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THE EFFECTS OF ANXIETY AND DEPRESSION ON
MEMORY COMPLAINTS AND MEMORY PERFORMANCE
IN OLDER ADULTS

presented by

Julia Nicholson Crumrine

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of the requirements for

Ph.D. degree in Psychology



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THE EFFECTS OF ANXIETY AND DEPRESSION ON
MEMORY COMPLAINTS AND MEMORY PERFORMANCE IN OLDER ADULTS

By

Julia Nicholson Crumrine

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ABSTRACT

THE EFFECTS OF ANXIETY AND DEPRESSION ON MEMORY COMPLAINTS AND MEMORY PERFORMANCE IN OLDER ADULTS

By

Julia Nicholson Crumrine

This study examined how anxiety and depression relate to memory complaints and memory performance in older adults. Previous research has shown that older adults exhibiting symptoms of depression tend to present more memory complaints and perform worse on memory performance tasks than non-depressed older adults. Anxiety, while more common than depression in older adults, has not been given as comparable attention in psychological literature. Given that over 34 million people in the United States are over the age of 65, this is an important area of investigation, especially with over \$42 billion being spent for treatment of anxiety disorders in older adults in this country.

The measures used in this study have been shown reliable for use with older adults (the State-Trait Anxiety Inventory, the Penn State Worry Questionnaire, the Beck Depression Inventory, the Geriatric Depression Scale, the Memory Assessment Clinics Self-Rating Scale, and the California Verbal Learning Test). Significant results were found for two of the nine components of hypotheses. Specifically, when anxiety was present, participants were more likely to have memory complaints than if anxiety was not present. Similarly, participants were more likely to report memory complaints if depression was present than if depression was not present. Also, female participants were more likely to report high levels of anxiety than male participants were. Additional

results were not statistically significant. The presence of overall anxiety or overall depression did not impact memory performance. Higher levels of state anxiety did not impact memory performance. Participation in memory-training workshops did not have an effect on decreasing memory complaints or increasing memory performance. There were no gender differences in reports of memory complaints. Also, level of education did not significantly predict memory complaints or memory performance.

“To believe you can is everything.”

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INTRODUCTION

With about 34.7 million adults over the age of 65 in the United States, it is important to gain a better understanding of physical and psychological concerns of older adults. Common concerns include changes in physical health, memory complaints, as well as psychological symptoms including anxiety. Based on a prevalence rate for Anxiety Disorders in the elderly of around 11.4% in the United States, we can estimate that over 3.9 million older adults experience symptoms of anxiety severe enough to meet criteria for diagnosis. These numbers only reflect the number of older adults who meet criteria for diagnosis. It is important to note that many more older adults experience symptoms of anxiety which affect daily functioning. Specific symptoms of anxiety will be described later. The experience of anxiety is likely to be unpleasant and based upon feelings that range from uneasiness to apprehension to terror. People experiencing feelings of anxiety are unlikely to be able to give a precise explanation as to the source of their fear. Instead, they describe their experience as a worry or concern that appears to be out of their control. This experience can be so unpleasant that they seek treatment to alleviate symptoms.

With regard to anxiety, Greenberg et al. (1999) estimated the annual cost of these disorders in the United States to be about \$42.3 billion dollars, or about \$1542 per patient. These authorities reported that psychiatric treatment, prescription medication, and nonpsychiatric medical treatment make up about 66% of this estimate (or about \$1018 per patient). That means that the cost of treating anxiety disorders in the 3.9 million older adults is about \$3.97 billion. In addition, most of the nonpsychiatric medical treatment usually comes as result of misdiagnosing physical symptoms as other

medical conditions, rather than anxiety. Research is needed to examine the effects of anxiety on memory functioning and memory complaints since memory functions and memory complaints impact the quality of life of older adults since anxiety is evidently treatable.

Older adults often report that their memory has changed since early adulthood. This current study investigated memory complaints as well as memory performance in older adults. Memory complaints are subjective reports regarding older adults' perceptions of memory ability. Frequently, complaints focus on difficulty with remembering names, location of objects (e.g., keys, wallets, or eyeglasses), or scheduled appointments. In this study, older adults reported on their memory ability, as compared to their peers. Memory performance, however, is an objective measure of memory ability. For example, memory performance can be measured by providing a list of words for an individual to remember and asking the individual to recall as many words as possible. This type of memory ability relies on verbal memory (i.e., memory that is dependent on language skills). There are other types of memory, like visual memory, spatial memory, or motor memory. These memory types were not examined in this current investigation. Rather, this current study focused on verbal memory, specifically word lists.

Anxiety in Older Adults

Previous research has suggested that, as a group, older adults experience less anxiety and stress than their younger counterparts (Beck & Stanley, 1997; Stanley, Beck & Zebb, 1996). Although, anxiety disorders are significantly more prevalent than mood disorders in older adults (Beck & Stanley, 1997; Fuentes & Cox, 1997; Stanley, Beck &

Zebb, 1996; Wetherell & Areán, 1997), the current psychological literature focuses less attention to investigating and explaining anxiety, in comparison to mood disorders, in adults over 65 years.

An examination of the literature on anxiety disorders in older adults showed that Generalized Anxiety Disorder (GAD) is the most common anxiety disorder found in older adults (Beck & Stanley, 1997; Beck, Stanley, & Zebb, 1996; Stanley, Beck, & Glassco, 1996; Stanley Beck, & Zebb, 1996). GAD is characterized primarily by excessive anxiety and worry, resulting in cognitive and physical symptoms (e.g., muscle tension, fatigue, irritability) severe enough to cause impairment in functioning (DSM-IV: APA, 1994). One difficulty in diagnosing older adults with GAD arises from the physical symptom components. Hersen, Van Hasselt, and Goreczny (1993) noted that older adults present physical symptoms (e.g., increased heart, pulse, and respiration rates) which can be attributed to other medical conditions. These symptoms can be mistaken for anxiety. Conversely, symptoms of anxiety can be mistaken for other medical conditions.

In assessing anxiety in adults, some of the behavioral measures include a physical complaint component. Specifically, the Hamilton Anxiety Rating Scale (HARS) has been criticized for depending too much upon somatic complaints (Beck & Stanley, 1997). Other measures of anxiety have been tested for use with an older adult population. Stanley, Beck, and Zebb (1996) investigated the State-Trait Anxiety Inventory (STAI), the Worry Scale (WS), the Padua Inventory (PI), and the Fear Questionnaire (FQ) for use with older adults. They found these measures appropriate for use with older adults. They cautioned, however, that further validating processes are needed before these

measures can be utilized with older adults. Wetherell and Areán (1997) examined the utility of the Beck Anxiety Inventory (BAI) for older adults. While their sample included older medical outpatients with low income, they found the BAI to be effective in identifying anxious symptoms for this group. They suggested that further research needs to be conducted with the BAI to be able to utilize this measure for use with an older adult population.

Most of the literature reflects the notion that anxiety disorders in older adults is an underinvestigated area given its prevalence. Comparatively, the investigation of anxiety disorders for younger adults is well established and well documented, as is the investigation of depression in older adults. The DSM-IV does not distinguish between age groups for the diagnosis of Generalized Anxiety Disorder (GAD). Research suggests that the etiology and course of GAD is different for older adults. While the diagnostic criteria are the same for all age groups, it seems that the etiology as well as specific symptoms and complaints differ between age groups. For example, older adults tend to have more physical complaints than their younger counterparts. Another complication to studying anxiety (in both older and younger adults) is the problem of comorbidity with depression (Mineka, Watson, & Clark, 1998). In addition, anxiety and depression frequently have overlapping symptoms, making a single diagnosis for either disorder more challenging. Comorbidity will be discussed in later sections.

The current literature focusing on anxiety disorders in older adults presents a wide range of characteristic symptoms. Beck et al. (1996) noted the lack of previous research on GAD in older adults. Their research was designed to address the limited literature as well as to prompt further research in this area. The GAD sample included 44 adults (30

women, 14 men) from 55 to 81 years of age who met DSM-III-R criteria for GAD. Forty one participants were Caucasian; two participants were African American; and one was Hispanic. The normal control participants were matched for age, gender, and ethnicity (30 women, 14 men; 41 Caucasian, 2 African American, 1 Hispanic). Beck et al. (1996) used four measures of anxiety (the State Trait Anxiety Inventory [STAI], the Worry Scale [WS], the Hamilton Anxiety Rating Scale [HARS], and the Penn State Worry Questionnaire [PSWQ]), two measures of depression, and one measure of fear (the Fear Questionnaire [FQ]). They found that the Generalized Anxiety Disorder (GAD) group scored significantly higher on all scales of anxiety and depression and on the social subscale of the fear measure. Beck et al. suggested that compared to older adults without mental disorders, older adults with GAD reported “elevated levels of anxiety, worry, depression, and social fears” (p. 231). In a closely related study, Stanley, Beck, and Zebb (1996) found no significant differences on measures of anxiety (STAI, WS, FQ, and PI) between older and younger adults with GAD. They cautioned, however, against generalizing these results given small sample sizes and the nature of mean scores.

Wetherell and Areán (1997) examined symptoms of anxiety in older adults although not specifically GAD. However, their findings offer clues regarding areas in which older adults tend to feel anxious. They suggested that anxiety includes four factors: cognitive, autonomic, neuromotor, and panic. These symptom areas are made up of several variables. Cognitive variables (symptoms) included unable to relax, fear of the worst happening, terrified, nervous, fear of losing control, fear of dying, and scared. Autonomic variables included unable to relax, feeling hot, indigestion or discomfort in abdomen, face flushed, and sweating (not due to heat). Neuromotor variables included

numbness or tingling, wobbliness in legs, dizzy or lightheaded, unsteady, hands trembling, shaky, and faint. Panic variables included heart pounding or racing, feelings of choking, and difficulty breathing. The above symptoms were characteristic of the symptoms of anxiety in older medical patients and are congruent with DSM-IV criteria for GAD.

Comorbidity of anxiety with other disorders is also a concern for younger as well as older adults. Mineka, Watson, and Clark (1998) examined the relationship between anxiety and depression, since these disorders tend to occur more often with each other than with other disorders. These disorders share common physical symptoms: fatigue, difficulty concentrating, and/or sleep disturbances. In addition, these disorders share general negative affective components that can make distinguishing between them troublesome. Mineka, Watson, and Clark described Clark and Watson's (1991) Tripartite Model to explain the relationship between anxiety and depression. According to this model, symptoms of anxiety and depression are viewed in three factors. First, the General Distress/Negative Affect factor contains the symptoms common to both anxiety and depression. Research has shown (Clark & Watson, 1991; Mineka, Watson, & Clark, 1998; and Watson, et al., 1995) that this factor includes symptoms which are nonspecific to each disorder: depressed affect, anxious affect, poor concentration, restlessness, sleep disturbances, and irritable mood. These symptoms occur in both diagnoses of anxiety and depressive disorders and are described generally as being components of negative affect. Second, the Somatic Tension and Hyperarousal factor accounts for symptoms unique to anxiety. These symptoms include mostly physical presentations of somatic tension and hyperarousal often seen in anxiety disorders and associated with common

panic disorder-like symptoms: lightheadedness, shortness of breath, trembling, and dry mouth. Finally, the Anhedonia and Absence of Positive Affect factor includes symptoms which are unique to depression. These symptoms include the loss of interest or ability to experience pleasure, fatigue, as well as the lack of positive affect.

The General Distress/Negative Affect component is of particular interest in this current investigation as it includes symptoms harmful to memory: poor concentration and restlessness. Basso and Bornstein (1999) found that recurrent depression can impair memory functioning as measured by the California Verbal Learning Test (CVLT) in younger adults. Other studies have shown that depression can impair memory functioning in younger and/or older adults (Burt, Zembler, & Niederehe, 1995, and Deptula, Singh, & Pomara, 1993). Additional studies have shown that depression in older adults can impair memory functioning (Cipolli et al., 1996, and King, Cox, Lyness, Conwell, & Caine, 1998) as well as increase memory complaints (Collins & Abeles, 1996, and Bassett & Folstein, 1993). This current investigation is designed to discover whether similar results on memory functioning and memory complaints are found with anxiety.

When discussing anxiety, it is important to note that anxiety is often broken down into two components: state anxiety and trait anxiety. Levy-Cushman, McBride, and Abeles (1999) reported that Cattell and Scheier (1961) were the first to distinguish between these concepts. State anxiety includes feelings of anxiety which are dependent upon the current situation. These feelings are likely to change with a change in the situation. Trait anxiety refers to feelings of anxiety that are more persistent, are more likely to represent overall feelings of anxiety, and are not directly state-dependent. The

presence of trait anxiety increases the likelihood of state anxiety during stressful situations.

Memory

In addition to presenting symptoms of anxiety, older adults often have memory complaints, including difficulty remembering location of car keys or eyeglasses, names of people and places, as well as significant past events. Ritchie, Ledéser, and Touchon (2000) reported that memory complaints and memory problems in older adults are not necessarily due to aging since the definition of “normal” aging has changed with improvements in general physical health, including better health care and better nutrition. When comparing scores on cognitive functioning tests between older and younger adults, frequently cross-sectional research does not take differences between generations (cohort effects) into account. They suggested that longitudinal studies, which follow the same group of individuals over a long period of time, show little cognitive decline in the participants. For individuals who do show such decline, there is a difference in the type of decline demonstrated. That is, older adults may or may not show decline in one or more of the following areas: attention, language, working memory, or secondary memory. Older adults may show decline in any combination of these areas but not necessarily in all of these areas.

Derouesné, Lacomblez, Thibault, and LePoncin (1999) investigated the difference in memory complaints in younger and older adults. Participants were recruited through newspaper, radio, and television media as well as through referrals and administered a screening examination which consisted of an interview, subjective memory complaints questionnaires, objective memory tests, and depression and anxiety self-report

questionnaires. Participants who acknowledged memory complaints but showed no cognitive impairment and no medical illness and/or psychological disorders were included in the study. Participants were then divided into two groups: younger adults and older adults, with 50 years old being the determining age. Over the course of 12 months, 260 participants were included in the study. The younger group included 77 participants and had a mean age of 39 years (range=20—49). The older group included 183 participants and had a mean age of 61.1 years (range=50—85). Derouesné et al. found no difference between the groups on cognitive performance but found that younger adults reported significantly higher depression and anxiety scores than the older adults. Furthermore, they found that while the groups were similar in overall subjective memory complaints, younger adults ranked their memory complaints as more severe and of longer duration than older adults did. They also reported that memory complaints were related to memory performance only in older adults with major complaints. That is, there was no significant relationship between memory complaints and memory performance for older adults with minor complaints or for younger adults with either major or minor complaints. In addition, they found that participants endorsing anxious symptoms were statistically more likely to report major memory complaints.

Research has shown that memory complaints are related to memory performance (Levy-Cushman & Abeles, 1998, and Jonker et al., 1996). They suggested that community-dwelling able elderly are able to identify their level of performance, especially when comparing their current level to previous ones. Other studies have shown that the severity or intensity of complaints contribute to memory performance (Hänninen et al, 1994, and Derouesné et al., 1999). That is, the more older adults

indicate that they have memory problems, the more they show lower levels of performance. Other factors may be influencing the scores on memory performance tests (e.g., symptoms of anxiety and/or depression). It seems that when older adults show more memory complaints, they also report higher levels of anxiety as well as depression. Foos (1997) reported a relationship between symptoms of anxiety symptoms and memory complaints in older adults. Further, memory complaints tend to decrease with the alleviation anxious symptoms. In addition, Jonker, Smits, and Deeg (1997) studied adults between the ages of 65 and 85 and reported that higher levels of anxiety were related to poorer memory performance in this age group. Based on the previous research, there seems to be a relationship between memory complaints and memory performance, anxiety and memory complaints, and anxiety and memory performance.

Bassett and Folstein (1993) examined 810 adults aged 18 to 92 to compare younger and older adults with respect to subjective memory complaints, objective memory performance, and psychiatric diagnosis. They found that overall, 22.1% of participants reported memory complaints while 11.6% showed poor memory performance as measured by the three item recall task on the Mini-Mental State Examination. Of adults ranging in age from 18 to 44, 14.5% reported memory complaints while 4.7% demonstrated poor memory performance. Of adults aged 45 to 64, 19.6% reported memory complaints while 11.9% demonstrated poor memory performance. The difference between this younger age group was not significant. However, older adults in each of the following age ranges differed significantly from each other. Of older adults between the ages of 65 to 74, 42.7% reported memory complaints and 25.5% showed poor memory performance. Of 75 to 84 year olds, 50.8%

reported memory complaints and 39.7% showed poor performance. Finally, of adults 85 and older, 88.3% reported memory complaints and 43.6% showed poor performance. Bassett and Folstein found that memory complaints increase with age while memory performance decreases with age. When examining the effects of psychiatric diagnosis, they did not divide participants into age groups. The following figures represent their whole sample. Psychiatric diagnoses were made based on clinical interviews by a psychiatrist who used DSM-III diagnoses. Of participants receiving a diagnosis, 5.8% were diagnosed with Affective disorders and 17.2% were diagnosed with Anxiety disorders. Of participants with Affective disorders, 34.2% reported memory complaints and 6.6% performed poorly on the memory performance task. Of participants diagnosed with Anxiety disorders, 27.2% reported memory complaints while 6.9% performed poorly on performance tasks. Of participants with no diagnosis, 18.6% reported memory complaints with 10.1% demonstrating poor performance. Bassett and Folstein did not report age groups with diagnoses so it is not clear how many participants diagnosed were older adults. Nevertheless, there was a significant difference between memory complaints and memory performance for those participants with Affective and Anxiety disorders. Other disorders were not statistically significant with regard to the relationship between complaints and performance. Participants with Affective disorders or Anxiety disorders were more likely to show a disparity between complaints and performance than participants with no diagnosis or with other diagnoses.

Memory Training

Andrewes, Kinsella, and Murphy (1996) found that memory-handbook training significantly improved memory performance in older adults. Participants were 20 men

and 20 women randomly assigned to treatment and control groups. All participants were administered a series of tests for screening purposes and another series to establish pre-treatment baselines. The Mattis Dementia Rating Scale was used as a dementia screening; the Rey Auditory Verbal Learning Test and the Warrington Forced-Choice Recognition for Faces were used to measure memory; the Beck Depression Inventory was used to measure emotional affect; and the National Adult Reading Test was used to estimate intellectual level. Finally, participants provided information regarding education level. There were no significant differences between the groups on screening measures. Next, all participants were administered a pre-test to establish baseline functioning. These assessments evaluated memory in the following areas: face-name learning, prospective memory (laboratory and everyday tasks), and memory strategy knowledge. In addition, both groups were instructed to complete a memory diary, including the frequency of remembered and forgotten tasks from a checklist of situations, during the week prior to post-testing. The treatment group was then provided memory strategies in the following areas: remembering names, future activities, location of placed objects, verbal information (lists and prose), how to get somewhere, and series of meaningful numbers. The strategies were provided in a handbook form as well as during a 30-minute training session. The control group was given a less useful but face valid pamphlet on mnemonics. All participants were encouraged to utilize the memory strategies for one month before returning for testing. Post-testing revealed significant differences between the groups. Specifically, the treatment group performed better on the face-name learning task and endorsed more strategy knowledge items than the control group. In addition, the treatment group showed significantly better performance on the

to-be-remembered tasks taken from the memory diary than the control group. There were no significant differences between the groups for prospective memory, either laboratory or everyday tasks. Andrewes et al. concluded that the memory handbook and training provided older adults with memory strategies that were useful in everyday situation tasks.

De Vreese, Belloi, Iacono, Finelli and Neri (1998) also examined the effectiveness of memory training with older adults. Participants were 18 men and 41 women selected from community-dwelling members of an association of retired persons. After undergoing screening for cognitive impairment, clinical depression, and biological factors which could impair memory, participants were assessed for objective and subjective memory functioning and mood. De Vreese et al. used two memory measures validated for use with older adults. The Randt Memory Test (Randt, Brown, & Osbourne, 1980) assessed objective memory in seven areas: general information, list learning, forward and backward digit span, paired associates, prose memory, picture recognition and verbal recall, and incidental learning. The Schulster Metamemory Scale (Schulster, 1981) assessed subjective memory through self-report in the following areas: past memory functioning as compared to current memory functioning, memory loss complaints, and memory functioning as compared with peers. Finally, participants completed a validated self-report questionnaire which detects affective disorders. Based on screening measures, participants were placed into one of two groups: subjective memory complainers (SMC) and those experiencing aging-associated cognitive decline (AACD). The SMC group consisted of 12 men and 27 women with a mean of 10.9 years of education. The AACD group consisted of 6 men and 14 women with a mean of 10.6

years of education. While both groups reported memory problems, only the AACD group showed objective cognitive decline. Participants were then randomly assigned to treatment groups in which they attended weekly 90-minute memory training sessions for three months. Fifty-nine participants (18 men and 41 women) completed pre- and post-testing as well as all training sessions. Participants were taught mnemonic techniques and learning strategies designed to assist in memory of people's names, location of placed objects, prospective memory, and recall of information and facts. In addition, participants were shown methods of increasing awareness of memory functioning as well as methods of coping with memory complaints. After memory training sessions, participants returned for post-testing. De Vreese et al. found that memory training sessions significantly improved objective memory performance in both SMC and AACD groups. In addition, memory training sessions significantly improved subjective memory complaints. Both groups seemed to have benefited from memory training sessions in objective memory performance as well as subjective memory complaints. Furthermore, participants showed significant improvement in measures of affective well-being though it is not certain whether the improvement was due to the content of the memory training sessions or the experience of being involved in the group sessions.

Gender Differences

Gender has been shown to be a factor in anxiety with older women reporting more anxiety than older men (Fuentes & Cox, 2000; Morin et al., 1999). Morin et al. examined 281 adults (177 women, 104 men) over 55 years old, using the Beck Anxiety Inventory (BAI). Women scored significantly higher (indicating more anxiety) than men. Similarly, Fuentes and Cox examined 84 adults (39 women, 45 men) over the age of 67,

using three measures of anxiety (Anxiety Sensitivity Index, Fear Questionnaire, and the State-Trait Anxiety Inventory). Older women scored higher than older men on all three measures of anxiety. Also, according to the DSM-IV, Generalized Anxiety Disorder (GAD) is found more often in women than men, with about 55 to 60 percent of patients diagnosed with GAD are women (APA, 1994). While differences on anxiety measures cannot be assumed based solely on gender, there appears to be enough support from previous research to investigate this area in the current study.

Education

Education has been shown to serve as a protective factor in cognitive functioning with individuals with higher levels of education showing less decline than individuals with lower levels of education (Compton, Bachman, & Logan, 1997). Compton, Bachman, and Logan examined the effects of aging and intellectual ability with college faculty members as their participants with an age range of 25 to 72 years old, using a range of measures which included tests of memory, intelligence, attention, and processing speed. The results showed that the older faculty members performed worse on measures requiring psychomotor speed. This finding is consistent with previous research. However, they did not find significant age-related differences on other measures that do not require psychomotor speed. This finding is contrary to previous research with older adults. The difference, it seems, is that the participants in this study were highly educated college faculty who most likely engaged regularly in cognitive tasks. Compton, Bachman, and Logan suggested that education and cognitive activity may enhance the performance in older adults. Also, they suggested that educated and cognitively active older adults may be able to counteract age-related cognitive decline or

that education and cognitive activity may protect older adults from cognitive decline. This study provides some encouragement for older adults to continue to engage in cognitive activities throughout their life span. It is possible that cognitive deficits found in older adults might be due partly to the general psychomotor slowing and not necessarily to an inevitable cognitive decline.

HYPOTHESES

There seems to be a relationship between performance on memory tests as well as reported memory complaints in older adults when either anxiety or depression is present. Also, education levels and gender differences seem to have some association with reported complaints and reported symptoms of anxiety and depression. This current study is designed to examine these relationships.

In light of the preceding review of the literature, this current investigation will examine the relationship between symptoms of anxiety and depression and memory complaints and symptoms of anxiety and depression and memory performance, as well as the relationship of demographic factors (specifically, gender and education) with anxiety and memory scores.

The following hypotheses were tested in this current investigation:

Hypothesis 1: Participants who endorse anxiety and depression symptoms will be more likely to report more memory complaints and show poorer memory performance than participants who do not endorse anxiety and depression symptoms. This relationship was tested using the scores from the anxiety measures: the State-Trait Anxiety Inventory (STAI) and the Penn State Worry Questionnaire (PSWQ), the scores from the depression measures: the Beck Depression Inventory (BDI) and the Geriatric Depression Scale (GDS), and the scores from the memory measures: the Memory Assessment Clinics Self-Rating Scale (MAC-S) and the California Verbal Learning Test (CVLT).

Hypothesis 2: Participants reporting higher levels of anxiety symptoms at the time of testing will score lower on the memory test than participants reporting lower levels of

anxiety symptoms at the time of testing. This relationship was measured using the scores from the STAI (State) and the CVLT.

Hypothesis 3: Participation in memory-training workshops is expected to reduce the number of memory complaints as well as increase scores on the memory functioning test. This effect was measured by comparing the MAC-S and CVLT scores from pre- and post-testing, after the participants participated in memory training workshops.

Hypothesis 4: Gender differences are expected with anxiety symptoms affecting memory complaints more in women than in men. In addition, women are expected to report more symptoms of anxiety than men report. Gender differences were studied using the demographic information as well as scores from the MAC-S, STAI, and PSWQ.

Hypothesis 5: Level of education differences are expected with individuals with higher levels of education showing fewer memory complaints and better memory performance than individuals with lower levels of education, independent of symptoms of anxiety and depression. This effect was measured using demographic information, MAC-S, and CVLT.

METHODS

Participants

This current study collected data from participants in the Michigan State University Mood and Memory Project. Community dwelling older adults were recruited through newspaper advertisements and mailings. Participants were administered a wide range of neuropsychological tests, with particular focus on attention, concentration, and memory. In addition, participants completed several self-report questionnaires regarding symptoms of depression and anxiety as well as a demographic worksheet. After testing, the participants attended seven mood and memory workshops geared to address concerns in these areas and offer strategies to assist participants in coping with these issues. Participants then returned for testing to measure changes in cognitive and emotional functioning. There were 59 participants who completed testing and the workshops in this order (pre-test, workshop, post-test). In order to establish a control group, some participants were administered both pre- and post-tests before participating in the workshops. There were 13 participants who completed both testing sessions prior to attending the workshop. In addition, there were 28 participants who completed pre-testing and dropped out of the research project. The post-testing scores were imputed for these participants using the NORM for Windows 95/98/NT program which will be described later in this section. These 28 participants were included in the control group for a total of 41 participants who did not attend the workshops.

Participants included 100 adults between the ages of 51 and 91 ($M = 67.82$; $SD = 8.76$). There were 39 males and 61 females, with between 5 and 21 years of education ($M = 15$; $SD = 3.23$). The mean age of male participants was 68.08 years ($SD = 7.72$)

with a mean education of 16.23 years ($SD = 3.03$). The mean age of female participants was 67.66 years ($SD = 9.42$) with a mean education of 14.21 years ($SD = 3.12$).

Participants were administered the battery of tests at two separate times: once within one week before the mood and memory workshop which lasted approximately four weeks and once within one week following the workshop. Each testing session took approximately two hours. During testing sessions, participants completed a demographic questionnaire as well as all testing materials. The mood and memory workshops were led by clinical psychology graduate students for up to 10 participants per group. Each session of the workshops lasted 75 to 90 minutes. Sessions were offered two times weekly for a total of seven sessions over a four week period. A description of measures relevant to the current study as well as a description of each workshop session will follow.

Materials

Measures. The following anxiety measures were used from the complete battery of research instruments:

- 1) State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970)—This self-report questionnaire consists of 20 items regarding current feelings and 20 items regarding general feelings. Subjects respond using a four point scale. Stanley, Beck, and Zebb (1996) reported substantial test-retest stability (.84 trait, $p < .001$) with older adults. In addition, the STAI seems to have considerable internal consistency with older adults ($\alpha = .85$ state, $\alpha = .79$ trait).
- 2) Penn-State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990)—This self-report measure consists of 16 items to which participants respond

on a five point Likert scale ranging from “not at all typical of me” to “very typical for me.” Meyer et al. (1990) reported different convergent validity with the STAI-Trait, $r(389)=.64$, than with the STAI-State, $r(395)=.49$, or the BDI, $r(154)=.36$. Meyer et al. reported good test-retest reliability $r(45)=.92$. Beck, Stanley, and Zebb (1995) examined the PSWQ’s psychometric properties with older adults. Participants included older adults with Generalized Anxiety Disorder ($n=47$, mean age=67.9) and normal controls ($n=94$, mean age=67.5). The PSWQ showed good internal consistency with both groups (GAD $\alpha=.803$ and control $\alpha=.803$). In addition, they found good convergent validity with the PSWQ correlating significantly with the STAI-T (.38), the STAI-S (.56), and the BDI (.45) in the control group.

The following depression measures were used:

- 1) Geriatric Depression Scale (GDS; Yesavage et al., 1983)—This self-report questionnaire consists of 30 items with a “yes” or “no” response for each item. Test-retest reliability showed a correlation of .85 ($p<.001$) after a one week delay between administrations. Convergent validity between the Zung Self-Rating Scale of Depression ($r=.86$) and the Hamilton Rating Scale for Depression ($r=.83$) was found for the GDS. In addition, the GDS showed good internal consistency ($r=.83$) and stability with older adults.
- 2) Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961)—This self-report questionnaire consists of 21 items on a four point scale. Beck et al. (1961) reported good internal consistency ($r=.93$). Miller and Seligman (1973) reported good test-retest reliability ($r=.74$) with older adults after a three month delay between administrations. Spitzer, Endicott, and Robbins (1978)

reported that the BDI has shown good internal consistency and stability with research of older adults.

Finally, the following memory measures were used:

- 1) California Verbal Learning Test (CVLT; Delis, Kramer, Kaplan, & Ober, 1987)—

This test consists of 16 items presented five times as a shopping list, with immediate and delayed recall. Lezak (1995) reported split-half reliability correlation coefficients ranging from .77 to .86.

- 2) Memory Assessment Clinics Self-Rating Scale (MAC-S, Crook & Larrabee, 1990, 1992)—This self-report questionnaire measures subjective memory complaints using 21 Ability items, 24 Frequency of Occurrence, and four Global Rating of memory problems. Subjects respond using a 5-point Likert scale. Lezak (1995) reported that normative data was developed based on over 1,000 adults, age 18 to over 70 years. Lezak also reported that Crook and Larrabee (1991) found test-retest reliability between .82 and .94 across 3 weeks.

The above measures have been shown reliable and valid for use in an older adult population. In addition, demographic information on gender and education was also used.

Memory Training Workshops. After completing pre-testing, participants attended a seven session training group that met twice weekly for 75 to 90 minutes each session. The number of participants ranged from five to ten per workshop. A list of training provided at each session is provided in Appendix A. During each session, participants were encouraged to discuss current concerns with changes in their memory. The workshop facilitator provided materials for improving memory ability and encouraged participants to practice memory skills between sessions. Memory techniques included

mnemonic training exercises for word lists (e.g., the Method of Loci), paragraphs (e.g. Preview-Question-Read-Summarize-Test method), and names of people (e.g., names-face association method). The facilitator began each session by asking participants to describe their level of practicing the previous session's techniques. Also, the facilitator taught relaxation techniques in session and asked that participants practice between sessions. Relaxation techniques included guided imagery, progressive muscle relaxation, and meditation. After completing the seven session workshop, participants returned within one week for post-testing.

Cut-off Scores

In order to categorize the data for later odds ratio utilization, cut-off scores were determined based on the literature for each of the seven variables. The information is summarized in Table 2.

State-Trait Anxiety Inventory (STAI). Higher scores on this self-report measure suggest higher levels of anxiety in both the state and the trait conditions. Using the results from Stanley, Novy, Bourland, Beck, and Averill (2001) a cut-off score of 37 was used for State anxiety and 46 for Trait anxiety. Stanley, Novi, et al. studied adults age 60 to 80 years. Scores of 37 on State anxiety and 46 on Trait anxiety represent one standard deviation from the mean for reported anxiety. All State anxiety scores greater than or equal to 37 were converted to "1" to indicate that State anxiety was present; scores below 37 were converted to "0" to indicate that State anxiety was not present or was low. In the same way, Trait anxiety scores equal to or greater than 46 were converted to "1" to indicate that Trait anxiety was present; scores below 46 were converted to "2" to indicate that Trait anxiety was not present or was low.

Penn-State Worry Questionnaire (PSWQ). Higher scores on the self-report measure suggest higher levels of anxiety. Using the results from Stanley, Novy, et al., a cut-off score of 53 was used. A score of 53 represents one standard deviation from the mean for reported anxiety. Scores equal to or greater than 53 were converted to “1” to indicate that anxiety was present; scores below 53 were converted to “2” to indicate there was little or no anxiety reported.

Total Anxiety Score (TAS). If participants showed the presence of anxiety in STAI-State, STAI-Trait, or PSWQ tests based on the cut-off categories, then the TAS was “1” to indicate the presence of anxiety. If participants did not show the presence of anxiety, then the TAS was “2” to indicate little or no anxiety.

Geriatric Depression Scale (GDS). Higher scores on this self-report measure suggest higher levels of depression. According to the GDS manual, scores from 0 to 9 indicate normal responses. Scores from 10 to 19 suggest mild depression while scores above 19 suggest severe depression. Therefore, a cut-off score of 10 was used in this current investigation. Scores equal to or greater than 10 were converted to “1” to indicate that depression was present; scores below 10 were converted to “2” to indicate little or no depression.

Beck Depression Inventory (BDI). Higher scores on this self-report measure suggest higher levels of depression. According to the BDI manual, scores from 0 to 9 suggest normal responses. Scores from 10 to 15 suggest minimal depression. Scores above 15 suggest mild-moderate, moderate-to-severe, or severe depression. Therefore, a cut-off score of 16 was used. Scores greater than or equal to 16 were converted to “1” to

indicate the presence of depression; scores below 16 were converted to “2” to indicate minimal or no depression.

Total Depression Score (TDS). If participants showed the presence of depression in either the GDS or BDI tests based on the cut-off categories, then the TDS was “1” to indicate the presence of depression. If participants did not show the presence of depression, then the TDS was “2” to indicate little or no depression.

California Verbal Learning Test (CVLT). Higher scores on this clinician-administered measure indicate better memory. Based on normative data for older adults (Paolo, Tröster, & Ryan, 1997a and Paolo, Tröster, & Ryan, 1997b), a cut-off score of 4 was determined (mean = 5.89, SD = 1.82). Scores equal to or less than 4 were converted to “1” to indicate poor memory performance; scores above 4 were converted to “2” to indicate normal or good performance.

Memory Assessment Clinics Self-Rating Scale (MAC-S). Higher scores on this self-report measure indicate fewer memory complaints. Based on normative data (Crook & Larrabee, 1992), a cut-off score of 52 was determined for the Ability subtest, which measures the participant’s ability to remember specific types of information. A score of 52 was approximately one standard deviation from the mean for ages 50 and above. Scores equal to or less than 52 were converted to “1” to indicate the presence of memory complaints; scores greater than 52 were converted to “2” to indicate little or no memory complaints.

Levels of education. Participants with up to 12 years of education were placed in the High School group. Participants with between 13 and 16 years of education were

placed in the College group. Participants with over 17 years of education were placed in the Graduate Work group.

Data Analysis

We employed the following statistical procedures to test hypotheses. For Hypothesis 1, Hypothesis 3, and Hypothesis 4, we used odds ratios to analyze the data. Rudas (1998) and von Eye and Schuster (2000) describe the method of testing each participant's pattern of responses with the hypothesis. By categorizing the data, we were able to assign a specific pattern of responses for each participant. That pattern, then, was tested with the hypothesis. For example, in Hypothesis 1, we categorized the four variables (viz., Anxiety, Depression, Memory Complaints, and Memory Performance) as described above. One component of Hypothesis 1 predicts that presence of anxiety will increase the chance of participants reporting memory complaints. In this example, the two variables Anxiety (1 = present; 2 = little or not present) and Memory Complaints (1 = present; 2 = few or not present) can be viewed in the cross-classification in Table 1. The hypothesis is the probability p_{11} that anxiety and memory complaints are both present. Alternatives include the probability p_{12} that anxiety is present but memory complaints are not; the probability p_{21} that anxiety is not present but memory complaints are; and the probability p_{22} that neither anxiety or memory complaints is present. The hypothesis states that the odds $\Omega_1 = p_{11} / p_{12}$ that participants with anxiety have memory complaints is greater than the odds $\Omega_2 = p_{21} / p_{22}$ that participants with no anxiety have memory complaints. The hypothesis is tested using the odds ratio $\theta = \Omega_1 / \Omega_2$ to determine if it is better than chance. If the odds ratio θ is greater than 1, we can say that

it is more likely that participants with anxiety report memory complaints than participants with little or no anxiety. Thus, using odds ratios, we determined the probabilities of Hypotheses 1, 3, and 4. Each of the five hypothesis will be addressed individually in this section.

Hypothesis 1: Participants who endorse anxiety and depression symptoms will be more likely to report more memory complaints and show poorer memory performance than participants who do not endorse anxiety and depression symptoms. One option is to analyze this data categorically. This 2 x 2 x 2 x 2 cross-classification of the four variables Anxiety (1 = present; 2 = little or not present), Depression (1 = present; 2 = little or not present), Memory Complaints (1 = present; 2 = few or not present), and Memory Performance (1 = poor; 2 = good) produced a pattern for each participant. For each of the variables, we determined cut off scores to indicate the presence or absence of the conditions. Using odds ratios, we were able to test each participant's pattern with the hypothesis. For example, p_{1221} is the probability of displaying the presence of anxiety, little or no depression, few or no memory complaints, and poor memory performance and was compared to the probability (p_{1111}).

Hypothesis 2: Participants reporting higher levels of anxiety at the time of testing will score lower on the memory test than participants reporting lower levels of anxiety symptoms at the time of testing. This relationship was measured using the scores from the STAI (State) and the CVLT. We used a t-test to compare regression parameters.

Hypothesis 3: Participation in memory-training workshops is expected to reduce memory complaints as well as increase scores on the memory functioning test. We analyzed this data categorically by using odds ratios. This 2 x 2 x 2 cross-classification

of the three variables Participation (1 = yes; 2 = no), Memory Complaints on Pretest (1 = yes; 2 = no), and Memory Complaints on Posttest (1 = yes; 2 = no) produced a pattern for each participant. Also, a 2 x 2 x 2 cross-classification of the three variables Participation (1 = yes; 2 = no), Memory Performance on Pretest (1 = poor; 2 = good), and Memory Performance on Posttest (1 = poor; 2 = good) produced a pattern for each participant. Again we used cut off scores to indicate the presence or absence of the conditions. We were able to test each participant's pattern with the hypothesis (p_{112}). Also, we were able to compare pattern p_{112} with pattern p_{111} , or pattern p_{112} with pattern p_{212} .

Hypothesis 4: Gender differences are expected with anxiety symptoms affecting memory complaints more in women than in men. In addition, women are expected to report more symptoms of anxiety than men report. We used odds ratios to compare Memory Complaints of men and Memory Complaints of women. Also, we used odds ratios to compare Anxiety of men and Anxiety of women.

Hypothesis 5: Level of education differences are expected with individuals with higher levels of education showing fewer memory complaints and better memory performance than individuals with lower levels of education, independent of symptoms of anxiety and depression. We analyzed this data using ANOVA. The scores for Memory Complaints and scores for Memory Performance was compared for each Level of Education variable (1 = High School or less/12 years or less; 2 = College/13 to 16 years; 3 = Graduate Work/17 years or more). We expected Memory Complaints to decrease with more education and Memory Performance to increase with more education.

Missing Values

The data set contained missing values in all variables. One option in research with missing data is to disregard incomplete data sets. However, there are a number of statistical procedures available to replace missing data in such a way that allows the use of all variables in a data set. In this current study, missing data were replaced as continuous data before categorization with cut-off scores. To replace missing values, NORM for Windows 95/98/NT "Multiple imputation of incomplete multivariate data under a normal model" Version 2.03 by J. L. Schafer was used. The data set was entered into the program. Missing values were generated, imputed, entered, and used in data analysis. By imputing missing data, we were able to include all participants in data analysis.

RESULTS

Hypothesis 1

This hypothesis has two components: the effect of anxiety and depression symptoms on memory complaints and the effect of anxiety and depression symptoms on memory performance. The first component of the hypothesis (participants endorsing anxiety and depression symptoms will report more memory complaints) was supported (see Table 3). The second component of the hypothesis (participants endorsing anxiety and depression symptoms will show poorer memory performance) was not supported (see Table 4).

Based on the above cut-off scores for anxiety, depression, and memory complaints, participants were categorized into one of two groups: Present or Not-Present. For memory performance, participants were categorized in either the Poor or Good group. For the anxiety variable, 45 participants were placed into the Present group while 55 were placed into the Not-Present group. For the depression variable, 23 participants were placed into the Present group while 77 were placed into the Not-Present group. For the memory complaints variable, 35 participants were categorized into the Present group while 65 were categorized into the Not-Present group. Finally, for the memory performance variable, 18 participants were categorized into the Poor group while 78 were categorized into the Good group.

In examining the effects of anxiety, the odds of Poor memory performance were 1.81 greater when anxiety was not present than when anxiety was present, though this result is not significant ($z\text{-score} = 1.09$; $p > .05$). The odds of Present memory

complaints were 3.09 times greater when anxiety was present than when anxiety was not present. This result is statistically significant ($z\text{-score} = 2.59; p < .05$).

In examining the effects of depression, the odds of Poor memory performance were 1.61 times greater when depression was not present than when depression was present, though this result is not significant ($z\text{-score} = 0.70; p > .05$). The odds of Present memory complaints were 5.34 times greater when depression was present than when depression was not present. This result is statistically significant ($z\text{-score} = 3.29; p < .05$).

Hypothesis 2

It was predicted that the level of anxiety at the time of testing would impact the level of memory performance, with participants reporting higher levels of anxiety performing worse than participants reporting lower levels of anxiety. This hypothesis was not supported (see Table 5).

At the time of testing, 32 participants reported higher levels of anxiety as indicated by the STAI-State measure, while 68 participants reported lower levels of anxiety. Scores from the CVLT were compared between the higher and lower levels. The group of participants reporting higher levels of anxiety obtained a mean of 6.13 ($SD = 1.76$) while the group of participants reporting lower levels of anxiety obtained a mean of 6.26 ($SD = 2.00$). The group of participants reporting higher levels of anxiety performed worse than the group of participants reporting lower levels of anxiety though the difference was not found to be significant ($F = .727; p > .05$).

Hypothesis 3

This hypothesis has two components. The first component (participation in memory-training workshops was expected to decrease in memory complaints) was not supported (see Table 6). The second component (participation in memory-training workshops was expected to increase memory performance) was not supported (see Table 7).

Fifty-nine participants attended memory-training workshops prior to the second testing while 41 did not participate prior to the second testing and serve as a control group, as described earlier. Of the 59 memory-training workshop participants, 22 showed memory complaints during pre-testing while 37 did not show memory complaints during pre-testing. At post-testing, 17 participants showed memory complaints while 42 did not. Of the 41 control participants, 13 showed memory complaints during pre-testing while 28 did not. At post-testing, 6 participants showed memory complaints while 35 did not. The odds of present memory complaints at post-testing are 2.36 times greater when participants attended memory-training workshops than when they did not participate in memory-training workshops, though this result is not significant ($z\text{-score} = 1.63$; $p > .05$).

Of the 59 memory-training workshop participants, 15 showed poor memory performance at pre-testing, while 44 showed good memory performance. At post-testing, 10 participants showed poor memory performance while 49 showed good memory performance. Of the 41 control participants, three showed poor memory performance at pre-testing while 38 showed good memory performance. At post-testing, eight participants showed poor memory performance while 33 showed good memory

performance. The odds of poor memory performance at post-testing is 1.19 times greater when participants did not attend memory training workshops than when they participated in memory-training, though this result is not significant ($z\text{-score} = 0.33$; $p > .05$).

Hypothesis 4

This hypothesis concerns gender differences and has two components. The first component (women will report more memory complaints than men) was not supported (see Table 8). The second component (women will report higher levels of anxiety than men) was supported (see Table 9).

There were 61 female participants and 39 male participants. Of the 61 female participants, 20 showed memory complaints while 41 did not. Of the 39 male participants, 15 showed memory complaints while 24 did not. Male participants were 1.28 times more likely to report memory complaints than women, though this result was not significant ($z\text{-score} = 0.58$; $p > .05$).

Of the 61 female participants, 33 reported high levels of anxiety while 28 did not. Of the 39 male participants, 12 reported high levels of anxiety while 27 did not. Female participants were 2.65 times more likely to report high levels of anxiety than males. This result is significant ($z\text{-score} = 2.26$; $p < .05$).

Hypothesis 5

This hypothesis concerns differences between levels of education and has two components. The first component (participants with higher levels of education will show fewer memory complaints than participants with lower levels of education) was not supported (see Table 10). The second component (participants with higher levels of

education will show better memory performance than participants with lower levels of education) was not supported (see Table 11).

There were three levels of education: High School (up to 12 years of education), College (between 13 and 16 years of education), and Graduate Work (over 17 years of education). There were 29 participants in the High School group, 37 participants in the College group, and 34 participants in the Graduate Work group. There were no significant differences between level of education groups and scores on the MAC-S Ability subtest ($F = 1.27$; $p > .05$). Higher scores on the MAC-S indicate fewer complaints. The High School group obtained a mean of 55.97 ($SD = 8.53$). The College group obtained a mean of 55.46 ($SD = 10.94$). The Graduate group obtained a mean of 59.00 ($SD = 9.95$). The Graduate group showed fewer complaints though this result is not significant. Also, there were no significant differences between level of education groups and scores on the CVLT ($F = 1.58$; $p > .05$). The High School group obtained a mean of 6.72 ($SD = 1.75$). The College group obtained a mean of 5.89 ($SD = 2.01$). The Graduate group obtained a mean of 6.15 ($SD = 1.92$). Level of education did not significantly predict memory complaints or memory performance.

General Findings

Overall, 45% of participants reported anxiety symptoms compared to 23% who reported depression symptoms. In looking at comorbid anxiety and depression, 18% of participants showed symptoms of anxiety and depression. Overall, 18% of participants showed poor memory performance. Overall, 35% of participants showed memory complaints. Of memory-training participants, 25% showed poor memory performance at

pre-testing as compared to 17% at post-testing. Of memory-training participants, 37% showed memory complaints at pre-testing compared to 29% at post-testing.

DISCUSSION

Anxiety and Depression

Almost half of the participants in this study reported significant levels of anxiety and nearly a quarter of participants reported significant levels of depression. These percentages are higher than the prevalence rates of the anxiety disorders and depressive disorders reported in previous research. Ohayon, Shapiro, and Kennedy (2000) reported a 6.9% prevalence for mood disorders and 9.3% prevalence for anxiety disorders in the general population. Stanley, Roberts, Bourland, and Novy (2001) reported a prevalence of 1.3% for anxiety disorders and 2.3% for depression in adults age 60 and older in a primary care setting. One explanation is that this study examined symptoms of anxiety and depression in community dwelling older adults, not in a clinical setting. Individuals can have symptoms of these disorders that are troublesome or uncomfortable, but not severe enough to meet criteria for diagnosis.

About a fifth of participants scored above the cut-offs for both anxiety and depression. One explanation of this finding is that the symptoms of anxiety and depression can overlap. That is, both anxiety and depression share general negative affective components, such as poor concentration, restlessness, and irritable mood. In addition, both anxiety and depression share general physical symptoms, such as fatigue and sleep disturbances. These physical and affective components are often associated with disturbances in memory.

Memory Complaints and Memory Performance

The distinction between these elements of memory is simple. Complaints refer to the subjective reports from the participants regarding how they believe their memory

ability compares with their peers while performance refers to the objective display of memory ability. It was hypothesized that both complaints and performance would be affected by the presence of anxiety and depression symptoms. Results show that for both anxiety and depression, memory performance was not significantly impaired. However, for both anxiety and depression, memory complaints were significantly higher when participants' scores were higher than cut-off scores. One explanation for the appearance that memory performance was not affected by mood is that the degree of mood disturbances was determined by symptoms and not clinical diagnosis. Perhaps the participants were not experiencing mood disturbances that were strong enough to impact objective ability. For memory complaints, however, participants who reported symptoms of anxiety and/or depression may be more likely to report that there is something wrong with their memory ability.

Gender Differences

It was hypothesized that female participants would report more memory complaints and more anxiety symptoms than male participants. Results showed that female participants reported significantly higher levels of anxiety than male participants. This finding is consistent with previous research (Fuentes & Cox, 2000; Morin et al., 1999; Ohayon, Shapiro, & Kennedy, 2000). However, results showed that for memory complaints, there was no gender difference. Given the previous research on gender differences for anxiety combined with previous research suggesting that participants reporting symptoms of anxiety also report memory complaints more so than participants who do not report symptoms anxiety, it was hypothesized that female participants would report more memory complaints in this current investigation. The data did not support

this hypothesis. The tendency, though not statistically significant, was for male participants to report more memory complaints than female participants. One explanation is that there were more women in the study than men. A statistical hope is that there are equal numbers of men and women in any particular study that examines gender differences. With more male participants in the study, there might have been more variability in male responses to memory complaint measures. In addition, more participants reported symptoms of anxiety (45% of participants) than memory complaints (35% of participants). Since there were more overall reporting on anxiety symptoms, it is more likely that gender differences appear for anxiety. That is, since more participants reported anxiety symptoms overall, there is a better chance that there will be more women within that group.

Other research has presented similar results in that no gender differences were found for memory complaints. Derouesne, Lacomplex, Thibault, and LePoncin (1999) found no gender differences in adult over 50 years old. Blazer, Hays, Fillenbaum, and Gold (1997) also found no significant gender difference for memory complaints in adults 65 years or older. Like this current study, Blazer et al. (1997) had significantly more men than women in their study. Additional research has shown no gender differences for memory complaints in younger and older adults. Ponds, van Boxtel, and Jolles (2000) found no gender differences for self-reported cognitive abilities (viz., attention, decision making, memory, and mental speed) in adults ages 24 to 86 years. Also, Bassett and Folstein (1993) found no gender differences for memory complaints in adults ages 18 to 92 years.

Education

There were no differences between levels of education for memory complaints or for memory performance. One explanation is that these results may be misleading since participants in each group were compared to participants in the other groups. That is, the assumption in this hypothesis is that memory performance declines with age and that education can serve as a protective factor. However, since no premorbid memory level was tested, we cannot make comparisons between each participants memory ability at age 20, for example, to the memory ability at age 60. If a participant with more education shows the same memory ability as a participant with less education, we cannot know if there has been decline with age. That is, the participant with more education may have had a better memory ability at age 20 than the participant with less education had at age 20. When these two participants are compared at age 60, however, they show no difference. The participant with more education has experienced a significant decline while the participant with less education has not. In this example, education did not serve to protect memory ability. In this study, however, we have no way of knowing whether this decline is the case or not. A longitudinal study is needed to examine this question. The results of this study suggest that level of education does not have an impact on participants' ability to recall word lists.

Van der Linden, Philippot, and Heinen (1997) found that participants (ages 20-80 years) with higher levels of education demonstrated better memory performance on the CVLT (General Verbal Learning measure) than participants with lower levels of education. That effect decreased but was still significant when they controlled for vocabulary knowledge. In addition, Van der Linden et al. (1997) found that for the short-

delay recall factor of the CVLT, participants with higher levels of education performed better than those with lower levels of education. However, education did not produce statistically significant differences for the forgetting rate factor and the learning strategy factor of the CVLT. Also, Van der Linden et al. found no significant differences with regard to education for memory complaints. That is, level of education did not have an effect on participants' subjective memory evaluation as measured a memory self-assessment questionnaire. Age, however, did have an effect for memory complaints with older participants (ages 60-80 years) reporting more problems with memory than younger participants (ages 20-30 years). Van der Linden et al. proposed that there is a difference between level of education and intelligence with respect to protective factors for memory. They suggested that level of education should be separated from verbal intelligence or vocabulary knowledge when examining memory performance in older adults.

Schmand, Smit, Geerlings, and Lindeboom (1997) also encourage a distinction between level of education and intelligence when studying older adults. In examining the risk factors for dementia, Schmand et al. (1997) found that vocabulary knowledge was significantly better than education in predicting cognitive decline.

Memory Training

It was hypothesized that memory training would decrease memory complaints and increase memory performance. The results did not support the components of this hypothesis. Fewer participants reported memory complaints at post-testing after participating in memory training workshops. In addition, fewer participants showed poor memory performance at post-testing after participating in memory training workshops.

These trends, however, were not statistically significant. Control participants showed a similar trend for memory complaints, though not statistically significant. However, more control participants showed poor memory performance at post-testing, though not statistically significant either. One explanation for these results is that the memory improving techniques presented in the workshops require a great deal of practice and effort in order to be effective. The time of post-testing (within one week after workshops) may not allow for enough practice for participants to master the techniques. Also, there was not a questionnaire to determine whether workshops participants were practicing or utilizing the memory training techniques. Future research on memory training may benefit from incorporating this type of questionnaire to determine whether participants are practicing the memory techniques presented in workshops. Kramer and Willis (2002) indicated that older adults can benefit from cognitive training and suggested that new techniques be implemented that address deficits specific to the needs older adults. However, they stated that most research in training with older adults is completed in a format that requires participants to practice techniques on their own. This procedure relies on compliance with instruction to practice, as in this current study. Also, Baltes and Raykov (1996) provided six sessions of cognitive training to older adults in the area of figural relations problems. The training sessions were conducted in such a way that practicing at home was not required. They found that older adults benefited from this type of training.

Results Found in Predicted Direction

There are three components to the hypotheses in which the results showed that the differences were not significant but the tendency matched the components of the

hypotheses. These findings, while not statistically significant, are worthy of discussion. First, Hypothesis 2 stated that the level of anxiety at the time of testing (state anxiety) would negatively impact the level of memory performance. Results showed that the 32 participants with higher state anxiety scored lower than the 68 participants with lower state anxiety. However, the difference in scores between the two groups was not statistically significant. Next, in Hypothesis 3, the second component of the hypothesis stated that participation in memory training workshops was expected to improve memory performance. Results showed that at post-testing there were five fewer participants than at pre-testing who showed poor memory performance after participating in memory training workshops. For the group who did not participate in memory training workshops, there were five more participants showing poor memory performance at post-testing than at pre-testing. At least five participants of the memory training workshops seemed to have improved memory performance while five participants of those who did not participate seemed to have shown a decline in memory performance. Finally, the first component of Hypothesis 5 stated that participants with higher levels of education would report fewer memory complaints than participants with less education. While the results were not significant, the tendency was for participants with 17 or more years of education to report fewer memory complaints than participants with some college and for participants with less than a high school education. These results for these three components of the hypotheses that were not significant but in the predicted direction may have been strengthened with different methodology. The following section discusses these issues.

Methodological Concerns / Limitations of Study

There are methodological issues which may have had an effect on the outcomes of this study. Each of the issues will be discussed in this section to explain results that did not support hypotheses. Of primary concern in this present study was that the raw data was dichotomized for use in odds ratio calculations. That is, cut off scores were set to place participants into one of two categories. For example, the memory performance cut off score was set at four. Participants scoring four or below were placed in the “poor” performance category. There were 18 participants in this category (out of 100 participants). Those participants scoring above four were placed in the “normal or good” performance category. There were 82 participants in this category (out of 100 participants). Within this category were participants scoring between five and ten. We treated all participants in the “normal or good” group as the same when there might have been differences for participants showing better memory performance with respect to any of the other variables that were tested. By using two categories, we were unable to compare participants with poor memory performance to participants with particularly good memory performance. In the same way, we dichotomized other variables: anxiety, depression, and memory complaints. It is possible that using three categories (e.g., low, medium, and high) might have produced different results because we would have been able to compare the “low” and “high” groups for the hypotheses presented. Also, with respect to dichotomizing data, we may have found different results if the data were continuous through regression analysis.

Additional methodological concerns can be raised regarding the sample, with issues of sample size and gender being of particular interest. The sample size in this

study was 100. There were more women than men (61 women and 39 men). A larger sample size with more even distribution of female and male participants might have made a difference in the results by having more participants in each category. With the issues raised regarding dichotomizing the data and increasing the number of categories per variable, more participants would be needed to have enough participants in each category. Related to overall sample size is the size of the group of participants who endorsed symptoms of both depression and anxiety. This group (18% of all participants) is also too small to be able to generalize regarding comorbidity of anxiety and depression in older adults.

Self-selection of participants might also have had an effect on outcomes. Participants were recruited through advertisements that offered “Mood and Memory Workshops” and that encouraged participation for individuals who might be concerned about their memory as they age. The characteristics of individuals who responded may be different than individuals who chose not to respond. That is, individuals who responded might be more concerned about aging, memory, or mood. This concern may have an impact on anxiety, depression, and memory complaints scores. Also, these individuals may be more aware of memory issues, which can also have an effect on memory complaints. By responding to the advertisement, individuals are suggesting that they do have concerns about their memory. They may have already experienced problems associated with memory, which would impact memory complaints as well as memory performance scores. Finally, these individuals have demonstrated that they have the motivation as well as the ability to participate in workshops. It is possible that

individuals who chose not to respond may be more representative of the population of older adults.

Results of this study show that participation in workshops did not have a significant effect on reducing memory complaints or improving memory performance. There are several methodological issues to discuss regarding these results. Fifty nine participants completed workshops and returned for post-testing. Thirteen participants completed pre-testing and post-testing prior to attending workshops. These participants were designed to serve as control participants. Another 28 participants were pre-tested and began participation in workshops. Of these participants, some did not complete workshops and did not return for post-testing while others completed workshops but did not return for post-testing. Regardless of the reason they did not return for post-testing, there may be a difference in characteristics of these participants as compared to participants who did complete all parts of the study. We can speculate as to what these characteristics are. It may be that participants who did not return for post-testing were not satisfied with the workshops. Or, they were not interested in post-testing because they were only interested in the workshops. Perhaps they dropped out of workshops for a variety of reasons (e.g., inconvenient times or location, negative perceptions of the workshops, or apathy). Nevertheless, these participants who began workshops but were not post-tested are likely to have different motivation levels than participants who completed workshops and post-testing.

Another consideration for an explanation of the results regarding the workshops involves the type of workshop that participants attended. Of the 59 participants who participated in workshops, 22 were Relaxation and 37 were Attention. Both types of

group presented the same information regarding memory training techniques and strategies as well as the same amount of time devoted to memory training. Both groups presented additional information regarding techniques of relaxation and techniques for improving attention. However, the amount of time spent on these techniques depended on the focus of the group. That is, the Relaxation group spent more time on relaxation techniques and less time on techniques for improving attention. The Attention group spent more time on activities that focused on improving attention with less time spent on relaxation techniques. During data analysis, we did not distinguish between group type. The hypothesis regarding participation in memory training focused on the memory complaints and memory performance, not anxiety. However, it is possible that by analyzing the groups together, we missed the effect of group type. The Relaxation group might be better at decreasing anxiety but not improving memory. In a similar way, the Attention group might be better at improving memory but not decreasing anxiety. If these possibilities are true, then by placing both group types together, we may have neutralized the effects of each group with the other. Our hypothesis regarding memory training, however, was focused on participation in memory training workshops. We proposed that the participation was the important factor, not group type. This idea may help to explain the reason that we did not find significant results for participation in memory training.

Broader Implications

There were five hypothesis with a combined nine components for this research study. Two of those nine components were supported by the data. Three components were in the predicted direction, though not significant. There are some important

outcomes of this research. With 45% of participants endorsing symptoms of anxiety, there is evidence that older adults experience anxiety more than we expected. Medical and psychological professionals should be urged to consider further investigation of how anxiety impacts the health and well-being of older adults. When older adults seek medical attention, it may be beneficial for physicians to take time to inquire about anxiety symptoms. While the results of this study did not support the effect of memory performance, previous research supports the notion that anxiety can have negative effects on health concerns for older adults. Further research is needed to investigate these concerns.

Most of the older adults in this study did not show poor performance on memory tests. This news is good since loss of memory is a concern for older adults. In addition to inquiring about anxiety, medical and psychological professionals should be urged to perform memory check ups for older adult patients. These memory check ups can serve to inform clinicians on the level of memory performance for older adults. In addition, since older adults show concern for memory loss in the form of memory complaints, memory check ups can provide objective evidence that can serve to alleviate concerns for older adults. Further, if memory check ups show negative results, clinicians can make appropriate referrals for testing and treatment.

Finally, gender differences with respect to anxiety symptoms showed that women tend to experience and/or report symptoms of anxiety more frequently than men do. Medical and psychological professionals should consider paying attention to the emotional needs of older women.

APPENDIX

APPENDIX A

Memory Training Workshop Description

Session 1:

- a) Introduction and discussion of participant's present memory problems
- b) Relaxation and mental imagery exercise
- c) Review and discussion handouts: Memory awareness and What happens to your memory as you get older?
- d) Mnemonic training for word lists (handout Method of Loci)
- e) Practice exercise for Method of Loci
- f) Mood discussion (handout: Memory and self concept)
- g) Homework assignment: construction of individual locations for Method of Loci

Session 2

- a) Group discussion of previous session (e.g., homework, handouts, and methods)
- b) Relaxation and mental imagery exercise
- c) Mnemonic training for word lists (review of Method of Loci)
- d) Second practice exercise for Method of Loci
- e) Mood discussion (handout: Self-change skills)
- f) Homework assignment: 16 –word list to be memorized with Method of Loci

Session 3

- a) Group discussion of previous session (e.g., homework, handouts, and methods)
- b) Relaxation and mental imagery exercise
- c) Mnemonic training for paragraphs (handout: Strategies for recall of text)
- d) Practice exercise with Preview-Question-Read-Summarize-Test (PQRST) method)

e) Mood discussion (handout: Stress and attention and Pleasant activities and depression)

f) Homework assignment: practice exercises for Method of Loci and PQRS

Session 4

a) Group discussion of previous session (e.g., homework, handouts, and methods)

b) Relaxation and mental imagery exercise

c) Mnemonic training for paragraphs (review PQRS method)

d) Mood discussion (handout: Positive thinking)

e) Homework assignment: practice exercises for PQRS

Session 5

a) Group discussion of previous session (e.g., homework, handouts, and methods)

b) Relaxation and mental imagery exercise

c) Mnemonic training for names (handout: How to remember names)

d) Mood discussion (handout: Assertiveness)

e) Homework assignment: practice exercises for PQRS and name-face association

Session 6

a) Group discussion of previous session (e.g., homework, handouts, and methods)

b) Relaxation and mental imagery exercise

c) Mnemonic training for names (review names-face association mental imagery with slide show exercise)

d) Handout: External strategies for memory recall

e) Homework assignment: practice exercises for Method of Loci and name-face task

Session 7

- a) Group discussion of previous session (e.g., homework, handouts, and methods)
- b) Relaxation and mental imagery exercise
- c) Mnemonic training for names (handouts: How to remember names and Maintaining your memory and attention power)
- d) Mood discussion (handout: feelings about workshop and obtained abilities)
- e) Homework assignment: arrangements for post-testing

Table 1
2 x 2 Cross-Classification of Anxiety and Memory Complaints

		Memory Complaints	
		Present	Not
Presence of Anxiety	Yes	p_{11}	p_{12}
	No	p_{21}	p_{22}

Table 2
Cut-off Scores for Measures

	1	2
STAI		
State	≥ 37 (present)	≤ 36 (not present)
Trait	≥ 46 (present)	≤ 45 (not present)
PSWQ	≥ 53 (present)	≤ 52 (not present)
TAS	(present)	(not present)
GDS	≥ 10 (present)	≤ 9 (not present)
BDI	≥ 16 (present)	≤ 15 (not present)
TDS	(present)	(not present)
CVLT	≤ 4 (poor)	≥ 5 (good)
MAC-S	≤ 52 (poor)	≥ 53 (good)
Levels of education	1 = Up to 12 years of education 2 = Between 13 and 16 years of education 3 = Over 17 years of education	

Table 3
Results of Hypothesis 1, Component 1

Anxiety	Complaints
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	Present	Not Present	odds	odds ratio	z-score
Present	22	23	0.96	3.09	2.59
Not Present	13	42	0.31		

Depression	Complaints
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	Present	Not Present	odds	odds ratio	z-score
Present	15	8	1.88	5.34	3.29
Not Present	20	57	0.35		

Table 4
Results of Hypothesis 1, Component 2

Anxiety	Performance
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	Poor	Good	odds	odds ratio	z-score
Present	6	39	0.15	1.81	1.09
Not Present	12	43	0.28		

Depression	Performance
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	Poor	Good	odds	odds ratio	z-score
Present	3	20	0.15	1.61	0.70
Not Present	15	62	0.24		

Table 5
Results of Hypothesis 2

CVLT	State Anxiety	N	Mean	SD
	Present	32	6.13	1.76
	Not Present	68	6.26	2.00

F = 0.727 p > .05

Table 6
Results of Hypothesis 3, Component 1

Participation		Complaints		odds	odds ratio	z-score
		Present	Not Present			
	Yes	17	42	0.40	2.36	1.63
	No	6	35	0.17		

Table 7
Results of Hypothesis 3, Component 2

Participation		Performance		odds	odds ratio	z-score
		Present	Not Present			
	Yes	10	49	0.20	1.19	0.33
	No	8	33	0.24		

Table 8
 Results of Hypothesis 4, Component 1

Gender		Complaints				
		Present	Not Present	odds	odds ratio	z-score
Male		15	24	0.63	1.28	0.58
Female		20	41	0.49		

Table 9
Results of Hypothesis 4, Component 2

Gender		Anxiety		odds	odds ratio	z-score
		Present	Not Present			
Male		12	27	0.44	2.65	2.26
Female		33	28	1.18		

Table 10
Results of Hypothesis 5, Component 1

Complaints

MAC-S	Education	N	Mean	SD
	12 or fewer years	29	55.97	8.53
	13-16 years	37	55.46	10.94
	17 or more years	34	59.00	9.95

F = 1.27	p > .05
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Table 11
Results of Hypothesis 5, Component 2

Performance

CVLT	Education	N	Mean	SD
	12 or fewer years	29	6.72	1.75
	13-16 years	37	5.89	2.01
	17 or more years	34	6.15	1.92

F = 1.58	p > .05
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