MFQ), family history of AD (number of family members endorsed by each participant), knowledge of AD (KADS), and objective memory (composite score of objective memory tests) predicted adults' fear of developing AD.

Variables were entered into the hierarchical regression analysis in sequential blocks: (1) MFQ, (2) family history, (3) KADS, and (4) the objective memory composite score. The order in which the variables were entered into the equation was based upon the strength of the correlations found previously in French (2005) such that the variable most strongly correlated with the FADS (i.e., MFQ) was entered into the equation first. French (2005) found that the MFQ was most strongly positively correlated with the FADS ($r = .32, p < .001$) followed by family history ($r = .26, p < .01$). In this study, it was also found that objective memory was not significantly correlated with the FADS ($r = -.09, p > .05$). For this reason and for the reason that objective memory was again expected to

not predict fear, objective memory was entered into the equation last. Little is known about the relationship between knowledge of AD and fear of AD. Thus, the KADS was entered into the equation after the MFQ and family history, but before the objective memory composite score.

Table 3 displays the correlations between the variables. Table 4 displays the unstandardized regression coefficients (B) and standard errors (SE B), the standardized regression coefficients (β), adjusted R^2 , and R^2 change for each step in the regression.

After step 1, with subjective memory in the equation, $R^2 = .11$, $F(1, 48) = 6.03$, $p < .05$. Addition of family history of AD, knowledge of AD, and objective memory did not reliably improve R^2 at steps 2, 3, or 4 of the regression analysis. After step 4, with all independent variables in the equation, $R^2 = .13$, $F(4, 45) = 1.72$, $p > .05$. Results from the hierarchical regression analysis revealed that neither family history of AD, knowledge of AD, nor objective memory improved prediction of older adults' fear of developing AD beyond that afforded by subjective memory.

The Relationship between Knowledge of AD and Levels of Anxiety

A Pearson product-moment correlation was computed between the KADS and the STAI-Y to examine the hypothesis that a positive association would exist between the variables. Results of the analysis revealed no significant relationship ($r = -.16$, $p > .05$).

The Relationship between Subjective Memory Complaints and Objective Memory

To test the hypothesis that there would be no significant relationship between subjective memory complaints and objective memory, a Pearson product-moment correlation was calculated between the MFQ and the objective memory and cognitive measures composite scores. Data analysis revealed that, in fact, no significant

relationship existed between the MFQ and either of the composite scores (objective memory: $r = .26, p > .05$; cognitive measures: $r = .26, p > .05$).

The Relationship between Fear of Developing Alzheimer's Disease and Subjective Memory Complaints after Controlling for Negative Mood

Significant correlations were found between the FADS and the MFQ ($r = .33, p < .05$) and the FADS and the GDS ($r = .42, p < .01$). No significant correlation was observed between the MFQ and the GDS ($r = .16, p > .05$). As proposed, a partial correlation was conducted to examine the relationship between the FADS and the MFQ after removing the effects of the GDS to ensure that negative mood was not affecting the relationship between subjective memory and fear of developing AD. The analysis revealed a $pr = .30, p < .05$. Results of this analysis support the hypothesis that the relationship between fear of developing AD and subjective memory would still be significant even after controlling for the effects of negative mood. This finding implies that the relationship between subjective memory and fear of developing AD is sufficiently strong and independent of negative mood.

CHAPTER 5

DISCUSSION

Relationships with and Predictors of Fear of Developing Alzheimer's Disease

Fear of Developing AD and Subjective Memory Complaints

In the current study it was hypothesized that subjective memory complaints would be positively correlated with and significantly predictive of fear of developing AD. These hypotheses were substantiated, confirming prior research findings that a significant relationship exists between subjective memory and fear of developing AD (Cutler & Hodgson, 1996; Cutler & Hodgson, 2001; French, 2005; Hodgson & Cutler, 2003, Werner, 2002). The fact that all published studies to date, including the current study, have found a significant relationship between subjective memory and fear of developing AD, substantiates the notion that older adults are more likely to fear developing AD if they perceive their memory as poor.

Fear of Developing AD and Family History of AD

Based on the study by French (2005), it was also hypothesized that family history of AD would be significantly correlated with and predictive of fear of developing the disease. In contrast to French (2005), the current study found a relationship in the predicted direction, albeit non-significant. The results, therefore, failed to confirm the proposed hypotheses, signifying that individuals with a family history of AD are no more afraid of developing the disease than individuals without a family history.

The reason for the discrepancy between studies is somewhat perplexing considering the similarities in methodology. Both studies operationalized family history of AD in the same way: an individual was considered to have a family history of AD if either a first or second degree family member was diagnosed with AD. Additionally, both studies used the FADS to assess older adults' fear of developing AD. The fact that the variables are identical leads the researcher to conjecture that the inconsistency in the results may be due to the differences in the samples studied.

Participants in the current study were recruited differently than those in the previous study because of more stringent rules implemented by the UNLV Institutional Review Board. In French's (2005) study, individuals were recruited from a wide variety of locations including retirement homes, senior centers, adult living complexes, and local neurology clinics. Additionally, many of the participants were tested in these facilities because of their inability to travel to UNLV for testing. In fact, the majority of testing appointments occurred in the community as opposed to on the UNLV campus. In the current study, very few subjects were recruited from senior facilities; the vast majority of participants were recruited from the community via newspaper ads and word of mouth. Moreover, all of the participants lived independently and were able to attend the testing session on the UNLV campus, suggesting, perhaps, a higher level of overall ability.

In addition to finding disparities between the two studies with regard to both testing locations and residence types, differences can also be found in demographic variables. When analyzing both the French (2005) and current studies, differences in education, ($\chi^2(7, 50) = 41.72, p < .01$) and ethnicity ($\chi^2(5, 50) = 11.32, p < .05$) emerged. With regard to education, participants in the current study had significantly higher levels of

education; participants in the current study had completed, on average, a Bachelor's degree, whereas participants in French's 2005 study had completed, on average, only some college without receiving even an Associate's or technical degree. Furthermore, only 8% of participants in the current study were ethnic minorities compared to 20% in the French (2005) study. Please refer to Table 5 for a comparison of demographic variables between French's 2005 study and the current study.

Another possibility for the discrepancy in results between studies rests in the differences in sample sizes. French (2005) found a moderate correlation ($r = .26, p < .01$) between family history and the FADS, whereas a much smaller relation was found in the current study ($r = .10, p > .05$). Although not significant, the relation between family history and the FADS in the current study is in a similar direction as that in the study by French (2005). It is possible that a larger sample size would allow for greater variability in both family history and the FADS, possibly yielding a stronger and more significant relation. This conjecture is further supported when examining effect sizes.

In the current study the sample size was sufficient enough to replicate some of the more robust effects from the French (2005) study. Specifically, in both studies, subjective memory was associated with and predictive of fear of developing Alzheimer's disease. In addition, given the smaller sample size in the current study ($N = 51$) versus that of French (2005; $N = 101$), the robustness of the effect of one's appraisal on one's own memory in the prediction of fear of developing AD, is further exemplified. A smaller sample size than that in French's 2005 study did, however, seem to contribute to the lack of replication of results that were less robust. Specifically, power analyses

indicated that many more participants would be needed to replicate the prior findings of a significant relation between family history of AD and one's fear of developing AD.

Taken together, differences in demographic variables as well as a possibly insufficient sample size may be contributing to the lack of replication of the relationship between family history and fear of developing AD. Future investigation would benefit from sampling a larger and more diverse, both ethnically and educationally, population. Specifically, a sample of twice to three times that in the current study as well as a population with more lower end variability with regard to education as well as a greater representation of minorities might increase the likelihood of replicating the less robust findings of French (2005).

Fear of Developing AD and Knowledge of AD

Few studies have addressed the relationship between knowledge of AD and anxiety regarding development of the disease. Of these studies, one found no relationship between knowledge of AD and fear (Commissaris et al., 1994), another found that increased knowledge of AD decreased fear of AD (Commissaris et al., 1995), and the last found that, as knowledge of AD increased so did fear of developing the disease (LaForce & McLean, 2005).

Based upon the previous studies and the Medical Students' Disease construct, it was hypothesized that as knowledge of AD increased so would fear of developing the disease. Unfortunately only a small, non-significant correlation ($r = -.10, p > .05$) was found between knowledge of AD and fear of developing AD. In addition, the subsequent regression analysis of factors contributing to fear of developing AD, knowledge, as an individual predictor, did not contribute significantly to the prediction of fear of

developing AD ($\beta_s = -.056, -.045; p > .05$). Of note, however, is the fact that the measurement of AD was based on the KADS. And, although the parent measure of the KADS (i.e., ADKT) was a psychometrically sound instrument, the KADS is currently in its pilot form, and thus, may not have the same psychometric properties as the original questionnaire, thereby possibly affecting the results of the study.

It is difficult to interpret this finding. There are relatively few studies comparing knowledge of AD and fear of developing AD and of those extant studies, none is in agreement. Results from this study, however, are consistent with Commissaris and colleagues' (1994) results. Future research using comparable methodology will aid in determining whether or not "a lot of knowledge [is] a bad thing..." (Chapman & Bilton, 2004, p. 369).

Fear of Developing AD and Objective Memory

Whereas it was hypothesized that subjective memory, family history of AD, and knowledge of AD would be both be positively correlated with and significant predictors of fear of developing AD, objective memory was thought to not be associated with or predictive of this fear, which is precisely what was found in the current study. This result suggests that, regardless of an individual's actual memory performance on standardized tests of memory, he/she will not be afraid of developing AD. Individuals with impaired memory will be no more afraid of developing AD than individuals with a good/"normal" memory. Only one other study has directly examined this relationship (French, 2005). The current finding is important because it replicates the results found in this previous study.

Previous research has shown that individuals with actual memory impairments do not believe, or at least they do not admit, that they have a problem (Bouchard & Rossor, 1999). Additionally, both the current study and previous studies have revealed that individuals are afraid of developing the disease if they believe their memory is poor. Therefore, the current study lends support to the notion that memory-impaired individuals are not afraid of developing AD because they do not believe they have a memory problem.

Relationship between Knowledge of AD and Levels of Anxiety

Only two studies thus far have addressed the relationship between knowledge of AD and anxiety (Graham et al., 1997a; Proctor et al., 2002). These studies found that as knowledge of dementia increased, so did anxiety. Based upon the previous studies, the Medical Student Disease concept, and the hypothesis that knowledge of AD would be associated with fear of developing AD (as discussed in the introduction), it was also conjectured that knowledge of AD would be associated with anxiety. This hypothesis was not substantiated.

One reason for the disparity in results may be a reflection of the population being examined. Both Graham et al. (1997a) and Proctor et al. (2002) tested the relationship between knowledge of AD and anxiety using caregivers of dementia patients. The current study utilizes older adults from the community. In fact, only 10% of the participants were caregivers to patients with AD at the time of testing. Being a caregiver can dramatically increase not only knowledge of AD, but also anxiety levels (Mahoney, Regan, Katona, & Livingston, 2005; Schulz, O'Brien, & Bookwala, 1995). Therefore, if

the current study utilized caregivers as the previous studies did, the hypothesis may have been substantiated.

Relationship between Subjective and Objective Memory

In the current study it was hypothesized that there would be no relationship between subjective and objective memory. This hypothesis was substantiated suggesting that an individual's perception of his/her memory does not accurately reflect the individual's actual memory. Previous research investigating the relationship between subjective and objective memory has been mixed. Some research has found a positive relationship between the two variables (Gagnon et al., 1994; Jonker et al., 1995; Jonker et al., 1996; Johansson et al., 1997; McPherson et al., 1995; Wang et al., 2000; Zelinski et al., 1980). Most research, however, has found either a weak/modest relationship (Bolla et al., 1991; Hertzog et al., 2000; Schmidt et al., 2001; Zelinski et al., 2001) or no relationship (French, 2005; Kahn et al., 1975; Riedel-Heller et al., 1999; Schofield et al., 1997). The current study provides additional information in support of the belief that there is no significant relationship between subjective and objective memory. And, because many of the methodological problems (i.e. utilizing single-item questionnaires or measures without good psychometric properties to address subjective memory) plaguing previous studies were corrected in the current study, it gives even further credibility to this notion.

The Relationship between Fear of Developing Alzheimer's Disease and Subjective Memory Complaints after Controlling for Negative Mood

To ensure that the relationship between subjective memory and fear of developing AD was not due to negative mood in the current study, the effects of negative mood were statistically removed from the correlation between the subjective memory measure and the FADS. The correlation between subjective memory and fear of developing AD remained significant even after removing the effects of negative mood suggesting that negative mood does not impact an individual's perception of his/her memory. Individuals who believe their memory is poor are afraid of developing AD regardless of whether or not their mood is negative.

Limitations and Future Research

The current study was able to improve upon many of the previous studies by addressing several of their limitations. For example, in the current study we (1) used a psychometrically sound instrument for measuring fear of developing AD, (2) used a 49 item questionnaire to assess knowledge of AD rather than asking just a few questions, (3) excluded individuals using cognitive enhancing medication, and (4) utilized community-dwelling individuals ages 65 and older who are at particular risk for developing AD. Yet, even though great effort was made in addressing limitations from previous studies, not all limitations could be foreseen.

The generalizability of the findings of the current study to the broader population may be somewhat limited due to the nature of the participants. First, in the current study, the researchers were able to obtain a fairly representative sample of community-dwelling

Caucasian individuals. However, older adults from ethnic minority groups were underrepresented. Secondly, individuals were recruited mainly from the general community; only a few participants were recruited from senior institutions. Thus, caution should be taken in generalizing results of this study to older adults from underrepresented ethnic groups and living facilities other than those in the general community.

Secondly, participants included in the study were pre-screened for gross memory impairment and neurological disorders. Therefore, results of the study can only be generalized to individuals with no known neurological impairments and those without obvious dementia.

Other major limitations of the current study pertain to family history of AD. Only 24% of individuals reported a family history of AD. This number is reduced to 12% when looking specifically at first-degree relatives with the disease. As discussed previously, having a larger sample size in general and a larger sample size of individuals with a family history of AD more specifically, may yield stronger results than the ones found in the current study. Additionally, a larger sample of this nature would also allow researchers to make valid comparisons between individuals with and without a family history of AD.

Measuring family history of AD in older adults is difficult. The current study used self-report data from participants. This is problematic in that individuals must rely upon retrospective information of family members that may or may not be accurate. This is in part due to the fact that Alzheimer's disease as a labeled medical condition did not gain wide-spread use until approximately 25-30 years ago when the National Institute of Health / National Institute on Aging was established. And, it was not even until several

years after the inception of the NIA that researchers began receiving funding for exploration of AD and related dementias (Kalamazoo Center for Medical Studies, n.d.). Therefore, many of the participants may not have factual information about their relatives' diagnoses as many of the inflicted relatives lived prior to the AD social movement. Having information from both the participant and an additional, reliable informant could confirm that a family history of AD actually existed. Another option would be to use medical records of diagnosed family members to confirm a diagnosis of AD.

Another limitation lies in the measure being used to address knowledge of AD. The Knowledge about Alzheimer's Disease Scale (KADS; Carpenter et al., 2006) employed in the dissertation is in its pilot form. The psychometric properties of this questionnaire have yet to be determined. Furthermore, the True/False response choices do not allow for significant variation in responses. And, most individuals, although reporting that they do not know much about AD, actually performed fairly well on the test causing a ceiling effect. Future research using the KADS in its psychometrically sound form will aid in determining the accuracy of the current study's results.

Finally, subjective memory accounts for only 9.3% of the variance in fear of developing AD. Future research might explore what other variables account for the remaining variance. Some of these potential variables worth exploring include additional risk factors such as head injury and vascular health, financial constraints, relationship with potential caregivers, and spiritual beliefs.

Conclusion

In the current study we found that: (1) in-line with existing studies, subjective memory was positively associated with fear of developing AD, (2) family history, knowledge of AD, and objective memory were not significantly correlated with fear of developing AD, (3) subjective memory was the only significant predictor of fear of developing AD; neither family history, knowledge of AD, nor objective memory predicted fear of developing the disease, (4) knowledge of AD was not associated with anxiety, (5) there was no significant relationship between subjective and objective memory, and (6) the relationship between subjective memory and fear of developing AD was still significant after controlling for participants' negative mood.

From a research perspective, the results of the current study are novel and important for several reasons. To date, the few published studies examining peoples' fear of developing AD have focused on correlating fear with only two main variables: anxiety or subjective memory. The current study not only replicated these published studies in finding positive associations between fear of developing AD and anxiety or subjective memory but also extended these previous results by including additional relevant variables such as subjective and objective memory function, family history, and knowledge of AD. Even though these additional variables failed to exhibit significant correlations with fear of developing AD, we have a better understanding of how they relate to such fear.

From a clinical standpoint, these findings will aid clinicians in determining what aspects are possibly contributing to their clients' fears of developing AD. In addition to therapy, psychoeducation about the relationship between fear of developing AD and

subjective memory complaints, family history, knowledge of AD, and objective memory may prove beneficial to clients in that it may help assuage their fears of developing AD.

In conclusion, Alzheimer's disease is becoming increasingly prevalent. Yet, older adults' fear of developing AD has received little attention in the literature. Part of this may be due to the fact that, until recently, there were no psychometrically sound instruments to measure this fear. The development of the Fear of Alzheimer's Disease Scale (FADS; French, 2005) provides researchers the opportunity to explore older adults' fear of developing AD and along with this instrument, the variables possibly affecting fear of developing this degenerative disease.

APPENDIX I

TABLES

Table 1

*Maximum Scores, Means and Standard Deviations of Measures and their Subscales
(N = 50)*

Measure	Max	Mean	SD
Fear of Alzheimer's Disease Scale (FADS)	120	25.44	20.91
General Fear	68	18.02	14.30
Physical Symptoms	32	1.42	4.20
Catastrophic Attitude	20	6.00	4.69
Memory Functioning Questionnaire (MFQ)	448	284.14	48.62
General Frequency of Forgetting	224	164.00	26.38
Seriousness of Forgetting	126	82.36	23.15
Retrospective Functioning	35	16.06	4.92
Mnemonic Usage	56	21.72	10.52
Knowledge about Alzheimer's Disease Scale (KADS)	49	37.54	3.80
Perceived Knowledge of AD	10	5.38	1.75
Composite Score of Objective Memory	237	120.92	28.76
Logical Memory I Recall Total Score	75	38.82	10.34
Logical Memory I Scaled Score		11.64	3.04
Logical Memory II Recall Total Score	50	23.02	9.01
Logical Memory II Scaled Score		12.04	3.16
CVLT-II Recall Total Score	80	47.80	10.14
CVLT-II Recall T-Score		57.64	10.13
CVLT-II Short Delay Recall	16	9.76	3.11
CVLT-II Long Delay Recall	16	10.80	3.31
Composite Score of Cognitive Measures	442	243.48	41.62
Digit Symbol Total Score	133	63.20	13.52
Digit Symbol Scale Score		12.62	2.76
Incidental Learning Pairing	18	9.94	4.27
Incidental Learning Free Recall	9	6.72	1.40
Digit Span Total Score	30	18.70	3.75
Digit Span Scaled Score		12.88	2.96
Boston Naming Test Total Score	15	14.72	0.57
Geriatric Depression Scale (GDS)	30	4.60	4.73
State-Trait Anxiety Inventory – Form Y (STAI)	160	60.62	17.23
State Anxiety Subscale	80	29.34	10.20
Trait Anxiety Subscale	80	31.28	8.78

Note. The Composite Score of Cognitive Measures includes both the measures listed and the measures contained in the Composite Score of Objective Memory.

Table 2

Percentage of responses for the Fear of Alzheimer's Disease Scale (N = 50)

Item	Never	Rarely	Some- times	Often	Always
I am afraid of getting Alzheimer's disease.	10	34	40	14	2
When I forget something, I am apt to think that I am developing Alzheimer's disease.	24	42	24	8	2
My heart races or palpitates when I think about getting Alzheimer's disease.	82	14	4	0	0
I cannot sleep because I'm worrying about developing Alzheimer's disease.	92	2	2	2	0
I would rather die than develop Alzheimer's disease.	52	16	16	8	8
I am afraid of developing Alzheimer's disease because of the burden I would be for my family.	28	30	26	10	6
When I think about the possibility of developing Alzheimer's disease, I become nervous or anxious.	60	26	10	2	2
The more I learn about Alzheimer's disease, the more fearful I become of getting it.	42	28	22	2	6
When I misplace things, I sometimes think that I may have Alzheimer's disease.	36	34	24	2	4
I feel hot and even sweat when I think about developing Alzheimer's disease.	86	10	2	0	2
Developing Alzheimer's disease would be the worst thing to happen to me.	44	20	22	8	8
Thinking about Alzheimer's disease makes me feel fatigued.	88	8	2	2	0
I fear not recognizing family members.	48	30	8	12	2
I think that I will probably get Alzheimer's disease and it frightens me.	58	20	16	8	0
Even though my memory is good, I am still afraid of developing Alzheimer's disease.	26	42	22	10	0
My hands become clammy when I think about getting Alzheimer's disease.	90	6	2	0	2

Item	Never	Rarely	Sometimes	Often	Always
I often have difficulty concentrating because I'm worrying about developing Alzheimer's disease.	90	6	4	0	0
Developing Alzheimer's disease frightens me because I would eventually lose all of my independence.	36	26	18	8	12
Now that Alzheimer's disease is becoming more public with the diagnosis of popular T.V., movie, and political figures (e.g., Charlton Heston, Ronald Reagan), I am becoming more afraid that I may develop it.	48	36	14	0	2
I feel shaky when I think about getting Alzheimer's disease.	86	4	8	0	2
My appetite decreases when I think about developing Alzheimer's disease.	98	0	0	0	2
I would rather have a painful physical illness (e.g., cancer, AIDS) than develop Alzheimer's disease.	56	22	12	6	4
When I hear about others with Alzheimer's disease, I become fearful that I will get it as well.	40	34	20	4	2
I'm afraid of losing my memories.	28	22	34	12	4
The older I get, the more fearful I become that I may develop Alzheimer's disease.	32	34	24	4	6
I believe that Alzheimer's disease is one of the worst diseases a person could develop.	24	22	28	14	12
I worry about developing Alzheimer's disease more than I worry about developing other diseases.	58	18	16	4	4
I'm afraid of getting Alzheimer's disease because I would have to rely on someone else to take care of me.	28	30	16	16	10
The worse my memory becomes, the more I fear that I may have Alzheimer's disease.	36	38	10	10	6
I sometimes think that I am developing Alzheimer's disease.	58	26	10	2	4

Table 3

Correlations among Measures

	FADS	MFQ	KADS	GDS	STAI	Objective Memory	Cognitive Measures
Family History	.10	.17	.24	-.18	.22	-.01	.01
FADS		.33*	-.10	.42**	.44**	-.13	-.22
MFQ			-.17	.16	.41**	-.26	-.26
KADS				-.29*	-.28*	.33*	.29*
GDS					.71***	-.07	-.12
STAI						-.19	-.22
Objective Memory							.95***

Note. FADS = Fear of Alzheimer's Disease Scale; MFQ = Memory Functioning Questionnaire; GDS = Geriatric Depression Scale; STAI = State-Trait Anxiety Inventory; Objective Memory is the composite score of the memory measures; Cognitive Measures is the composite score of the Objective Memory tests plus the additional cognitive measures.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4

Summary of Hierarchical Regression Analysis for Variables Predicting Fear of Developing Alzheimer's Disease (N = 50)

Variable	B	SE B	β	Adjusted R ²	R ² Change
Step 1				.09	.11
MFQ	.14	.06	.33*		
Step 2				.08	.00
MFQ	.14	.06	.33*		
Family History	.96	2.88	.05		
Step 3				.06	.00
MFQ	.14	.06	.31*		
Family History	1.28	3.02	.06		
KADS	-.31	.81	-.06		
Step 4				.06	.02
MFQ	.13	.06	.31*		
Family History	1.24	3.06	.06		
KADS	-.25	.85	-.05		
Objective Memory	-.19	.76	-.04		

Note. MFQ = Memory Functioning Questionnaire; Family History is the number of relatives with Alzheimer's disease; KADS = Knowledge About Alzheimer's Disease; Objective Memory is the composite score of the memory measures.

* $p < .05$.

Table 5

Demographic information for participants in the French (2005) study (N = 101) and the current study

Demographic Variable	French (2005) (% of participants)	Current Study (% of participants)
Age	M=73.45; SD=6.86	M=72.24; SD=5.37
Gender		
Male	35	48
Female	65	52
Marital Status		
Single	4	10
Married	44	52
Divorced	22	22
Widowed	30	16
Ethnicity		
African American	13	2
Asian	1	4
Caucasian	80	92
Latino/Hispanic	5	0
Native American	0	2
Pacific Islander/Filipino	0	0
Other	1	0
Religious Affiliation		
Buddhist	0	2
Catholic	22	10
Jewish	11	18
Muslim	0	0
Protestant	39	26
Latter Day Saints	2	2
No Affiliation	23	40
Other	3	2
Education Level		
Some high school or less	11	4
Graduated High School (or GED)	42	14
Technical or Associate's degree	8	4
Some College	1	26
Bachelor's degree	22	20
Some graduate school	0	2
Master's degree	12	14
PhD, JD, or MD Degree	4	16

APPENDIX II

MENTAL STATUS QUESTIONNAIRE (MSQ)

QUESTION	RESPONSE	RIGHT (1)	WRONG (0)
1. What is the name of this place?			
2. Where is it located (address)?			
3. What is today's date?			
4. What is the month now?			
5. What is the year?			
6. How old are you?			
7. When were you born (month)?			
8. When were you born (year)?			
9. Who is the president of the U.S.?			
10. Who was the president before him?			

TOTAL SCORE _____

APPENDIX III

PERSONAL BACKGROUND INFORMATION

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Home Phone: _____ Work Phone: _____

Can we leave a message at these numbers? Yes No

Age: _____ Date of Birth: _____

Gender: Male Female

Marital Status: Single Married Divorced Widowed

Ethnicity (Please check only one):

- African American Asian Native American
 Latino/Hispanic Caucasian Pacific Islander/Filipino
 Other: _____

Were you born in the United States? No Yes

If **NO**, how old were you when you moved to the U. S.? _____

Do you speak English fluently? No Yes

Religious Affiliation (Please check only one):

- Buddhist Catholic Jewish Muslim
 Protestant Latter Day Saints Other: _____

What was your highest level of education?

- Some high school or less
 Graduated high school (or GED)
 Some technical or associate coursework
 Technical or associate's degree
 Some college
 Bachelor's degree
 Some graduate school
 Master's degree
 Doctoral (Ph.D., other doctoral) degree
 Professional degree (e.g., M.D., J.D.)

What is/was your primary occupation? _____

Would you like to participate in future research if available? Yes No

If **YES**, can we contact you by phone? Yes No

If **YES**, can we contact you by mail? Yes No

MEDICAL HISTORY

Do you have any current medical problems? Yes No

If **YES**, please list what medical problems you currently have:

1. Medical Diagnosis/Problem: _____

2. Medical Diagnosis/Problem: _____

3. Medical Diagnosis/Problem: _____

Have you ever had open-heart surgery? Yes No

Have you ever been diagnosed with or had any of the following:

Parkinson's Disease Huntington's Disease

Alzheimer's Disease Pick's Disease

Creutzfeldt-Jakob Disease Vascular Dementia

Stroke Hydrocephalus

Brain damage Delirium

Endocrine Disorder (please list): _____

Major organ system impairment (examples: heart, lung, liver, kidney). Please list: _____

Are you taking any of the following medications:

Aricept Exelon Reminyl

Razadyne Cognex Namenda

Do you have any problems walking? Yes No

PSYCHIATRIC HISTORY

Have you ever been diagnosed with or had any of the following:

Major Depression Schizophrenia

Post-Traumatic Stress Disorder (PTSD)

Anxiety Disorder (please list type(s)): _____

Alcohol or substance abuse or dependence

Other: _____

Do you drink alcohol? Yes No

If **YES**, please complete the following:

1. How frequently do you drink? _____

2. When you drink, what do you usually drink? _____

Do you use any recreational drugs? Yes No

If **YES**, please complete the following:

1. How frequently do you use recreational drugs? _____

3. What recreational drugs do you use? _____

FAMILY HISTORY

Have any of your **biological** family members ever been diagnosed with Alzheimer's Disease? Yes No

First degree relative (Mother, Father, Sibling, Child)

Has more than one first degree relative been diagnosed with Alzheimer's Disease? Yes No

If **YES**, how many of your first degree relatives have been diagnosed? _____

How emotionally close are you to your first degree relative #1?

<i>Not at all Close</i>		<i>Somewhat Close</i>		<i>Extremely Close</i>
1	2	3	4	5

How emotionally close are you to your first degree relative #2?

<i>Not at all Close</i>		<i>Somewhat Close</i>		<i>Extremely Close</i>
1	2	3	4	5

How emotionally close are you to your first degree relative #3?

<i>Not at all Close</i>		<i>Somewhat Close</i>		<i>Extremely Close</i>
1	2	3	4	5

How emotionally close are you to your first degree relative #4?

<i>Not at all Close</i>		<i>Somewhat Close</i>		<i>Extremely Close</i>
1	2	3	4	5

Second degree relative (Grandfather, Grandmother, Aunt, Uncle)

Has more than one second degree relative been diagnosed with Alzheimer's Disease? Yes No

If **YES**, how many of your second degree relatives have been diagnosed? _____

How emotionally close are you to your second degree relative #1?

Not at all Close *Somewhat Close* *Extremely Close*
1 2 3 4 5

How emotionally close are you to your second degree relative #2?

Not at all Close *Somewhat Close* *Extremely Close*
1 2 3 4 5

How emotionally close are you to your second degree relative #3?

Not at all Close *Somewhat Close* *Extremely Close*
1 2 3 4 5

How emotionally close are you to your second degree relative #4?

Not at all Close *Somewhat Close* *Extremely Close*
1 2 3 4 5

QUESTIONS PERTAINING TO ALZHEIMER'S DISEASE

Have you heard of Alzheimer's disease? No Yes

Are you currently the main family caregiver for someone with Alzheimer's disease or a related disorder? No Yes

Have you ever been the main family caregiver for someone with Alzheimer's disease or a related disorder? No Yes

Have you ever attended an Alzheimer's disease or related disorder support group?
 No Yes

Have you ever attended a class or educational program about Alzheimer's disease or a related disorder? No Yes

Does your paid job involve working with people who have Alzheimer's disease or a related disorder? No Yes

Do you volunteer with people who have Alzheimer's disease or a related disorder?
 No Yes

From which of the following places have you obtained information about Alzheimer's disease and related disorders? (check all that apply)

- family
 - friends and acquaintances
 - physicians or other health care professionals
 - Alzheimer's Association
 - television or radio
 - books, newspapers, or magazines
 - religious leaders
 - MEDLINE, PubMed, or similar professional databases
 - other Internet or World Wide Web sites
 - academic journals
 - research conferences
 - other sources (please list): _____
-

APPENDIX IV

FEAR OF ALZHEIMER'S DISEASE SCALE (FADS)

Instructions: Please indicate your level of agreement with each statement by checking the appropriate box.

Check one

	Never	Rarely	Some- times	Often	Always
1. I am afraid of getting Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. When I forget something, I am apt to think that I am developing Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. My heart races or palpitates when I think about getting Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. I cannot sleep because I'm worrying about developing Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. I would rather die than develop Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. I am afraid of developing Alzheimer's disease because of the burden I would be for my family.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. When I think about the possibility of developing Alzheimer's disease, I become nervous or anxious.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. The more I learn about Alzheimer's disease, the more fearful I become of getting it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. When I misplace things, I sometimes think that I may have Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. I feel hot and even sweat when I think about developing Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Check one

	Never	Rarely	Some- times	Often	Always
11. Developing Alzheimer's disease would be the worst thing to happen to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Thinking about Alzheimer's disease makes me feel fatigued.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. I fear not recognizing family members.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. I think that I will probably get Alzheimer's disease and it frightens me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Even though my memory is good, I am still afraid of developing Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. My hands become clammy when I think about getting Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. I often have difficulty concentrating because I'm worrying about developing Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Developing Alzheimer's disease frightens me because I would eventually lose all of my independence.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Now that Alzheimer's disease is becoming more public with the diagnosis of popular T.V., movie, and political figures (e.g., Charlton Heston, Ronald Reagan), I am becoming more afraid that I may develop it.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. I feel shaky when I think about getting Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. My appetite decreases when I think about developing Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. I would rather have a painful physical illness (e.g., cancer, AIDS) than develop Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. When I hear about others with Alzheimer's disease, I become fearful that I will get it as well.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Check one

	Never	Rarely	Some- times	Often	Always
24. I'm afraid of losing my memories.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. The older I get, the more fearful I become that I may develop Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. I believe that Alzheimer's disease is one of the worst diseases a person could develop.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. I worry about developing Alzheimer's disease more than I worry about developing other diseases.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. I'm afraid of getting Alzheimer's disease because I would have to rely on someone else to take care of me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. The worse my memory becomes, the more I fear that I may have Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. I sometimes think that I am developing Alzheimer's disease.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How often do these present a problem for you?

	<i>always</i>		<i>sometimes</i>			<i>never</i>	
l. words	1	2	3	4	5	6	7
m. going to the store and forgetting what you wanted to buy	1	2	3	4	5	6	7
n. taking a test	1	2	3	4	5	6	7
o. beginning to do something and forgetting What you were doing	1	2	3	4	5	6	7
p. losing the thread of thought in conversation	1	2	3	4	5	6	7
q. losing the thread of thought in public speaking	1	2	3	4	5	6	7
r. knowing whether you've already told someone something	1	2	3	4	5	6	7

As you are reading a novel, how often do you have trouble remembering what you have read ...

	<i>always</i>		<i>sometimes</i>			<i>never</i>	
a. in the opening chapters, once you have finished the book	1	2	3	4	5	6	7
b. three or four chapters before the one you are currently reading	1	2	3	4	5	6	7
c. the chapter before the one you are currently reading	1	2	3	4	5	6	7
d. the paragraph just before the one you are currently reading	1	2	3	4	5	6	7
e. the sentence before the one you are currently reading	1	2	3	4	5	6	7

When you are reading a newspaper or magazine article, how often do you have trouble remembering what you have read...

	<i>always</i>		<i>sometimes</i>			<i>never</i>	
a. in the opening paragraphs, once you have finished the article	1	2	3	4	5	6	7
b. three or four paragraphs before the one you are currently reading	1	2	3	4	5	6	7
c. the paragraph before the one you are currently reading	1	2	3	4	5	6	7
d. three or four sentences before the one you are currently reading	1	2	3	4	5	6	7
e. the sentence before the one you are currently reading	1	2	3	4	5	6	7

How well you remember things that occurred...

	<i>very bad</i>		<i>fair</i>			<i>very good</i>	
a. last month is	1	2	3	4	5	6	7
b. between 6 months and 1 year ago is	1	2	3	4	5	6	7
c. between 1 and 5 years ago is	1	2	3	4	5	6	7
d. between 6 and 10 years ago is	1	2	3	4	5	6	7

Seriousness of Forgetting

When you actually forget in these situations, how serious of a problem do you consider memory failure to be? ...

	<i>very serious</i>		<i>somewhat serious</i>			<i>not serious</i>	
a. names	1	2	3	4	5	6	7
b. faces	1	2	3	4	5	6	7
c. appointments	1	2	3	4	5	6	7
d. where you put things (e.g., keys)	1	2	3	4	5	6	7
e. performing household chores	1	2	3	4	5	6	7
f. directions to places	1	2	3	4	5	6	7
g. phone numbers you've just checked	1	2	3	4	5	6	7
h. phone numbers used frequently	1	2	3	4	5	6	7
i. things people tell you	1	2	3	4	5	6	7
j. keeping up correspondence	1	2	3	4	5	6	7
k. personal dates (e.g., birthdays)	1	2	3	4	5	6	7
l. words	1	2	3	4	5	6	7
m. going to the store and forgetting what you wanted to buy	1	2	3	4	5	6	7
n. taking a test	1	2	3	4	5	6	7
o. beginning to do something and forgetting what you were doing	1	2	3	4	5	6	7

When you actually forget in these situations, how serious of a problem do you consider memory failure to be? ...

	<i>very serious</i>		<i>somewhat serious</i>			<i>not serious</i>	
p. losing the thread of thought in conversation	1	2	3	4	5	6	7
q. losing the thread of thought in public speaking	1	2	3	4	5	6	7
r. knowing whether you've already told someone something	1	2	3	4	5	6	7

Retrospective Functioning

How is your memory compared to the way it was...

	<i>much worse</i>		<i>same</i>			<i>much better</i>	
a. 1 year ago?	1	2	3	4	5	6	7
b. 5 years ago?	1	2	3	4	5	6	7
c. 10 years ago?	1	2	3	4	5	6	7
d. 20 years ago?	1	2	3	4	5	6	7
e. when you were 18?	1	2	3	4	5	6	7

Mnemonic Usage

How often do you use these techniques to remind yourself about things...

	<i>always</i>		<i>sometimes</i>			<i>never</i>	
a. keep an appointment book	1	2	3	4	5	6	7
b. write yourself reminder notes	1	2	3	4	5	6	7
c. make lists of things to do	1	2	3	4	5	6	7
d. make grocery lists	1	2	3	4	5	6	7
e. plan your daily schedule in advance	1	2	3	4	5	6	7
f. mental repetition	1	2	3	4	5	6	7
g. associations with other things	1	2	3	4	5	6	7
h. keep things you need to do in a prominent place where you will notice them	1	2	3	4	5	6	7

APPENDIX VI

KNOWLEDGE ABOUT ALZHEIMER'S DISEASE

Below are some statements about Alzheimer's disease. Please read each statement carefully and check whether you think the statement is True or False. If you aren't sure of the right answer, make your best guess. It's important to check an answer for every statement even if you're not completely sure of the answer.

	Check One	
1. An evaluation of a person for Alzheimer's disease typically includes information from a physical exam, memory tests, brain scans, and a history of the symptoms.	<input type="checkbox"/> True	<input type="checkbox"/> False
2. People with Alzheimer's disease are particularly prone to depression.	<input type="checkbox"/> True	<input type="checkbox"/> False
3. In general, as people with Alzheimer's disease get worse, they are more likely to wander and get lost.	<input type="checkbox"/> True	<input type="checkbox"/> False
4. Medications can permanently stop Alzheimer's disease from getting worse.	<input type="checkbox"/> True	<input type="checkbox"/> False
5. More than 50% of people over the age of 85 have Alzheimer's disease.	<input type="checkbox"/> True	<input type="checkbox"/> False
6. It has been scientifically proven that mental exercise can prevent a person from getting Alzheimer's disease.	<input type="checkbox"/> True	<input type="checkbox"/> False
7. After symptoms of Alzheimer's disease appear, the average life expectancy is 6 to 12 years.	<input type="checkbox"/> True	<input type="checkbox"/> False
8. When a person with Alzheimer's disease becomes agitated, a medical examination might reveal other health problems that caused the agitation.	<input type="checkbox"/> True	<input type="checkbox"/> False
9. People with Alzheimer's disease do best with simple instructions giving one step at a time.	<input type="checkbox"/> True	<input type="checkbox"/> False
10. When people with Alzheimer's disease begin to have difficulty taking care of themselves, caregivers should take over right away.	<input type="checkbox"/> True	<input type="checkbox"/> False
11. If a person with Alzheimer's disease becomes alert and agitated at night, a good strategy is to try to make sure that the person gets plenty of physical activity during the day.	<input type="checkbox"/> True	<input type="checkbox"/> False
12. In rare cases, people have recovered from Alzheimer's disease.	<input type="checkbox"/> True	<input type="checkbox"/> False
13. Having a parent or sibling with Alzheimer's disease increases the chance of developing it.	<input type="checkbox"/> True	<input type="checkbox"/> False
14. People whose Alzheimer's disease is not yet severe can benefit from psychotherapy for depression and anxiety.	<input type="checkbox"/> True	<input type="checkbox"/> False

Check One

15. Some people with Alzheimer's disease cannot recognize their children when they see them.	<input type="checkbox"/> True	<input type="checkbox"/> False
16. Drivers in the early stages of Alzheimer's disease have more auto accidents than other older drivers.	<input type="checkbox"/> True	<input type="checkbox"/> False
17. A person suspected of having Alzheimer's disease should be evaluated to rule out treatable disorders with similar symptoms.	<input type="checkbox"/> True	<input type="checkbox"/> False
18. If trouble with memory and confused thinking appears suddenly, it is likely due to Alzheimer's disease.	<input type="checkbox"/> True	<input type="checkbox"/> False
19. Currently, the best way to diagnose Alzheimer's disease is with a blood test.	<input type="checkbox"/> True	<input type="checkbox"/> False
20. Most people with Alzheimer's disease live in nursing homes.	<input type="checkbox"/> True	<input type="checkbox"/> False
21. Poor nutrition can make the symptoms of Alzheimer's disease worse.	<input type="checkbox"/> True	<input type="checkbox"/> False
22. People in their 30s can have Alzheimer's disease.	<input type="checkbox"/> True	<input type="checkbox"/> False
23. Taking vitamin E may reduce a person's risk of developing Alzheimer's disease.	<input type="checkbox"/> True	<input type="checkbox"/> False
24. A person with Alzheimer's disease becomes increasingly likely to fall down as the disease gets worse.	<input type="checkbox"/> True	<input type="checkbox"/> False
25. If a person with Alzheimer's disease follows the caregiver all over the house, it is helpful to encourage the person with Alzheimer's disease to stay in one room.	<input type="checkbox"/> True	<input type="checkbox"/> False
26. When people with Alzheimer's disease repeat the same question or story several times, it is helpful to remind them that they are repeating themselves.	<input type="checkbox"/> True	<input type="checkbox"/> False
27. Once people have Alzheimer's disease, they are no longer capable of making informed decisions about their own care.	<input type="checkbox"/> True	<input type="checkbox"/> False
28. Eventually, a person with Alzheimer's disease will need 24-hour supervision.	<input type="checkbox"/> True	<input type="checkbox"/> False
29. Having high cholesterol may increase a person's risk of developing Alzheimer's disease.	<input type="checkbox"/> True	<input type="checkbox"/> False
30. Alzheimer's disease can be caused by eating food that was cooked in aluminum pots.	<input type="checkbox"/> True	<input type="checkbox"/> False
31. The percentage of people over age 65 with Alzheimer's disease exceeds 10%.	<input type="checkbox"/> True	<input type="checkbox"/> False
32. Tremor or shaking of the hands or arms is a common symptom of people with Alzheimer's disease.	<input type="checkbox"/> True	<input type="checkbox"/> False
33. Symptoms of severe depression can be mistaken for symptoms of Alzheimer's disease.	<input type="checkbox"/> True	<input type="checkbox"/> False
34. Alzheimer's disease is one type of dementia.	<input type="checkbox"/> True	<input type="checkbox"/> False

Check One

35. Trouble handling money or paying bills is a common early symptom of Alzheimer's disease.	<input type="checkbox"/> True	<input type="checkbox"/> False
36. One symptom that can occur with Alzheimer's disease is believing that other people are stealing one's things.	<input type="checkbox"/> True	<input type="checkbox"/> False
37. When a person has Alzheimer's disease, using reminder notes is a crutch that can contribute to decline.	<input type="checkbox"/> True	<input type="checkbox"/> False
38. Prescription drugs that prevent Alzheimer's disease are available.	<input type="checkbox"/> True	<input type="checkbox"/> False
39. Having high blood pressure may increase a person's risk of developing Alzheimer's disease.	<input type="checkbox"/> True	<input type="checkbox"/> False
40. Genes can only partially account for the development of Alzheimer's disease.	<input type="checkbox"/> True	<input type="checkbox"/> False
41. It is safe for people with Alzheimer's disease to drive, as long as they have a companion in the car at all times.	<input type="checkbox"/> True	<input type="checkbox"/> False
42. People with Alzheimer's disease do best when exposed to new experiences and environments as often as possible.	<input type="checkbox"/> True	<input type="checkbox"/> False
43. People with Alzheimer's disease have more problems remembering things on some days than on others.	<input type="checkbox"/> True	<input type="checkbox"/> False
44. Alzheimer's disease is a normal part of aging, like gray hair or wrinkles.	<input type="checkbox"/> True	<input type="checkbox"/> False
45. Alzheimer's disease progresses at the same speed for everyone.	<input type="checkbox"/> True	<input type="checkbox"/> False
46. Changes in personality may occur in people who have Alzheimer's disease.	<input type="checkbox"/> True	<input type="checkbox"/> False
47. Alzheimer's disease cannot be cured.	<input type="checkbox"/> True	<input type="checkbox"/> False
48. Frequent forgetfulness is the most common early sign of Alzheimer's disease.	<input type="checkbox"/> True	<input type="checkbox"/> False
49. Most people with Alzheimer's disease remember recent events better than things that happened in the past.	<input type="checkbox"/> True	<input type="checkbox"/> False

50. Circle any number between 1 and 10 to indicate how much knowledge you think you have about Alzheimer's disease and related disorders.

1 2 3 4 5 6 7 8 9 10

I know nothing
at all

I have some
knowledge

I am very
knowledgeable

APPENDIX VII

GERIATRIC DEPRESSION SCALE (GDS)

Instructions: Please choose the best answer to describe how you've felt the last 2 weeks.

Check One

1. Are you basically satisfied with your life?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2. Have you dropped many of your activities and interests?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3. Do you feel that your life is empty?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
4. Do you often get bored?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
5. Are you hopeful about the future?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
6. Are you bothered by thoughts you can't get out of your head?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
7. Are you in good spirits most of the time?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
8. Are you afraid that something bad is going to happen to you?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
9. Do you feel happy most of the time?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
10. Do you often feel hopeless?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
11. Do you often get restless and fidgety?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
12. Do you prefer to stay at home, rather than going out and doing new things?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
13. Do you frequently worry about the future?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Check One

14. Do you feel you have more problems with memory than most?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
15. Do you think it is worthwhile to be alive now?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
16. Do you often feel downhearted and blue?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
17. Do you feel pretty worthless the way you are now?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
18. Do you worry a lot about the past?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
19. Do you find life very exciting?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
20. Is it hard for you to get started on new projects?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
21. Do you feel full of energy?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
22. Do you feel that your situation is hopeless?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
23. Do you think that most people are better off than you are?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
24. Do you frequently get upset over little things?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
25. Do you frequently feel like crying?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
26. Do you have trouble concentrating?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
27. Do you enjoy getting up in the morning?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
28. Do you prefer to avoid social gatherings?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
29. Is it easy for you to make decisions?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
30. Is your mind as clear as it used to be?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

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