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Dementia Worry and Neuropsychological Performance in Healthy Older Adults

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Abstract

Objective: Dementia is one of the most feared diseases in American society. However, limited research exists regarding how worrying about dementia may influence peoples' cognitive abilities. The current study examines how dementia worry affects performance on neuropsychological domains of executive function, memory, attention, and processing speed in a healthy older adult population.

Method: Participants ($n = 40$) were screened for depression using the Patient Health Questionnaire-8 (PHQ-8, scores > 10 were excluded) and for mild cognitive impairment using the Telephone Interview for Cognitive Status (TICS, scores < 32 were excluded). All participants were administered common neuropsychological tests of executive function, memory, attention, and processing speed. Participants were also asked to complete the Dementia Worry Scale (DWS), a measure assessing the level of dementia worry individuals experience in daily life.

Results: A multivariate effect of dementia worry on neuropsychological measures of executive function was supported. Specifically, higher levels of dementia worry were significantly related to poorer performance on combined measures of executive function (Wilk's Lambda $= 0.821$, $F\ (2, 36) = 3.934$, $p = .028$).

Conclusions: Dementia worry significantly affects scores on specific neuropsychological measures. Inasmuch, dementia worry may have both functional implications for older adults, as well as assessment implications for practicing neuropsychologists. Further research is necessary to parse apart whether dementia worry represents a psychological variable affecting cognitive performance and/or serves as an early marker of cognitive decline.

Keywords: Aging; Cognitive decline; Dementia; Worry; Neuropsychological performance

Introduction

As of now, 1 in 10 adults aged 65 and older are diagnosed with Alzheimer's disease (AD), the most common form of dementia, and that number increases to 1 in 3 for adults aged 85 and older. Currently, AD alone costs the healthcare system approximately 290 billion dollars a year, though this number will likely exceed 1 trillion as adults continue to live longer, putting them at higher risk of the disease. Moreover, the population of adults aged 65 and older is expected to double by 2050, increasing from 55 to 88 million (Alzheimer's Association, 2019).

Although these statistics motivate vital research targeting aging and neurodegenerative disease, the attention abnormal aging draws can also create an atmosphere of fear and worry among older adults. Indeed, it is thought that dementia is second only to cancer as the most feared disease. This phenomenon, known as dementia worry, has an estimated prevalence rate ranging from 26% to 49% in middle-aged and older adults (Kessler, Bowen, Baer, Froelich, & Wahl, 2012).

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Cutler and Hodgson (1996) first identified dementia worry in 1996 as "anticipatory dementia." They denoted this phenomenon as the fear in middle-aged persons that cognitive changes signaled the future onset of AD. In a study by Kessler and colleagues (2012), dementia worry was depicted more generally as "an emotional response to the perceived threat of developing dementia, independent of chronological age and cognitive status." More recently, dementia worry has been suggested to moderate differences between actual cognitive impairment and performance on cognitive-based measures (Fresson, Dardenne, Geurten, & Meulemans, 2017).

Correlates of dementia worry show that individuals who score higher on dementia worry, as based on the Dementia Worry Scale (DWS), report higher concern about current memory functioning, endorse more beliefs that they may develop dementia in the future, and report higher levels of depressive symptoms (Kinzer & Suhr, 2016). Concern about developing dementia has also been shown to decrease life satisfaction and psychological well-being (Cutler & Brăgaru, 2017; Cutler & Hodgson, 2013). Interestingly, evidence suggests dementia worry is only weakly correlated with physical health (Chung, Mehta, Shumway, Alvidrez, & Perez-Stable, 2009; Werner, 2002; Yeo, Horan, Jones, & Pendleton, 2007).

Previous research supports that dementia worry in older adults increases in the context of negative aging stereotypes and may increase older adults' susceptibility to age-based stereotype threat (Molden & Maxfield, 2017). In a study by Fresson and colleagues (2017), older adults with a moderate or high fear of Alzheimer's disease who were exposed to negative age-based stereotypes were found to perform significantly lower on objective cognitive measures as compared to those in a positive condition.

Overall, it is clear that dementia worry is a significant and important phenomenon in the lives of older adults; however, it has received little attention in research literature. While limited studies have explored the psychological correlates of dementia worry, its relationship to subjective cognitive concerns, and its moderating effect in the context of negative aging stereotypes, no known studies have directly investigated how dementia worry relates to neuropsychological performance.

The current study examines how dementia worry affects objective cognitive performance in neuropsychological domains pertinent for the clinical assessment of cognitive decline in older adults. Specifically, we examine how dementia worry relates to performance outcomes on executive function, memory, attention, and processing speed. Broadly, this study aims to add to our knowledge of the effects of dementia worry, expand our awareness of potential non-neurological factors contributing to neuropsychological performance, and increase our understanding of the possible factors involved in the early stages of cognitive decline. Importantly, we hope to use information gained from this investigation to demonstrate the utility of dementia worry assessment in neuropsychological evaluation. We further hope to use these findings to support further research on intervention strategies for dementia worry in older adults.

Method

Participants

Fifty individuals were recruited for this study through community outreach efforts (e.g., newspaper ads, flyers) in a midsized town in the Pacific Northwest. Participants in the study were at least 65 years old and were screened to exclude participants with evidence of cognitive impairment (i.e., score < 32 on the Telephone Interview for Cognitive Status (TICS); Knopman et al., 2010), depression (i.e., score of > 10 on the Patient Health Questionnaire-8 (PHQ-8); Kroenke et al., 2009), or high anticholinergic medication use (i.e., score > 2 on the Anticholinergic Burden Scale (ACB); Risacher, McDonald, Tallman, et al., 2016). Participants were additionally screened to exclude those with neurological disorder (e.g., seizure disorders, TBI, degenerative motor diseases), current psychotic illness, or substance use disorder. Following the application of exclusion criteria, a total of 40 participants remained. Participation in this study was voluntary and all participants received 10 dollars for their participation.

Materials

Neuropsychological domains and measures. Measured neuropsychological domains of executive function, memory, attention, and processing speed were determined based on their sensitivity to the effects of advancing age (Harada, Natelson Love, & Triebel, 2013). Specific tests were selected in accordance with their measurement of these domains (Huang, Liu, Chang, & Su, 2017; Lezak, Howieson, & Loring, 2004; Rabin et al., 2009; Ruchinskas, 2019). Tests were additionally selected with clinical generalizability in mind, as based on their common use in the neuropsychological assessment of aging. All use data was based upon the largest, most comprehensive clinical neuropsychology test usage pattern survey conducted in the U.S. and Canada (Rabin, Paolillo, & Barr, 2016).

Following these selection criteria, The California Verbal Learning Test II (CVLT-II; Delis, Kramer, Kaplan, & Ober, 2000) immediate and delayed free recall scores were used to assess memory, DKEFS Stroop (Delis, Kaplan, & Kramer, 2001) and Trail Making Test B (TMT-B; Reitan & Wolfson, 1985) were used to assess executive function, Trail Making Test A (TMT-A; Reitan & Wolfson, 1985) and the Weschler Adult Intelligence Scale-IV (WAIS-IV) Digit Span subtest were used to assess attention, and the WAIS-IV Coding and Symbol Search subtests were used to assess processing speed (WAIS-IV; Wechsler, 2008, Wechsler, 2008).

Dementia worry scale. The Dementia Worry Scale (Suhr & Isgrigg, 2011) is a validated measure assessing the construct of "dementia worry." Participants were asked to respond to 13 statements related to worrying about dementia and to indicate on a Likert scale ranging from 1 to 5 how typical of themselves each statement was ("not at all typical" of them = 1 to "very typical" of them = 5). Items on the DWS include statements related to psychological worries about developing dementia, difficulty controlling worries about dementia, and tendencies to associate normal aging processes with dementia.

Procedure

The study's assessment procedures were conducted by the primary researcher and by trained research assistants. Scoring was performed by trained research assistants who had no involvement in the assessment administration. Following informed consent, neuropsychological tests were administered in semi-randomized order to each participant. Specifically, the CVLTII was administered first for each participant. All other tests were randomized within the CVLTII 20-min delay period. This was then followed by the CVLTII delayed recall. If all tests could not be administered within the delay period, those tests remaining would be administered following CVLTII recall. At the conclusion of testing, participants completed the Dementia Worry Scale questionnaire. The Dementia Worry Scale was administered at the end in order to minimize priming participants for worrying about dementia prior to testing. Administration of these measures was followed by debriefing.

Statistical Analyses. Data were analyzed using Multivariate Analysis of Covariance (MANCOVA) within cognitive domains of Executive Function, Memory, Attention, and Processing Speed. The independent variable was set as the dichotomous DWS score and each cognitive domain was constructed of two dependent variables. Age was set as the covariate in order to control for the known effects of age on dependent measure outcomes. The construct of Memory was measured using total word scores on immediate and delayed CVLT II free recall, Executive Function was measured using Trial 4 scores from DKEFS Stroop and total seconds scores from TMT B, Attention was measured using total seconds scores of TMT A and total raw scores of WAIS-IV Digit Span, and Processing Speed was measured using total correct scores from WAIS-IV Coding and Symbol Search. All MANCOVA assumptions were tested prior to the analyses and were appropriately satisfied.

Following a significant MANCOVA for Executive Function, we examined the univariate relationship between dementia worry and individual neuropsychological measures of executive function. Specifically, the relationship between dementia worry and performance on the DKEFS Stroop Inhibition/Shifting and Trail Making Test B was analyzed. We additionally used Chi-square analysis to examine the relationship between age category and level of dementia worry.

Results

Descriptive Statistics

Demographic information is provided in Table 1. Of the included 40 participants, 13 (32.5%) were men and 27 (67.5%) were women. Thirty-nine participants identified as Caucasian (97.5%) whereas one (2.5%) identified as Asian. Participants ranged in age from 67 to 85. Nine (22.5%) participants were aged 65–70, ten (25%) were aged 71–75, twelve (30%) were aged 76–80, and nine (22.5%) were aged 81–85. The mean number of completed years of education was 17.7 with a standard deviation of 2.42. There were no significant differences in gender, education, cognitive status, or physical health between participants with higher versus lower levels of dementia worry. In general, the sample performed within the expected range on all measures, given their age and expected variability in performance. Means and standard deviations for each neuropsychological measure within high and low dementia worry groups are displayed in Table 2.

Statistical Analyses

A multivariate main effect of dementia worry on neuropsychological measures of executive function was supported, suggesting participants with higher levels of dementia worry scored significantly lower on cognitive performance measures

Table 1. Participant characteristics

Demographic factor	Mean	Standard deviation	Range
Age	75.65	5.63	67–85
Education	17.7	2.42	12–23
Total TICS score	35.08	1.83	32–40
PHQ total	2.85	2.35	0–8
	Frequency	**Percent**	
Female	27	67.5%	
Male	13	22.5%	
Caucasian	39	97.5%	
Asian	1	2.5%	

Table 2. Means and standard deviations of neuropsychological measures in low and high dementia worry (DW) groups

Neuropsychological measure	DW level	*N*	Mean	Std. deviation
DKEFS Stroop Inhibition/Shifting	Low	20	65.4500	10.62011
	High	20	77.1000	22.86321
Trails B speed	Low	20	73.9000	24.96714
	High	20	90.3000	33.92577
CVLTII immediate free recall	Low	20	9.5000	3.34821
	High	20	10.0000	3.12881
CVLTII delayed free recall	Low	20	10.9000	3.80996
	High	20	10.8500	2.77726
Trails A speed	Low	20	30.1500	8.46214
	High	20	31.7500	8.29632
Digit span total	Low	20	28.2000	6.55021
	High	20	26.6000	4.86015
WAIS-IV symbol search	Low	20	26.0500	5.45291
	High	20	25.5500	5.67984
WAIS-IV coding	Low	20	61.9500	11.09042
	High	20	59.2500	12.06943

Table 3. Multivariate analyses of covariance (MANCOVAs) of dementia worry on neuropsychological performance controlling for age

Cognitive domain	Wilks' λ	*F*	d*f*	*p* value	Partial η^2
Executive function	0.821	3.934	2, 38	.028	0.179
Processing speed	0.989	0.192	2, 38	.826	0.011
Attention	0.982	0.325	2, 38	.725	0.018
Memory	0.990	0.174	2, 38	.841	0.010

Table 4. Univariate analyses of covariance (ANCOVAs) for role of dementia worry on specific executive function measures controlling for age

Cognitive domain	*F*	d*f*	*p* value	Partial η^2
DKEFS Stroop Inhibition/Shifting	5.715	1, 38	.022	0.134
Trails B	4.758	1, 38	.036	0.114

of executive function (Wilks' $\lambda = 0.821$, F (2, 36) = 3.934, $p = .028$, partial $\eta^2 = 0.179$) than those with lower levels of dementia worry. There were no significant multivariate main effects for memory, attention, or processing speed (see Table 3).

A significant univariate main effect for dementia worry was found for the DKEFS Color-Word Inhibition/Shifting (F (1, 38) = 5.715, $p = .022$) and for the Trails B (F (1, 38) = 4.758, $p = .036$) measures of executive function (see Table 4). There was also a significant relationship between age category and level of dementia worry, with young-old adults (between the ages of 65 and 75) exhibiting a higher level of dementia worry than old adults (76–85 years in age) (χ^2 (1, $N = 40$) = 4.912, $p = .027$) (see Table 5).

Table 5. Chi square analysis of age category and level of dementia worry

Statistic	Value	*df*	Significance
Pearson Chi-square	4.912[a]	1	0.027
Likelihood ratio	5.019	1	0.025
Linear-by-linear association	4.789	1	0.029
N of valid cases	40		

[a]0 cells (.0%) have expected count less than 5. The minimum expected count is 9.50.

Discussion

Results from the current study suggest that dementia worry is significantly related to decreased neuropsychological performance on measures of executive function in healthy, nondepressed older adults. As the aging population continues to grow and public and media attention of Alzheimer's disease and dementia continues to flood society, dementia worry, an already prevalent phenomenon, is likely to continue to increase in our society. Understanding the impact dementia worry has on older adults' cognitive performance and risk of cognitive impairment is thus imperative. In addition, our results further suggest that dementia worry may be of greater concern for young-old adults than for old adults.

In line with previous research by Fresson and colleagues (2017), our findings support the relationship between worrying about dementia and decreased executive function performance in healthy older adults. Importantly, our results add to this finding by showing dementia worry affects multiple executive function performance measures and does so even without the experimental induction of age-based stereotype threat. Our results also showed that people with higher dementia worry were 30% more likely to perform at clinically impaired levels on executive function tasks (−1.5 SD when compared to a normative baseline) than those with lower dementia worry. The decrease in performance on neuropsychological measures of executive function related to dementia worry shown in our study may thus have significant implications for the lives of older adults. Indeed, performance in this cognitive domain is related to functional ability in the elderly (Brewster, Peterson, Roker, Ellis, & Edwards, 2017).

Beyond the potential functional implications of decreased cognitive performance in relation to dementia worry, the findings from this study are also important in regard to their meaning in a neuropsychological assessment context. As the current study suggests, dementia worry may increase rates of impaired performance on measures commonly used in the neuropsychological assessment of MCI in older adult populations, it is important for clinical neuropsychologists to be aware of this phenomenon. Indeed, assessing for dementia worry may help practitioners better interpret findings from neuropsychological assessment in this population.

It is pertinent to note that dementia worry and the actual risk of acquiring dementia share overlapping features. Previous research studies have shown that dementia worry is related to having more memory concerns, having a high number of general worry or depressive symptoms, and exposure to dementia (Kinzer & Suhr, 2016). While subjective memory concerns, general worry, and dementia exposure were not assessed in this study, our findings did not support that dementia worry was correlated with self-reported depressive symptoms. Research has also suggested that dementia worry may moderate the relationship between objective memory impairment and subjective memory impairment (Kinzer & Suhr, 2016). We can interpret this in multiple ways—for one, dementia worry may be a non-neurological factor that decreases objective performance, or it may be a consequence of true cognitive impairment. Interestingly, our study did not find that dementia worry decreased objective memory performance in older adults, but rather, that it decreased performance in executive function.

Given that performance in this cognitive domain has been shown to decrease in the context of psychological factors of anxiety, worry, and depression, it is possible that the specific decrease in executive function we found in relation to dementia worry is a result of the psychological influence of dementia worry on neuropsychological performance (de Vito, Calamia, Greening, & Roye, 2019; Thomas & O'Brien, 2008). Of note, our finding that dementia worry was higher in younger older adults could indicate that older adults entering into old age experience dementia worry in response to adjusting to nascent, normal age-related cognitive changes. In future research, it will be important to better assess the relationship between age, psychological factors, and dementia worry.

While our findings could arguably support the psychological influence of dementia worry on neuropsychological performance within a normally functioning older adult population, it is not possible to fully discount the potential that the decreases in objective cognitive performance found in this study are due to dementia worry as an early marker of cognitive impairment. Indeed, while all our study participants were above the cutoff for cognitive impairment as assessed by a global screening measure, research suggests that neuropsychological measures are often more adept at picking up on subtle cognitive deficits (Cullum & Lacritz, 2009). Thus, whether dementia worry positively correlates with true neurological impairment or is a non-neurological

factor that decreases cognitive performance is a question deserving of further study. At this time, however, no studies have investigated the relationship between dementia worry and later MCI/AD onset.

That said, multiple recent studies in related research fields potentially suggest the utility of dementia worry as an indicator of dementia risk. For instance, while subjective cognitive decline (SCD) may or may not be accompanied by worrying, older adults with higher levels of worry about their SCD have been shown to have a significantly increased risk of developing MCI/AD (van Harten et al., 2018; Wolfsgruber et al., 2016). Further, general worry is supported to be a psychological marker of dementia risk when associated with biological markers of dementia such as amyloid burden and APOE-e3 carrier status (Bower, Szajer, & Murphy, 2019; Verfaillie et al., 2019). While our study does not establish the relationship between dementia worry and SCD-related worry or general worry, such findings do raise questions as to whether dementia worry is associated with the "worried well" or if it could be an indicator of those at greater risk of cognitive impairment.

Of note, it is certainly possible that dementia worry is both a non-neurological and a neurological factor, and that the differential contribution of psychological and neurological variables to dementia worry depends on individual variability. In general, much research demonstrates that anxiety, depression, and MCI interact in complex ways (Brewster et al., 2017; Wolitzky-Taylor, Castriotta, Lenze, Stanley, & Craske, 2010). Additionally, certain literature shows that different anxiety and depression profiles have different relationships with MCI (Andreescu et al., 2014). As a type of worry especially pertinent to an older adult population, it may be useful to assess for dementia worry in studies distinguishing population subtypes at risk of cognitive decline. More research is also warranted in order to assess the long-term outcomes of dementia worry on the development of MCI and dementias, the relationship between dementia worry and measures of subjective cognitive decline, and the association of dementia worry with biological markers of AD.

While we should additionally continue to research whether dementia worry is a neurological factor, non-neurological factor, or a combination of both, interventions may reduce dementia worry regardless, and therefore help to reduce associated reductions in executive function performance. However, in thinking about interventions for dementia worry, we must be careful. While excessive worry is likely associated with increased psychological distress, worry may also be an effective motivator for necessary dementia screening and treatment-seeking behavior. Indeed, concern about dementia and fear of AD are related to increased intention to get screened for dementia, while public education about normal forgetfulness and dementia has been shown to reassure individuals who, in fact, perform poorly on objective cognitive measures (Commissaris et al., 1995; Tang et al., 2017). The balance between intervening to decrease worrying about dementia and intervening to increase assessment seeking is important to consider in future efforts for intervention implementation. In addition to education about dementia and normal aging, other interventions for dementia worry could include psychological interventions for general worry reduction, such as the use of stress reduction and cognitive-behavioral techniques.

Limitations to our study include selection bias given the use of a voluntary sample of older adults, use of a nondiverse study population, the lack of assessment surrounding the relationship between dementia worry and other psychological variables, and the cross-sectional nature of the study. The administration of the Dementia Worry Scale following neuropsychological assessment could have further influenced our results; however, we did not want to administer this instrument prior to testing given its potential priming effect. We are also aware of the potential for Type I error in our statistical analyses given our multiple comparisons of dementia worry across differing cognitive domains. In addition, our sample was highly educated, which could limit the generalizability of our findings. Yet, across several studies including our own, education has not been associated with level of dementia worry (Kessler et al., 2012). The cross-sectional design of the current study also limits our ability to determine whether the shown results are related to dementia worry as a key indicator of future pathological cognitive decline or as an acute psychological influence on cognitive performance. In order to better address this question, it would be useful to follow up with current study participants to assess the relationship between level of dementia worry and cognitive performance over time.

Future research should further investigate the relationship between dementia worry and other measures of worry and anxiety, explore dementia worry in relation to subjective cognitive decline and biological markers of dementia, and assess the longitudinal effects of dementia worry on cognitive performance and health outcomes. It would also be interesting to look at the relationship between dementia worry and emotion regulation, as well as to look at the effects of dementia worry in a depressed, older adult population. Research should additionally apply studies of dementia worry on objective and subjective cognitive decline to more diverse populations, including those with lower levels of education and those from non-Western cultural backgrounds.

Overall, the results of our study show that dementia worry is related to reduced executive function performance and is more prevalent in young-old adults. Importantly, these results add to the complicated investigation into the dynamic relationship between psychological variables and neurological impairment in a geriatric population. Given the increasing population of older adults, the prevalence of MCI and AD, and the increased cultural focus on aging and dementia, the phenomenon of dementia worry and its relationship to biological, physiological, cognitive, emotional, and behavioral factors in older adults deserves scientific attention. As the line between normal and abnormal aging is currently ill defined, understanding factors like dementia

worry may lead to better conceptions of age-related decline, may help increase accuracy in mild cognitive impairment diagnosis, and could help to support cognitive interventions in aging populations.

Conflict of Interest

None declared.

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