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Determinants of Subjective Memory In First-Degree Relatives and Care Providers of Individuals with Dementia

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**Determinants of Subjective Memory In First-Degree Relatives and Care Providers of
Individuals with Dementia**

A Thesis

Presented to the Department of Psychology

College of Liberal Arts and Sciences

and

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Cassidy Marie Tiberi

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Abstract

Subjective memory may help practitioners understand who pursues assessment and treatment for memory concerns. Two factors that are related to subjective memory are depressive affect and fear of dementia, and two groups of older adults who may be susceptible to these factors are first-degree relatives and care providers of patients with dementia. This study seeks to determine how depressive affect and fear of dementia influence the subjective memory of these two groups. Fifty-five adults ages 55 and older who were a care provider and/or first-degree relative of patients with dementia reported their perceptions of their own memory, feelings of depression, and dementia worry on a Qualtrics questionnaire. I anticipated that depressive affect would be a stronger predictor of subjective memory in care providers than in first-degree relatives, whereas dementia worry would be a stronger predictor of subjective memory in first-degree relatives than in care providers. Additionally, I hypothesized that the relationships between subjective memory and both depression and dementia worry would be strongest for individuals who are both first-degree relatives and care providers. Overall, my hypotheses regarding differential patterns of relationships across groups was not supported. However, results showed that depression was the strongest predictor of subjective memory, regardless of group affiliation. Correlation analyses also revealed strong relationships between fear of dementia and depression among both care providers and first-degree relatives. By better understanding the lack of influence of a fear of dementia and the strong influence of depression on the subjective memory of these two populations, clinicians may be better equipped to support older adults with memory concerns.

Determinants of Subjective Memory In First-Degree Relatives and Care Providers of Individuals with Dementia

Subjective memory, which includes the concept of memory self-efficacy, is a construct that has been given significant attention in the current literature. Memory self-efficacy has been defined as “beliefs about one's own capability to use memory effectively in various situations” (Hertzog et al., 1989, p. 687). Subjective memory is important because it may help researchers and practitioners understand who seeks help for concerns about their memory. For example, one study compared 33 healthy individuals who sought help at memory clinics to 85 participants who did not. The researchers found those who presented to memory clinics with subjective complaints scored lower on a measure of memory self-efficacy than their non-help-seeking peers (Ramakers, Visser, Bittermann, Ponds, van Boxtel & Verhey, 2009). As such, gaining a better understanding of subjective memory may provide clinicians with useful information as they support and care for their patients.

One important factor that influences subjective memory is depression (Cipolli et al., 1996; Dellefield & McDougall, 1996; Mendes et al., 2008; Niederehe & Yoder, 1989). Cipolli et al. (1996) reported that among 400 adults in the general population aged 50-88, depressed individuals had lower scores on all objective memory and subjective memory measures when compared to their non-depressed peers. Similarly, Dellefield and McDougall (1996) found that among 145 community-dwelling older adults, individuals with depression scored lower in memory self-efficacy than other nondepressed participants. The relationship between depressive affect and subjective memory holds even among non-depressed adults. Mendes et al. (2008) found significant correlations between self-reported symptoms of depression and subjective memory complaints in 292 healthy individuals in the general population.

Another factor that may influence subjective memory is older adults' concern about developing dementia in the future. These concerns are quite prominent in the general population. Across a sample of 219 adults aged 40 and older, nearly half of them were at least somewhat concerned about developing dementia (Bowen, Kessler & Segler, 2018). These findings are nearly identical to those from another study of 193 adults aged 65 and older where close to half of the participants were at least "somewhat concerned" and one sixth reported being "very concerned" that they would develop dementia at some point in the future (Norman et al., 2018). These same studies investigated the relationship between dementia worry and subjective memory and yielded consistently significant results (Bowen et al., 2018; Norman et al., 2018). Bowen et al. (2018) found that dementia worry was associated with perceived memory capacity and perceived memory change in a sample of healthy older adults. Norman et al. (2018) also found that being more concerned about developing dementia was associated with a higher self-reported frequency of forgetting. Thus, there appears to be a robust relationship between stronger fears of developing a neurodegenerative disorder and lower memory self-efficacy.

Two groups of older adults who are particularly vulnerable to depression and concerns about developing dementia are family members and care providers of individuals with dementia. One common cause of dementia is Alzheimer's disease, a neurodegenerative disease that progressively interferes with memory and other cognitive skills as well as the ability to carry out everyday tasks (National Institution for Aging, 2019). According to the CDC, in 2014, more than 5 million Americans were living with AD. Due to its widespread nature, family caregivers are heavily involved in the daily lives of their loved ones, providing approximately 70% of healthcare to AD patients in the United States (Alzheimer's Disease International, 2010). As such, AD and other forms of dementia impact not only the diagnosed patients, but also their

family members and care providers who may be vulnerable to depression and anxiety about someday developing the disease themselves.

Many studies have examined the potential negative affective outcomes that can result from caring for an older adult with severe memory loss (Mausbach et al., 2013; Wang, Yip & Chang, 2015). Mausbach et al. (2013) found that spousal caregivers were more likely to meet the cutoff for clinically significant depression than their non-caregiving peers, although not all studies demonstrate this effect (see for example, Tang et al., 2015). Wang et al. (2015) also identified greater depression in individuals caring for a family member with dementia, documenting a significant effect of stress on caregivers' self-reported depression. Although together, these findings provide some understanding of how caring for a family member with dementia influences depression, research to date has not examined depression in non-care-providing first-degree relatives of dementia patients.

In contrast, research on dementia worry has centered more prominently on first-degree relatives than on care providers (Kessler, Süd Hof & Frölich, 2014; Rahman, 2016). Kessler et al. (2014) found a strong positive relationship between being a first-degree relative of a patient with dementia and dementia worry, such that first-degree family members have more concerns about developing dementia themselves than their peers do. To the contrary, Rahman (2016) found no statistically significant differences in fear of AD between participants who did and did not have a first-degree family member with dementia. Although concerns about developing dementia have not been directly investigated in care providers, given the prevalence of anxiety regarding dementia (Bowen et al., 2018; Norman et al., 2018), care providers are unlikely to be immune to dementia worry.

Given that first-degree relatives are highly prone to concerns about developing dementia (Kessler et al., 2014; Rahman, 2016) and given that these concerns are associated with lower memory self-efficacy (Bowen et al., 2018; Norman et al., 2018), it is, perhaps, not surprising that several studies have documented lower subjective memory in first-degree relatives of patients with dementia (Hausmann et al., 2018; Tsai, Green, Benke, Silliman & Farrer, 2006). In a study by Hausmann et al. (2018), a group of 10 healthy older adults who were first-degree family members of patients with AD reported more concerns about their own memory than a group of individuals without a family history. This effect of shared genetics was also documented in a much larger-scale study by Tsai and colleagues (2006). These researchers found a greater incidence of subjective memory complaints in 1203 first-degree relatives of patients with AD than in 296 spouses of similar patients. At the same time, this effect has not always been consistently documented in the literature. A study by McPherson et al. (1995) did not find significant differences between first-degree family members and an age- and gender-matched control group with regard to memory complaints following a neuropsychological assessment. Another study performed by Heun et al. (2003) compared the subjective memory of first-degree relatives of AD patients, first-degree relatives of patients with major depressive disorder and a control group and found no significant differences in subjective memory complaints across three groups of older adults once they controlled for age. Thus, the research regarding the nature of memory self-efficacy and subjective memory complaints in first-degree relatives remains inconclusive.

While many studies have looked at depression, dementia worry, and subjective memory in either care providers or first-degree family members of patients with dementia, no research to date has combined all of these into a single study conducted with a population that includes both

of these groups of older adults. As such, the current study will seek to further elucidate the ways in which depression and dementia worry affect subjective memory and to determine whether these relationships differ for care providers versus first-degree relatives of patients with dementia. I anticipate that depressive affect will be a stronger predictor of subjective memory in care providers than in first-degree relatives, whereas dementia worry will be a stronger predictor of subjective memory in first-degree relatives than in care providers. Additionally, I hypothesize that the relationships between subjective memory and both depression and dementia worry will be strongest for individuals who are both first-degree family members and care providers of individuals diagnosed with dementia.

Method

Participants

Participants included 55 adults (77.8% female; 87% white) aged 55 and older ($M = 63.5$, $SD = 5.40$) who were 1) first-degree relatives (i.e. parent, child, grandparent or sibling) of patients with diagnosed dementia, 2) care providers of patients with dementia, or 3) first-degree relatives of patients with dementia who were also care providers. All participants provided informed consent before beginning the study. Eleven participants were care providers, 23 were first-degree family members, and 21 were both. The three groups were statistically equivalent in their race ($\chi^2 (n=55) = 4.94, p = .55$) and gender ($\chi^2 (n=55) = 0.43, p = .81$) distributions and in their years of formal education ($F (2,52) = 0.31, p = .73$). See Table 1. However, the average age across groups differed significantly ($F (2,52) = 3.40, p = .04$) with those who were both care providers and first-degree relatives being significantly younger than those who were exclusively care providers, $p = .02$.

Materials

All of the questionnaires utilized for this study are included in the Appendix.

Fear of Alzheimer's Disease Scale (FoADS: French, Floyd, Wilkins, & Osato, 2011; Rahman 2016). This 30-item questionnaire measured the amount of concern participants have related to developing dementia. Some example items included: "When I forget something, I am apt to think that I am getting Alzheimer's disease;" "When I misplace things, I sometimes think that I may have Alzheimer's disease;" and "I fear not recognizing family members." Participants rated each item on a five-point Likert-type scale (1 = "never" to 5 = "always"). Possible scores ranged from 0 to 150, with higher scores signifying higher dementia worry.

Personal Beliefs about Memory Instrument (PBMI: Lineweaver & Hertzog, 1998). This questionnaire measured three components of subjective memory: memory self-efficacy, change in memory over time and perceived control over memory. Three items measured global memory self-efficacy. One example asked participants to compare their own memory to the memory of their same-aged peers. Additionally, an 8-item retrospective change subscale asked participants to compare their memory now to their memory 10 years ago and to their memory when they were 18 years old. Next, two 4-item subscales measured the amount of control participants believe they exert over their current and future memory functioning. The final 24-item subscale asked participants to rate their specific memory self-efficacy, that is their ability to remember certain types of information (i.e. trivia, appointments, words in conversation, faces, etc.) on a scale from 1 ("very poor") to 5 ("very good"). Across those subscales, higher scores reflected better memory self-efficacy, as well as beliefs in less retrospective change and higher levels of control over memory now and in the future.

Center for Epidemiological Studies-Depression (CES-D: French, Floyd, Wilkins, & Osato, 2011). This questionnaire contained 20-items that measured depressive affect. Participants rated how often they had experienced symptoms associated with depression in the past week. Example items included: “I did not feel like eating; my appetite was poor;” “I felt that I could not shake off the blues even with help from my family or friends;” and “I felt that everything I did was an effort.” Participants responded to each statement on a four-point Likert-type scale from 0 to 3 (0 = “Rarely or None of the Time” to 3 = “Most or Almost All the Time”). Total scores ranged from 0 to 60, with higher scores indicating greater depressive symptoms.

Demographic Questionnaire. A demographic questionnaire created for the purposes of this study asked participants to report their race, age, gender, years of formal education, and relationships shared with people with dementia.

Procedure

This study was conducted through an online survey created on Qualtrics. Each participant completed a series of questionnaires related to subjective memory, dementia worry, and depressive affect. Participants were recruited into this study through Mechanical Turk, an online recruitment platform where participation in scientific studies is incentivized through Amazon credits. A large group of adults on the platform who were aged 55 and over completed an initial screening that included only the demographic questionnaire. These participants received 25 cents in pay. Those who were care providers and/or first-degree relatives then received an invitation to complete the full study for \$5 in Amazon credit. Another method of recruitment was through personal connections and local care provider networks. Care providers were emailed a flier listing the study criteria and instructions on how to access and complete the study. Upon completing the survey, all participants emailed the researcher a code that appeared after the final

question. Payment via a \$5 Amazon eGift card was sent in response to emails that included the correct survey code.

Results

Group Averages Across Subjective Memory, Depression, and Fear of Alzheimer's Disease

The average score for the three PBMI subscales, the CES-D, and the FoADS are illustrated in Figures 1, 2, and 3. The three groups were statistically equivalent in their self-reported memory self-efficacy ($F(2,52) = 0.53, p = .59$), self-reported memory change ($F(2,52) = 0.72, p = .49$), and self-perceptions of memory control ($F(2,52) = 0.34, p = .71$) on the PBMI. The three groups were also statistically equivalent in their depression scores ($F(2,52) = 1.19, p = .31$) and fear of dementia, $F(2,52) = 2.30, p = .11$.

Correlations between Subjective Memory, Fear of Alzheimer's Disease, and Depression

Standard correlation analyses explored the relationships between depression, fear of dementia, and subjective memory (memory self-efficacy, change in memory over time, and perceived control over one's memory) in the full sample as well as in each of the subgroups of participants. See Table 2.

In the full sample, the three subjective memory measures from the PBMI were significantly related to one another, all $r_s \geq .547$, all $p_s < .01$. These relationships also reached significance for each of the three subgroups, all $r_s \geq .484$, all $p_s < .05$.

When examining the relationship memory self-efficacy shared with depression and fear of dementia, memory self-efficacy negatively correlated with depression in the overall sample, $r = -.437, p < .01$. However, this relationship was only significant in the subgroup of participants who were both a care provider and a first-degree relative, $r = -.490, p < .01$. Fear of AD did not have a significant relationship with memory self-efficacy in any of the subgroups. Perceived

change in memory negatively correlated with both depression ($r=-.270, p<.05$) and fear of dementia ($r=-.355, p<.01$) in the general sample. However, this relationship was not significant among any of the subgroups.

In the full sample, perceived control over memory negatively correlated with both depression ($r=-.473, p<.01$) and fear of dementia, $r=-.306, p<.05$. The negative correlation between perceived control over memory and depression was also present in care providers ($r=-.787, p<.01$) and in participants with both genetic and caregiving relationships, $r=-.458, p<.05$.

Increased fear of dementia significantly corresponded with higher depression scores in both first-degree relatives ($r=.635, p<.01$) and in care providers, $r=.608, p<.05$. Due to the lack of a significant relationship between these constructs among the subgroup who shared both types of relationships with dementia patients, the significant relationship in the full sample is not as strong as that seen among the other two subgroups ($r=.346, p<.01$) although it still reached statistical significance.

Predictors of Subjective Memory in Care Providers and/or First-Degree Relatives

To more directly address the primary hypothesis, we ran multilevel regression analyses that included depression, fear of Alzheimer's disease, and group (dummy coded) as predictors in the first model and added the interaction between group and the other predictors in the second model. We examined these models for memory self-efficacy, perceptions of memory change and perceived control over memory. Inconsistent with my hypothesis, none of the interaction effects reached statistical significance and adding the interaction effects resulted in decreased model fit. This result indicates that the relationships between depression, dementia worry, and subjective memory were similar regardless of group membership.

Several main effects did reach significance in the initial models of the multilevel analyses. These results are summarized in Table 3. First, the model that predicted memory self-efficacy was significant, $R^2=.213$, $F(4,50) = 3.38$, $p<.05$. CES-D scores were the only significant predictor of memory-self efficacy. The model that predicted self-reported change in memory over time neared but did not reach significance ($R^2=.157$, $F(4,50) = 2.33$, $p=.069$), with fear of Alzheimer's disease being a statistically significant predictor. Finally, for self-perceived control over memory, the model was significant ($R^2=.249$, $F(4,50) = 4.14$, $p<.01$). Again, self-reported depression was the only significant predictor of memory control beliefs.

Discussion

This study aimed to build upon the previous literature examining the constructs of depression, fear of dementia, and subjective memory in those who share a significant relationship with an individual with dementia and then to determine if depression and fear of dementia had a different predictive relationship with subjective memory depending upon if the individual was a first-degree relative and/or a care provider. I hypothesized that depression would be a stronger predictor of subjective memory for care providers than first-degree relatives whereas fear of dementia would be a stronger predictor for first-degree family members than care providers. I also predicted that these two constructs would be equally strong predictors of subjective memory for individuals who were both a first-degree relative and a care provider.

Before examining the relationships among the primary variables in this study, I compared the three groups on the outcome measures. A surprising result when comparing all of the groups was that they were all similar in their depression, fear of AD, and subjective memory, which was not anticipated. The lack of a significant difference in depression scores contrasts with the findings of Mausbach et al. (2013) and Wang et al. (2015) who found that depression was more

prevalent among care providers than older adults in the general population who may or may not have also been a first-degree relative. Additionally, the lack of a significant difference for fear of AD is inconsistent with the findings of Kessler et al. (2014), who reported that first-degree relatives have increased dementia worry when compared to older adults without this relationship. However, Rahman (2016) did not find a significant difference in dementia worry between those who were and were not a first-degree relative, indicating that there is literature supporting the lack of significance difference in the current study. Finally, for subjective memory, Tsai and colleagues (2006) documented that first-degree relatives had more subjective memory complaints than spouses. However, this was the only study of note to directly compare the level of any of the key constructs across care providers and first-degree relatives. Although the current study did not replicate these findings, with a larger sample, some of these differences may have reached statistical significance, especially the levels of dementia worry and depression that were higher but not significantly so in the group of participants who were both first-degree relatives and care providers.

When directly examining my hypothesis regarding the patterns of relationships among these variables, my hypothesis was not strongly supported, as group did not interact with the other predictor variables when examining any of the subjective memory outcome measures. Instead, the regression analyses pointed to depression as the strongest predictor of subjective memory regardless of group membership. However, the correlational analyses do provide limited support for my postulation that depression would be a more significant predictor of subjective memory in care providers than in first-degree relatives, as depression was the only significant correlate related to subjective memory in either group. Increased depression scores were associated with lower self-perceptions of control over one's memory in this subgroup. This is

perhaps not surprising given that depression has been associated with a decreased sense of control in the literature (Bowen et al., 2018; Dellefield & McDougall, 1996). The current study expands these findings by relating them specifically to care providers of dementia patients.

On the other hand, fear of Alzheimer's disease did not correlate more strongly with subjective memory in the first-degree relatives group than the care provider group as I had predicted, as it was not significant in either analysis and the magnitudes of the correlations were highly similar. However, in the full sample, participants who reported greater dementia worry also perceived their memory to have changed more negatively and felt they had less control over their memory. The regression analysis also supported the significant correlation between perceived decline in memory and a concern about developing Alzheimer's disease when all older adults in the sample were taken into account. These results support Bowen et al. (2018) who found a significant relationship between perceived memory decline and an increased fear of dementia in a sample of older adults. Because this study is correlational, it is impossible to know whether self-perceived decline in memory is fueling dementia worry or whether individuals with a greater fear of dementia are more sensitive to subtle changes in their memory across time. Future studies will be necessary to further examine the direction of this relationship.

Inconsistent with my third hypothesis, depression was the only significant correlate of subjective memory in the group of participants who were both family members and care providers. Similar to care providers, increased depression was related to less perceived control over memory. Additionally, increased depression also correlated with lower memory self-efficacy in this group. This supports the findings of decreased memory self-perceptions in depressed older adults according to Cipolli et al. (1996) and Dellefield & McDougall (1996).

Many of these results were mirrored in the overall sample, where increased depression scores related to both lower memory self-efficacy and decreased control beliefs.

While there was not a connection between fear of AD and subjective memory, the correlational analyses revealed significant correlations between depression and fear of dementia, with the relationships reaching significance in the full sample, the care providers, and the first-degree relatives. This relationship raises the possibility that depression is a mediator between subjective memory and fear of dementia. More specifically, fear of dementia may lead to depression which then influences subjective memory. The regression analyses may have allowed depression to emerge as a significant predictor but not fear of AD, due to potential shared variance between these two constructs. The sizeable but insignificant negative relationship between fear of AD and subjective memory lend support to this possibility. While the current study did not have enough power to adequately test this hypothesis, this relationship is one of interest for future studies with larger samples. Additionally, the current study only examined linear relationships amongst the variables. Future studies will be necessary to determine whether potential colinear or higher-order relationships exist between depression, fear of Alzheimer's disease, and subjective memory in these three groups of older adults.

Limitations and Future Directions

Despite finding several significant results within my sample, an important limitation to recognize is the small sample size overall and particularly within each participant subgroup. This may influence the extent to which these results can be generalized to the larger population of care providers and/or first-degree relatives. With the care provider sample including only eleven individuals, the number of significant results discovered was surprising. Many recruitment strategies aimed at targeting more care providers ultimately resulted in an increase in the "Both"

group because many known care providers had a family connection as well, even though that may not have been the individual they were caring for. Future studies should aim to gather a larger sample size overall and across each subgroup to determine the extent to which these findings apply to a broader population of care providers and/or first-degree relatives.

While the subgroups were not statistically different in their race, gender, or years of education, the sample in this study is not representative of the overall population in these characteristics. The recruitment strategies used favored white, well-educated, and female participants in their early sixties. If socioeconomic background impacts concerns regarding depression, dementia worry, and subjective memory, further examination of these constructs in a more diverse sample will better elucidate the nature of the relationship between these variables in care providers and/or first-degree relatives.

Last, the nature of the care provider relationship participants had with an individual with dementia was not broadly defined in the current study. The definition of care provider was not explained in detail, so it is likely that certain self-identified care providers were less involved than others. For example, some care providers in this study may not have been living with or providing daily care to the individual with dementia. Less involved care providers could be less impacted by this relationship and, therefore, have lesser depression, dementia worry, and subjective memory concerns than those who are more involved. Several studies have shown greater depressive affect, fear of dementia, and subjective memory concerns in older adults who share relationships with a patient with dementia when compared to the average older adult (Hausmann et al., 2018; Kessler et al., 2014; Mausbach et al., 2013; Wang, Yip & Chang, 2015), but these studies set a minimum level of involvement (e.g. particular tasks the person had to perform or amount of time spent per week care providing) in the patient's lives in order to

participate. Further research could improve upon the present study by either requiring participants to be daily or residential care providers or by examining if the extent of the relationship has an impact upon their depression, fear of dementia, and subjective memory.

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Table 1*Mean (SD) and Proportion Sociodemographic Characteristics of Participants*

	<i>n</i>	Age	% White	% Female	Years of Ed
All Participants	55	63.308 (5.42)	87.00	77.80	15.89 (2.32)
First-Degree Relatives	23	64.09 (4.45)	86.96	73.91	16.13 (2.26)
Care Providers	11	66.00 (7.36)	100	81.81	15.45 (2.42)
Both	21	61.24 (4.60)	80.00	80.00	15.85 (2.41)

Note. No significant differences emerged between participant groups in terms of education, race or gender. Care providers were significantly older than those who are classified as Both, $F(2,52) = 3.40, p=.04$.

Table 2*Correlations between Subjective Memory, Depression, and Fear of Alzheimer's Disease*

	PBMI Change	PBMI Control	CES-D Total	FoADS Total
First-Degree Relatives (<i>n</i> =23)				
PBMI MSE	.504*	.638**	-.341	-.200
PBMI Change		.484*	-.048	-.298
PBMI Control			-.360	-.388
CES-D Total				.635**
Care Providers (<i>n</i> =11)				
PBMI MSE	.899**	.666*	-.563	-.338
PBMI Change		.613*	-.553	-.290
PBMI Control			-.787**	-.389
CES-D Total				.608*
Both (<i>n</i> =21)				
PBMI MSE	.695**	.717**	-.490*	-.104
PBMI Change		.578**	-.301	-.393
PBMI Control			-.458*	-.194
CES-D Total				.011
All Participants (<i>n</i> =55)				
PBMI MSE	.641**	.666**	-.437**	-.180
PBMI Change		.547**	-.270*	-.355**
PBMI Control			-.473**	-.306*
CES-D Total				.346**

Note. PBMI=Personal Beliefs about Memory Instrument; MSE= Memory Self-Efficacy; CES-D=Center for Epidemiological Studies- Depression Scale; FoADS= Fear of Alzheimer's Disease Scale.

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 3*Summary of the Regression Analysis Results Examining the Relationships Among Self-Report Measures*

Outcome Measure	CES-D	CES-D	FoADS	FoADS	Gp 1 vs Gps 2 & 3	Gp 1 vs Gps 2 & 3	Gp 2 vs Gps 1 & 3	Gp 2 vs Gps 1 & 3	R ²	F	df	p
	β	p	β	p	β	p	β	p				
PBMI MSE	-.434	.002	-.044	.749	.044	.762	-.120	.409	.213	3.38	4, 50	.016
PBMI Change	-.163	.248	-.291	.046	-.025	.868	.067	.656	.157	2.33	4, 50	.069
PBMI Control	-.421	.002	-.168	.217	-.046	.746	-.010	.945	.249	4.14	4, 50	.006

Note. Gp=Group; Gps=Groups; PBMI=Personal Beliefs about Memory Instrument; MSE= Memory Self-Efficacy; CES-D=Center for Epidemiological Studies- Depression Scale; FoADS= Fear of Alzheimer's Disease Scale. Significant predictors are bolded.

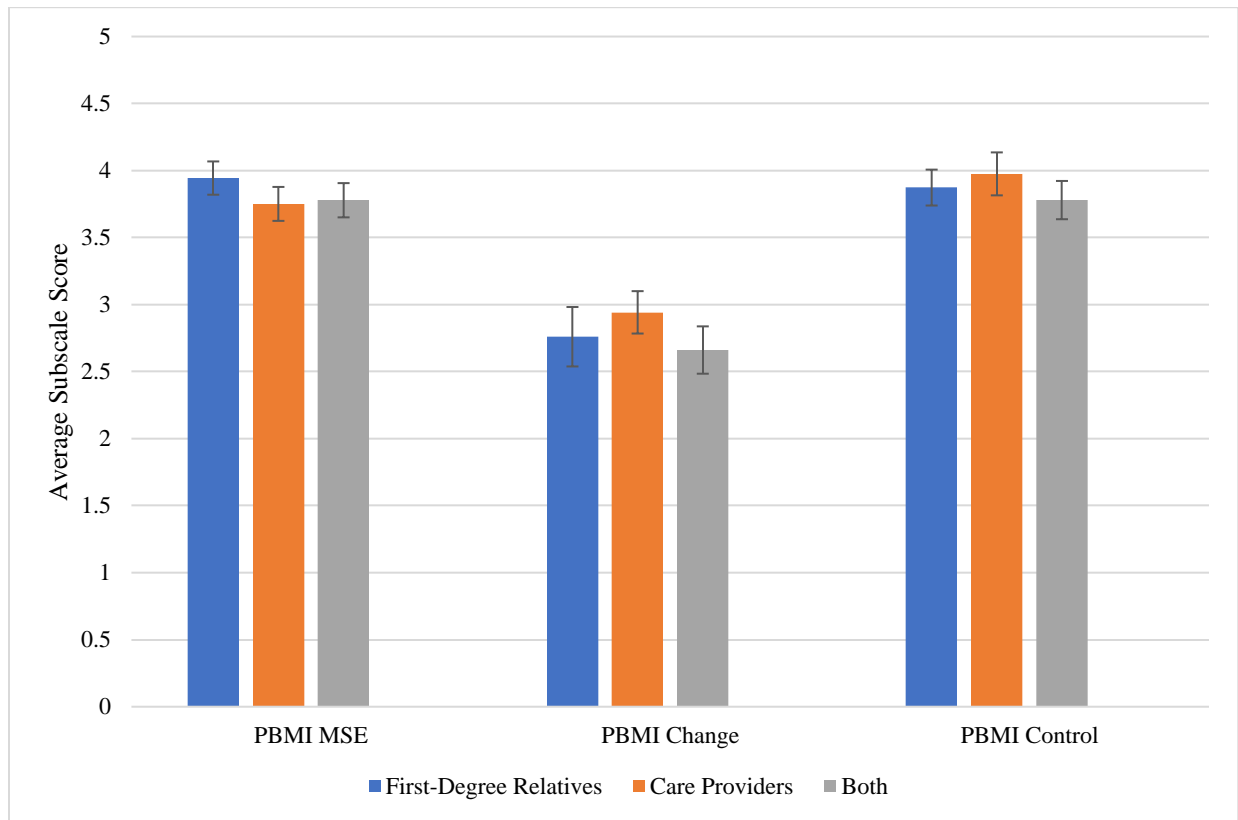


Figure 1. PBMI Means Across Groups. PBMI=Personal Beliefs about Memory Instrument; MSE= Memory Self-Efficacy. The three groups did not differ significantly in their memory self-efficacy ($F(2,52) = 0.53, p = .59$), self-perceived change in memory ($F(2,52) = 0.72, p = .49$), or control beliefs, $F(2,52) = 0.34, p = .71$.

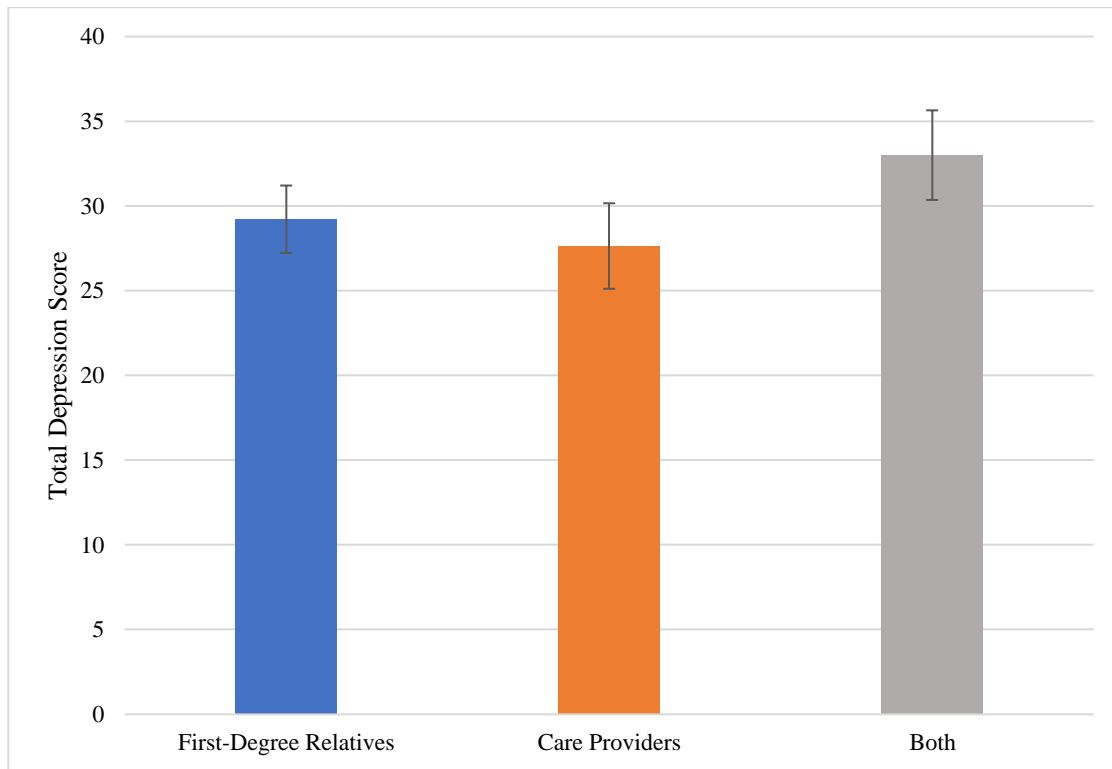


Figure 2. CES-D Means Across Groups. CES-D=Center for Epidemiological Studies-Depression Scale. The three groups did not differ significantly in their depression scores, $F(2,52) = 1.19, p = .31$.

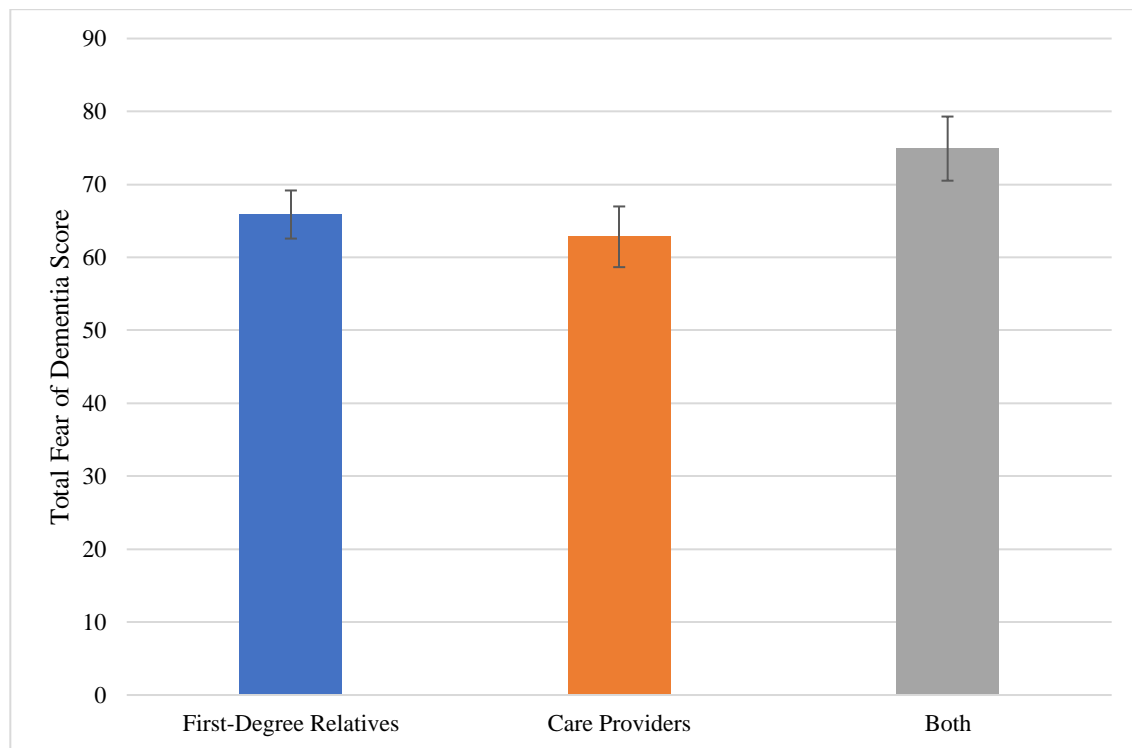


Figure 3. FoADS Means Across Groups. FoADS= Fear of Alzheimer's Disease Scale. The three groups did not differ significantly in their fear of dementia scores, $F(2,52) = 2.30, p = .11$.

Appendix

Personal Beliefs about Memory Instrument

We are interested in what you think about your own memory. In this questionnaire, you will be asked to make judgments about your memory. It is important to remember that there are no right or wrong answers to these items. We want to know what you think about your memory.

There will be three different kinds of items. The first kind will ask you about your ability to remember things. The second kind will ask you about changes in your memory. The third kind of item will ask you about how you can affect your memory by things that you do. The items will be grouped into sections. Please read each item and the response choices carefully before answering, so that you can be certain you understand the kind of ratings you are being asked to make.

		Very Poor				Very Good
1.	My ability to remember in general is:	1	2	3	4	5
		Much Below Average				Much Above Average
2.	Compared to all adults <u>my age</u> , my memory is:	1	2	3	4	5
3.	Compared to all adults of <u>all ages</u> , my memory is:	1	2	3	4	5
		Much Worse				Much Better
4.	Compared to 10 years ago, my ability to remember things now is:	1	2	3	4	5
		Much Harder				Much Easier
5.	Over the last 10 years, remembering things has come:	1	2	3	4	5
		Much Less Efficient				Much More Efficient
6.	Compared to 10 years ago, my memory now is:	1	2	3	4	5

		Greatly Declined				Greatly Improved
7.	Over the last 10 years, my memory has:	1	2	3	4	5
		Much Worse				Much Better
8.	Compared to when I was 18, my ability to remember things now is:	1	2	3	4	5
		Much Harder				Much Easier
9.	Since I was 18 years old, remembering things has come:	1	2	3	4	5
		Much Less Efficient				Much More Efficient
10.	Compared to when I was 18, my memory now is:	1	2	3	4	5
		Greatly Declined				Greatly Improved
11.	Since I was 18 years old, my memory has:	1	2	3	4	5
		None				A Lot
12.	The amount of control I have over my memory is:	1	2	3	4	5
		Strongly Disagree				Strongly Agree
13.	There are things I can do to help me remember.	1	2	3	4	5
14.	I can improve my chances of remembering something if I work at it.	1	2	3	4	5
15.	If I want to remember something, things I do make remembering more likely.	1	2	3	4	5
16.	I can do things now to determine what my memory will be like in the future.	1	2	3	4	5

17.	I can control the amount my memory will change in the future.	1	2	3	4	5
18.	Exercising my memory now will affect my memory functioning in the long run.	1	2	3	4	5
19.	Proper diet and physical exercise now will affect my memory functioning in the long run.	1	2	3	4	5
20.	My memory functioning in the future depends on what I do now.	1	2	3	4	5
		Very Poor				Very Good
21.	My ability to remember where I place an everyday object is:	1	2	3	4	5
22.	My ability to remember people I have met in the past is:	1	2	3	4	5
23.	My ability to remember names is:	1	2	3	4	5
24.	My ability to remember faces is:	1	2	3	4	5
25.	My ability to remember my appointments is:	1	2	3	4	5
26.	My ability to remember trivia is:	1	2	3	4	5
27.	My ability to remember events I personally experience is:	1	2	3	4	5
28.	My ability to remember to do something at a later time is:	1	2	3	4	5
29.	My ability to remember a telephone number I just checked is:	1	2	3	4	5
30.	My ability to remember a telephone number I frequently use is:	1	2	3	4	5
31.	My ability to remember how to get somewhere I go frequently is:	1	2	3	4	5

32.	My ability to remember how to get somewhere after getting directions is:	1	2	3	4	5
33.	My ability to remember my daily schedule is:	1	2	3	4	5
34.	My ability to remember whether I already told someone something is:	1	2	3	4	5
35.	My ability to remember short grocery lists is:	1	2	3	4	5
		Very Poor				Very Good
36.	My ability to remember the meanings of words is:	1	2	3	4	5
37.	My ability to remember words I need when conversing with someone is:	1	2	3	4	5
38.	My ability to remember places I visit is:	1	2	3	4	5
39.	My ability to remember the order in which events occur is:	1	2	3	4	5
40.	My ability to remember conversations I have held is:	1	2	3	4	5
41.	My ability to remember the source of information is:	1	2	3	4	5
42.	My ability to remember things that happened long ago is:	1	2	3	4	5
43.	My ability to remember things that happened recently is:	1	2	3	4	5

CES-D

Using the scale below, indicate the number which best describes how often you have felt or behaved this way—DURING THE PAST WEEK.

- 1 = Rarely or none of the time (less than 1 day)
 2 = Some or a little of the time (1—2 days)
 3 = Occasionally or a moderate amount of the time (3—4 days)
 4 = Most or all of the time (5—7 days)

DURING THE PAST WEEK:

- 1) I was bothered by things that usually don't bother me. _____
- 2) I did not feel like eating; my appetite was poor. _____
- 3) I felt that I could not shake off the blues even with help from my family or friends. _____
- 4) I felt that I was just as good as other people. _____
- 5) I had trouble keeping my mind on what I was doing. _____
- 6) I felt depressed. _____
- 7) I felt that everything I did was an effort. _____
- 8) I felt hopeful about the future. _____
- 9) I thought my life had been a failure. _____
- 10) I felt fearful. _____
- 11) My sleep was restless. _____
- 12) I was happy. _____
- 13) I talked less than usual. _____
- 14) I felt lonely. _____
- 15) People were unfriendly. _____
- 16) I enjoyed life. _____
- 17) I had crying spells. _____
- 18) I felt sad. _____
- 19) I felt that people disliked me. _____
- 20) I could not get "going." _____

Please make sure that you have answered each question above with a whole number from 0 to 3 before turning in your pre-testing packet.

Fear of Alzheimer's Disease Scale

Please indicate how often you experience the sentiment expressed by each of the following statements by circling the answer below each question.

1. The older I get, the more fearful I become that I may develop Alzheimer's disease.

Never Rarely Sometimes Often Always

2. I am afraid of losing my memories.

Never Rarely Sometimes Often Always

3. When I forget something, I am apt to think that I am getting Alzheimer's disease.

Never Rarely Sometimes Often Always

4. The worse my memory becomes, the more I fear that I may have Alzheimer's disease.

Never Rarely Sometimes Often Always

5. I sometimes think that I am developing Alzheimer's disease.

Never Rarely Sometimes Often Always

6. Even though my memory is good, I am still afraid of developing Alzheimer's disease.

Never Rarely Sometimes Often Always

7. When I misplace things, I sometimes think that I may have Alzheimer's disease.

Never Rarely Sometimes Often Always

8. When I hear about others with Alzheimer's disease, I become fearful that I will get it as well.

Never Rarely Sometimes Often Always

9. I think that I will probably get Alzheimer's disease, and it frightens me.

Never Rarely Sometimes Often Always

10. Now that Alzheimer's disease is becoming more public with the diagnosis of popular TV, movie, and political figures (e.g., Charlton Heston, Ronald Reagan), I am becoming more afraid that I may develop it.

Never Rarely Sometimes Often Always

11. The more I learn about Alzheimer's disease, the more fearful I become of getting it.

Never Rarely Sometimes Often Always

12. I am afraid of getting Alzheimer's disease.

Never Rarely Sometimes Often Always

13. Developing Alzheimer's disease frightens me because I would eventually lose all of my independence.

Never Rarely Sometimes Often Always

14. I'm afraid of getting Alzheimer's disease because I would have to rely on someone else to take care of me.

Never Rarely Sometimes Often Always

15. I fear not recognizing family members.

Never Rarely Sometimes Often Always

16. When I think about the possibility of developing Alzheimer's disease, I become nervous or anxious.

Never Rarely Sometimes Often Always

17. I worry about developing Alzheimer's disease more than I worry about developing other diseases.

Never Rarely Sometimes Often Always

18. My hands become clammy when I think about getting Alzheimer's disease.

Never Rarely Sometimes Often Always

19. Thinking about Alzheimer's disease makes me feel fatigued.

Never Rarely Sometimes Often Always

20. I feel hot and even sweat when I think about developing Alzheimer's disease.

Never Rarely Sometimes Often Always

21. My appetite decreases when I think about developing Alzheimer's disease.

Never Rarely Sometimes Often Always

22. I feel shaky when I think about getting Alzheimer's disease.

Never Rarely Sometimes Often Always

23. I often have difficulty concentrating because I'm worrying about developing Alzheimer's disease.

Never Rarely Sometimes Often Always

24. I cannot sleep because I'm worrying about developing Alzheimer's disease.

Never Rarely Sometimes Often Always

25. My heart races or palpitates when I think about getting Alzheimer's disease.

Never Rarely Sometimes Often Always

26. I would rather die than develop Alzheimer's disease.

Never Rarely Sometimes Often Always

27. Developing Alzheimer's disease would be the worst thing to happen to me.

Never Rarely Sometimes Often Always

28. I believe that Alzheimer's disease is one of the worst diseases a person could develop.

Never Rarely Sometimes Often Always

29. I would rather have a painful physical illness (e.g., cancer, AIDS) than develop Alzheimer's disease.

Never Rarely Sometimes Often Always

30. I am afraid of developing Alzheimer's disease because of the burden I would be for my family.

Never Rarely Sometimes Often Always

Demographic Questionnaire**Age:** _____**Gender:**

- Male
- Female
- Transgender
- Do not identify as male, female, or transgender

Years of Formal Education: _____**Which of the following is the highest degree or level of school you have completed?**

- Less than a high school diploma
- High school diploma or GED
- Some college, but no degree
- Associates Degree (for example: AA, AS)
- Bachelor's Degree (for example: BA, BBA, and BS)
- Master's Degree (for example: MA, MS, and MEng)
- Professional Degree (for example: MD, DDS, JD)
- Doctorate (for example: PhD, EdD)

Which of these U.S. Census Bureau race categories applies to you? Check all that apply.

- Black or African American
- White
- Asian
- American Indian or Alaska Native
- Native Hawaiian or Other Pacific Islander
- Other: _____

Have any of your biological relatives ever been diagnosed with dementia?

- Yes
- No

If so, who? List all relatives and specify relationship (if not, type N/A)

Has your spouse (current or deceased) been diagnosed with dementia?

- Yes
- No

Have you ever been diagnosed with dementia?

- Yes
- No

Have you been a primary caregiver for an individual with dementia?

- Yes
- No

If so, who? List all relatives and specify relationship (if not, type N/A)
