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Memory Complaint Profiles in Dementia Populations Utilizing the Memory Complaints Inventory

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MEMORY COMPLAINT PROFILES IN DEMENTIA POPULATIONS UTILIZING THE MEMORY COMPLAINTS INVENTORY

A Masters Thesis

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By

Becca Nicole Johnson

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MEMORY COMPLAINT PROFILES IN DEMENTIA POPULATIONS

UTILITZING THE MEMORY COMPLAINTS INVENTORY

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ABSTRACT

The Memory Complaints Inventory (MCI) is a self-report questionnaire developed by Paul Green to provide further effort-related evidence in neuropsychiatric practice. It is comprised of nine subscale scores, in addition to the imbedded Plausible and Implausible symptom validity scales. The current study utilized archival MCI scores in dementia populations to determine the presence of, and difference between, genuine memory impairment profiles in separate subgroups of cognitive impairment. The study sample consisted of 244 adults presenting to an outpatient neuropsychology practice for evaluation of memory impairment. The diagnostic categories of the sample consisted of Alzheimer's Disease (n = 21), Vascular Dementia (n = 33), Mild Cognitive Impairment (n = 53), Pseudodementia (n = 88), and Poor Effort (n = 49). Results indicated significant differences in all twelve one-way ANOVAs to represent differences between subgroups on each memory-related subscale of the MCI, the overall MCI score, and the imbedded Plausible and Implausible validity scales. Post-hoc analyses revealed large differences between the dementia categories and the Poor Effort subgroup, providing further evidence for the use of the MCI as a symptom validity measure due to its ability to differentiate between poor effort and genuine neurological impairment. Further support of the study's findings would result in reliable genuine memory impairment profiles to provide further diagnostic and prognostic specificity in general medical practice settings.

KEYWORDS: Memory Complaints Inventory (MCI), Dementia, Alzheimer's Disease, Vascular Dementia, Mild Cognitive Impairment, Pseudodementia, Poor Effort, validity

This abstract is approved as to form and content

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Steven Capps
Chairperson, Advisory Committee
Missouri State University

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INTRODUCTION

Memory complaints are an inevitable part of neuropsychiatric practice. The validity of subjective memory complaints, however, has been widely disputed, as many reported memory complaints do not resemble the resulting diagnosis. Some individuals will claim severe difficulty in daily memory tasks, yet receive a diagnosis of mild cognitive impairment, while others report few, if any, memory difficulties, yet a diagnosis of dementia, Alzheimer's type is warranted. Graham, Emery, and Hodges (2004) suggest distinctive cognitive profiles among unique dementia populations, which facilitate more effective diagnoses. For example, the inability to recognize specific deficits that are evident to clinicians or caregivers (anosognosia) has been widely prevalent in Alzheimer's patients, however, the frequency of individuals with anosognosia in mild cognitive impairment is nearly absent (Orfei et al., 2010). Further, cognitive performance should be considered in differing neuropsychiatric profiles, as executive deficits are more prominent in individuals with subcortical ischaemic vascular disease, and episodic memory deficits are more prominent in individuals with Alzheimer's Disease (Graham, Emery, & Hodges, 2004; Jokinen et al., 2006). Clearly, differing diagnostic categories suggest divergent neuropsychiatric profiles, as well as divergent subjective memory complaints.

Given each subgroup of dementia produces a unique neurocognitive profile, subjective memory complaints may not be an accurate depiction of an individual's specific diagnosis. One study found subjective memory complaints displayed an uncertain relationship with objective memory performance, creating a heightened rate of

false positive and false negative diagnoses (Lenehan, Klekociuk, & Summers, 2012). In a study by Thompson, Henry, Rendell, Withall, and Brodaty (2015), a self-report and an informant-report of prospective memory difficulties were given to family members and individuals with dementia or mild cognitive impairment, and results indicated that neither self-report nor informant-report accurately measured prospective memory impairments. However, many studies have found subjective memory complaints highly correlated with the prediction of the onset of dementia (Luck et al., 2015; Mitchell, Beaumont, Ferguson, Yadegarfar, & Stubbs, 2014; Waldorff, Siersma, Vogel, & Waldemar, 2012). Although subjective memory complaints are idiosyncratic and inconsistent with current cognitive impairment, much of the literature suggests that the perceived memory impairments continue to have high predictive validity of diagnostic outcome (L. M. Reid & Maclullich, 2006).

Though subjective memory complaints have been studied extensively among dementia subgroups, relatively little research has been directed towards examining a normative-group model of measuring subjective memory complaints among these populations. For example, the Memory Complaint Questionnaire (MAC-Q) is a brief measure of subjective memory complaints in individuals with "normal" cognitive functioning, but it is greatly influenced by affective states (M. Reid et al., 2012). The Subjective Memory Complaints Questionnaire (SMCQ) consists of subjective memory complaints for general and every day memory, however, Duman, Ozel-Kizil, Baran, Kirici, and Turan (2011) found that the SMCQ tends to correlate with depressive symptoms (Youn et al., 2009). The Memory Complaint Scale (MCS) differentiates demented elderly adults from normal elderly adults by identifying types of memory

complaints, however, more research is needed to replicate the findings (Vale, Balieiro, & Silva-Filho, 2012). Amid the multitude of questionnaires created to assess subjective memory complaints, there are virtually no normative comparison samples of clinical memory disorders for objective evaluation of the subjective memory complaints. This lack of data creates inconsistency in the weight of responses to subjective memory questions, as well as difficulty in differentiating those with true memory impairment and those who are malingering or those with true psychological distress, rather than neurocognitive distress. Specifically, those who exaggerate memory complaints in the self-reported memory questionnaires often perform poorly for external gain, presenting themselves in a negative manner, rather than due to genuine neurological impairment. For example, some individuals may exaggerate their memory impairment as a method of obtaining disability. Further, detection of malingering or determining specificity of diagnostic categories of dementia is largely impossible during the rapid and brief assessment conducted in a general medical practice due to the use of short general measures of cognitive functioning, such as the Mini Mental Status Exam (MMSE), the Saint Louis University Mental Status (SLUMS) exam, and the Montreal Cognitive Assessment (MOCA), in addition to subjective self-report. A specific assessment that encompasses validity subscales and an overall measure of memory impairment may be useful for general medical practice as informative of treatment planning and prognosis indicators for both the patient and family members or loved ones.

Memory Complaints Inventory

The Memory Complaints Inventory (MCI) is a standardized self-report measure of subjective memory complaints that simultaneously functions as a symptom validity test (SVT), developed by Green (2004). The MCI consists of 58 items, divided into nine separate categories. These categories include: General Memory Problems (GMP), Numerical Information Processing and Memory Problems (NIP), Visual-Spatial Memory Problems (VSMP), Verbal Memory Problems (VMP), Pain Interferes with Memory (PIM), Memory Interferes with Work (MIW), Impairment of Remote Memory (IRM), Amnesia for Complex Behavior (ACB), and Amnesia for Antisocial Behavior (Green, 2004). The MCI also contains Plausible and Implausible scales which inherently establishes a symptom validity test by portraying elevations on the Implausible scale when patients answer questions related to poor effort in a way that would not be consistent with genuine impairment, even in severe traumatic brain injury populations (Green, 2004). Therefore, if an individual scores high on the MCI overall, as well as the Implausible scales, it is likely that he or she may be exaggerating their memory impairment. The MCI has high reliability ($\alpha = 0.93$) for all nine scales, as well as high internal reliability, assessed by split-thirds reliability standards (Green, 2004).

The MCI is administered via computer and presents two non-memory related questions for practice about eating fresh vegetables and drinking tea or coffee. The individual is asked to rate how well the statement describes their experience within the last month. The MCI consists of a Likert Rating Scale style which ranges from 0 to 4 (0 = not at all true, 1 = a little true, 2 = moderately true, 3 = quite a bit true, 4 = extremely true). After the results are obtained, the program will generate a report based on

comparisons used in the sample population which was used to construct the MCI and there is an option to observe the patients' scores with the best fit comparison group.

The MCI was originally created as a symptom validity test to facilitate clinicians in identifying symptom exaggeration by means of self-report and to correlate with the Minnesota Multiphasic Personality Inventory – Second Edition – Restructured Form (MMPI-2-RF) scales of validity (Green, 2004). The MCI then provides evidence of symptom exaggeration in self-reports in neuropsychological settings. Paul Green's previous assessment instruments have primarily encompassed performance validity tests (PVTs), which rely on an individual's performance compared to a normative sample, to assess symptom exaggeration in patients' functioning, rather than patients' self-report of their current functioning. Therefore, the MCI, as a self-report measure of symptom validity correlates highly with performance on PVTs (Armistead-Jehle, Gervais, & Green, 2012b).

Previous research with the MCI has mainly focused on performance validity test presentation only, as well as disability-assessment in clinical practice. A study by Armistead-Jehle et al. (2012b) assessing individuals seeking disability status found as scores on performance validity tests (PVTs) decreased, scores on the MCI, a symptom validity test (SVT) increased. The authors also found non-significant correlations between self-reported memory impairments and objective measures of memory performance in a disability seeking sample (Armistead-Jehle et al., 2012b). These findings indicate how a possible gain from a psychological evaluation can pose as a harmful factor on the efficacy of subjective memory complaints in neuropsychological practice, as scores reflect inflated symptomology as opposed to true levels of memory

impairment (Armistead-Jehle et al., 2012b). As a result of those findings, Armistead-Jehle, Gervais, and Green (2012a) conducted a study investigating PVTs in a clinical sample that appeared absent of external gain. Their results indicated similar findings as the previous study supporting the inverse relationship between MCI scores and PVT scores, however, the Amnesia for Complex Behavior (ACB) and Amnesia for Antisocial Behavior (AAB) scales were not as strongly correlated with PVT scores as the previous study suggested (Armistead-Jehle et al., 2012a). The ACB and AAB scales are built into the MCI to determine Implausible memory complaints, and ACB and AAB are not typically elevated, even in neurologically impaired populations. The results indicated these select scales (ACB and AAB) may not discriminate between those who appeared to have external gain and those who appeared without external gain (Armistead-Jehle et al., 2012a).

Furthermore, Armistead-Jehle, Grills, Bieu, and Kulas (2016) conducted a study to evaluate the MCI to determine classification statistics in relation to the Medical Symptom Validity Test (MSVT), the Non-Verbal Medical Symptom Validity Test (NV-MSVT), the Personality Assessment Inventory (PAI), and the Minnesota Multiphasic Personality Inventory-II-Restructured Form (MMPI-2-RF). Their results found that individuals displayed elevated MCI scores on all scales when they failed the MSVT and the NV-MSVT, as well as when individuals elevated validity scales on the PAI and the MMPI-2-RF (Armistead-Jehle et al., 2016). These findings support the use of the MCI as a self-report measure of symptomology by showing high classification statistics in relation to SVTs and Performance Validity Tests (PVTs) (Armistead-Jehle et al., 2016).

Consistent with previous research, the current study focused on MCI profiles in a clinical sample of patients presenting to a neuropsychological practice for reported memory impairment. The researchers postulated that the MCI scale profiles would therefore be consistent with the cognitive profile of the dementia subgroups. As a result, the reported memory difficulties of the sample is predicted to have an inverse relationship with the severity of the disorder. In terms of severity of memory impairment, the current study focused on four subgroups of dementia, comprised of Alzheimer's Disease, Vascular Dementia, Mild Cognitive Impairment, and Pseudodementia, as well as a group classified with Poor Effort to further explore the MCI as a symptom validity test.

Alzheimer's Disease

Alzheimer's Disease is a well-known diagnosis in our contemporary medical and social terminology. The Alzheimer's Foundation of America (2016) estimates that as many as 5.1 million Americans may currently meet criteria for an Alzheimer's Disease diagnosis, and the incidence of the disease is rising as the population is living longer. Currently, 1.5% of the population is affected, however, as our older population continues to increase, estimates suggest that 20% of Americans will be affected by the disorder by the year 2050 (Alzheimers Foundation of America, 2016). The prevalence of the disorder has produced an abundance of research on the topic, creating the development of a typical neurocognitive profile of an individual diagnosed with Alzheimer's Disease. A diagnosis of Alzheimer's Disease subsumes a number of factors related to the disorder, including significant cognitive deficits, anosognosia, impaired activities of daily living (ADL), and a newfound necessity of a caretaker.

The American Psychiatric Association (2013) defines an Alzheimer's Disease diagnosis in the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) as having an insidious onset and gradual progression of impairment in one or more cognitive domains, with evidence of a causative Alzheimer's disease genetic mutation (obtained by genetic testing or family history), evidence of memory and learning decline, accompanied by decline in at least one other cognitive domain, progressive and gradual decline in cognition, and no evidence of mixed etiology (American Psychiatric Association, 2013). Cognitive domains affected by the progression of Alzheimer's Disease can include memory, language, attention, executive functioning, and visuospatial functioning (Caccappolo-Van Vliet et al., 2003). Research by Smits et al. (2015) posited that individuals diagnosed with Alzheimer's Disease demonstrated decline in *all* cognitive domains after a 1.5-year follow-up, with memory displaying the most impairment in comparison with other dementia subgroups.

In addition to cognitive deficits produced by Alzheimer's Disease, anosognosia is a primary factor related to the disorder. Anosognosia exists among a continuum and is not domain specific. A review of the literature suggests a positive correlation between anosognosia and the progression of cognitive decline (Clare, Wilson, Carter, Roth, & Hodges, 2004; Ecklund-Johnson & Torres, 2005; Lehrner et al., 2015). Further, anosognosia is associated with higher age, a decreased number of depressive symptoms, and self-reported functional impairment (Lehrner et al., 2015). Impaired insight was equally represented in a comparison of amnesic mild cognitive impairment and mild Alzheimer's Disease patients (Vogel et al., 2004). These results advance the Lehrner et al. (2015) findings, as it can be assumed that the progression from amnesic mild cognitive

impairment comes slightly before a diagnosis of mild Alzheimer's Disease, meaning that the two groups should be relatively similar in anosognosia symptomology.

Much like anosognosia and cognitive functioning, functional impairment or impairment in independent activities of daily living (IADL) exists on a non-domain specific continuum, and has been found to increase with the progression of Alzheimer's Disease (Galasko et al., 2005). A number of factors are thought to contribute to and affect ADLs, including executive function deficits, depression, and fine motor abilities. Executive functions, according to Barry (2012), are a set of cognitive abilities that regulate other abilities, such as goal-directed behavior, planning future behavior, anticipating outcomes, adapting to situations, forming concepts, and thinking abstractly. A correlational meta-analysis posits that executive functioning is associated with functional abilities, while also suggesting that an increase in age and Mini Mental Status Exam (MMSE) scores with significant executive dysfunction may result in higher functional impairment than executive dysfunction alone (Martyr & Clare, 2012). Tekin, Fairbanks, O'Connor, Rosenberg, and Cummings (2001) support the previous findings of the correlation between executive dysfunction and impaired IADLs, however, the results of their study maintained that functional impairment resulting from executive dysfunction and/or psychiatric symptoms may be mediated by frontal lobe dysfunction which is inherent in all Alzheimer's Disease patients. While many studies have found an association between depression and functional impairment in individuals with Alzheimer's Disease (Payne et al., 1998; Starkstein, Jorge, Mizrahi, & Robinson, 2005), Tekin et al. (2001) did not support a relationship between the two constructs. However, the authors found strong correlations between psychosis, agitation, anxiety, apathy, and

aberrant motor behavior, and explain their lack of an association due to their measurement of the apathy construct (Tekin et al., 2001). Finally, research indicates that impairment in fine motor abilities increases with the progression of the disease which causes a decrease the IADLs, reducing independent self-care (de Paula et al., 2016). This increase in impairment in IADLs is the root of the necessity for a care-giver with the progression of Alzheimer's Disease.

Vascular Dementia

Vascular dementia accounts for approximately 15% of all dementia cases, and is the second-most diagnosed subgroup of dementia, surpassed by Alzheimer's Disease (O'Brien & Thomas, 2015). Historically, uncertainties about the classification and diagnostic criteria for Vascular dementia have made this subgroup of dementia widely misunderstood. Vascular dementia is a condition in which a cerebrovascular event transpires, leaving behind varying levels of cognitive impairment. Because the diagnosis itself has the word "dementia" in its title, individuals often believe that memory impairment is a prominent feature of the disorder. However, O'Brien and Thomas (2015) posit that vascular dementia's effect on memory varies to differing degrees and fails to follow the progressive pattern of Alzheimer's, therefore, suggest the term 'vascular cognitive impairment' may encompass a more appropriate depiction of this specific condition. For the purpose of this paper, the terms will be used interchangeably. Vascular Dementia can develop due to a variety of differing vascular complications, including multiple cortical infarcts, lacunes, extensive white matter lesions, demyelination, gliosis, haemorrhagic changes, and amyloid angiopathy (O'Brien & Thomas, 2015). Because of

the variations of vascular events that occur, Vascular Dementia involves many avenues in which a diagnosis is warranted, thus creating a large accumulation of research on the matter, and an inconsistent neurocognitive profile. However, a diagnosis of Vascular Dementia can typically assume significant cognitive changes and certain neuropsychiatric features.

To warrant a diagnosis of Vascular Dementia using criteria from the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), an individual would need to display evidence of a significant cognitive decline in one or more cognitive domains, the deficits would need to interfere with independence in ADLs, the features would need to be consistent with a vascular etiology, there would need to be evidence of the presence of cerebrovascular disease, and the symptoms should not be explainable by another medical, mental, or brain disease/disorder (American Psychiatric Association, 2013). The American Psychiatric Association (2013) suggests that cognitive domains affected by neurocognitive impairment may include complex attention, executive function, learning and memory, language, perceptual motor, and social cognition. Evidence of vascular etiology is to be determined by either temporal relation to a cerebrovascular event or a decline in complex attention and frontal-executive functioning. Finally, presence of cerebrovascular disease is discovered through an individual's history, a physical examination, and/or a form of neuroimaging to explain neurocognitive deficits (American Psychiatric Association, 2013). Because of the varying vascular events that may result in a diagnosis of Vascular Dementia, there are an array of vascular neurocognitive profiles. This study focused on individuals who have a "typical" vascular neurocognitive profile, according to Levy and Chelune (2007), consisting of executive functioning deficits,

learning and memory issues, and prominent depressed mood to encompass most variations of Vascular Cognitive Impairment.

A review of the literature posits deficits in executive functioning as one of the largest markers for a vascular neurocognitive profile (Graham et al., 2004; Jokinen et al., 2006; Kandiah, Narasimhalu, Lee, & Chen, 2009; Levy & Chelune, 2007; Traykov et al., 2004). Jokinen et al. (2006) purported that executive deficits, incorporating mental flexibility, set shifting, response inhibition, and fluency are prominent characteristics of subcortical ischemic vascular dementia. Another study found that individuals with Vascular Dementia had a greater number of perseverations on an assessment that measures "stuck-in-set perseverations," suggesting vascular etiologies result in greater difficulty with switching tasks and thought processes (Traykov et al., 2004). This presumes those affected by vascular etiology have difficulty in shifting attention toward new stimuli because they are fixated on previous and/or possibly absent stimuli. Naturally, this would create functional deficits in IADLs, as well as deficits in social and interpersonal interaction. Levy and Chelune (2007) suggest executive deficits as a result of the disruption of the frontal-subcortical circuits. The area of the brain affected by vascular etiology will greatly influence the way in which executive deficits occur in different individuals.

In addition to executive dysfunction, individuals with Vascular Dementia or Vascular Cognitive Impairment also suffer from a spectrum of memory problems. Compared with Alzheimer's Disease, episodic memory tends to be more intact for individuals diagnosed with Vascular Dementia (O'Brien et al., 2003). However, memory difficulties associated with Vascular Dementia often include poor performance on

procedural memory tasks and poor ability to maintain learning for future tasks (Levy & Chelune, 2007). Graham et al. (2004) also found individuals diagnosed with Vascular Dementia show greater deficits in semantic memory. These findings suggest individuals with Vascular Cognitive Impairment struggle with memory complications much like Alzheimer's Disease patients; however, Vascular Cognitive Impairment typically manifests memory complications in relation to the location of the vascular etiology, producing several manifestations of memory impairment. Unfortunately, research findings have also indicated individuals with Vascular Dementia suffer from anosognosia related to their memory functioning, although the severity is less than those affected by Alzheimer's Disease (Morris et al., 2016). As a result, memory impairment in Vascular Dementia seems to be deviant from that of Alzheimer's Disease, but both types of impairments effect every-day functioning and estimation of abilities.

To further complicate the neurocognitive profile of Vascular Dementia/Vascular Cognitive Impairment, patients diagnosed with the disorder often suffer from mood related difficulties, as well, thus creating complications differentiating pure depressive symptomology from objective neurodegenerative concerns or most commonly a combination of the two. Park et al. (2007) conducted a study in which various patients with subtypes of dementia were matched on gender and dementia severity, and then compared the rates of depression within the groups. As a result, depressive symptoms were common in both Vascular Dementia patients, as well as Alzheimer's Disease patients; however, the patients with Vascular Dementia suffered from more depressive symptoms more often than that of Alzheimer's Disease patients (Park et al., 2007).

Mild Cognitive Impairment

Mild Cognitive Impairment is a construct which reflects abnormal cognitive performance for one's age and accounts for 3% to 19% of the population over the age of 65 (Gauthier et al., 2006). More specifically, the diagnostic criteria for Mild Cognitive Impairment consists of the following: (1) subjective memory complaint, (2) preserved activities of daily living, (3) intact general cognitive function, (4) memory impairment exceeding what would be expected for the normal aging process, and (5) no dementia diagnosis (Petersen et al., 1999). Subsequently, Petersen (2003), formulated three subtypes of Mild Cognitive Impairment, consisting of amnestic, multiple domain, and a single non-memory domain. The amnestic form of Mild Cognitive Impairment is the most common form of the diagnosis and likely results in a diagnosis of Alzheimer's disease after disease progression has occurred, and involves mainly significant memory impairment with no impairment in other cognitive domains (Petersen, 2003). The multiple domain form of Mild Cognitive Impairment typically encompasses minor impairments in activities of daily living and other general cognitive domains, such as executive function and language (Petersen, 2003). Further, single, non-memory domain Mild Cognitive Impairment is as the name implies, consisting of impairment in a single cognitive domain (e.g., executive functioning, language, visuospatial processing) without impairment in memory functioning (Petersen, 2003). Although the subtypes are important for diagnostic and clinical implications, the current study engenders all subtypes of Mild Cognitive Impairment without subtype specification to encompass Mild Cognitive Impairment in relation to a subjective memory complaints profile.

Mild Cognitive Impairment may be comprised of different etiologies, consisting of either degenerative, vascular, psychiatric, or traumatic etiologies (Petersen, 2004). Thus, differing etiologies may result in differences in projected outcome or progression of Mild Cognitive Impairment and variations of subjective memory complaint or activities of daily living. A diagnosis of Mild Cognitive Impairment is likely to lead to the eventual diagnosis of dementia with the progression of the aging process, specifically, the diagnosis of amnestic Mild Cognitive Impairment results in the greatest association with transition to Alzheimer's Disease (Busse, Hensel, Guhune, Angermeyer, & Riedel-Heller, 2006). Due to the high association between Mild Cognitive Impairment and later dementia, clarity and accuracy of the diagnosis is pertinent to the treatment recommendations and clinical implications of the patient's life going forward, accordingly, accurate profile mapping is necessary for this domain.

To further complicate assessment and diagnosis of Mild Cognitive Impairment, it is often accompanied by comorbid depression, meaning it is critical to distinguish cognitive impairment or decline from typical cognitive insufficiencies produced by depression alone or if there are comorbid diagnoses occurring (Ravdin & Katzen, 2013). Panza et al. (2009) posit 34% of patients diagnosed with MCI have co-occurring depressive symptomology. Of note, the patients in this study may not have met diagnostic criteria for Major Depressive Disorder; however, the patients were experiencing clinically significant depressive symptomology. If comorbidities occur, it is possible an evaluator may interpret memory performance more critically than those who have a single diagnosis of Mild Cognitive Impairment or depression. As addressed previously,

the diagnostic implications for Mild Cognitive Impairment alone differ greatly than the diagnostic implications for depression alone or the comorbidity of the two diagnoses.

Pseudodementia

Pseudodementia is a term that signifies cognitive deficits due to the effects of depressive symptomology, in the absence of organic dementia. Therefore, Pseudodementia, as a term, can be utilized interchangeably with Depression-Related Cognitive Impairment, which is a more preferred term in clinical practice. Ravdin and Katzen (2013) posit depression in older adults living in in a community-dwelling population has a prevalence rate of approximately 3 to 14 percent; over the course of one year, 1 in 15 older adults may experience major depression. In this case, the cognitive decline or deficits experienced are purely caused by psychiatric illness, rather than dementia-related illness. Unfortunately, experiencing late-life depression increases the risk of later developing dementia (Ravdin & Katzen, 2013).

The presentation of Pseudodementia has been found to produce significant cognitive complaints, often accruing more subjective complaints than those diagnosed with dementia (Siu, 1991). Further, Siu (1991) posits the reported cognitive complaints are often out of proportion to the level of the individual's current functioning capabilities, producing a profile of catastrophizing thought-related symptomology. This would present as a patient reporting severe memory impairment, yet consistently engaging in everyday activities such as managing finances, driving independently, cooking independently, and/or managing medications for oneself or someone else. This is in opposition with those independently diagnosed with Alzheimer's Dementia or later stages of Vascular

Dementia in which anosognosia impairs the patient's insight into their current capabilities of independent functioning, producing fewer subjective complaints of memory impairment.

Further, prominent features of Pseudodementia are shared with that of Major Depression and may be difficult to differentiate from early features of distinctive types of dementia. For example, research suggests apathy is a prominent early feature of Alzheimer's Disease and is also known to be a pronounced feature of depression; however, there is a discrimination between apathetic syndrome in Alzheimer's Disease and dysphoric mood in depression, thus creating a need for accurate assessment and careful dissection of hardly distinguishable symptomology (Hattori, Yoshiyama, Miura, & Fujie, 2010; Landes, Sperry, Strauss, & Geldmacher, 2001). Therefore, at face value, the two symptoms may be inseparable, but additional investigation is necessary to illuminate primary features of depression versus an early marker of preclinical Alzheimer's Disease. As a result, the prevalence, risk factors, and clinical presentation associated with late-life depression advance the need for clarity in subjective memory complaints in patients presenting to outpatient treatment clinics for medical necessity or psychiatric necessity.

Poor Effort

Poor effort or malingering (or feigning; all terms are used interchangeably) can be defined as the intentional exaggeration of neurological and/or psychological symptoms for the gain of an identifiable external reward (American Psychiatric Association, 1994). With the advancement of the field of neuropsychology and forensic neuropsychology,

specifically, there has been an uptick of individuals presenting in outpatient assessment settings for the purpose of personal injury litigation, worker's compensation, and other situations in which patients may gain financially from neuropsychiatric diagnoses (Slick, Sherman, & Iverson, 2010). Thus, the development of validity assessment was necessary to facilitate identification of feigned symptomology versus genuine neurologically impaired symptomology in these specific cases.

With the need of validity assessment came the abundance of scales and tasks developed to highlight feigning. A list of these tasks include the Test of Memory Malingering (TOMM), the Structured Inventory of Malingered Symptomology (SIMS), the Medical Symptom Validity Test (MSVT), the Non-Verbal Medical Symptom Validity Test (NV-MSVT), the Word Memory Test (WMT), and the Memory Complaints Inventory (MCI) which is utilized in the current study. This list is not an exhaustive account of all measures available for validity assessment; however, it is to provide insight into the multiple ways in which practitioners are capable of assessing malingering in both performance and symptom report measures. Therefore, with the variety of measures to choose from, the question bodes how neuropsychologists are able to categorize patients into the Poor Effort subgroup in their practice.

Diagnostic criteria for poor effort proposed by Slick et al. (2010) highlights three diagnoses of malingering to differentiate: Definite Malingering Neurocognitive Dysfunction, Probable Malingering Neurocognitive Dysfunction, and Possible Malingering Neurocognitive Dysfunction. All three diagnoses of malingering consist of four components which must be met for poor effort or malingering to be considered: (1) presence of a substantial external incentive, (2) evidence from neuropsychological

testing, (3) evidence from self-report, and (4) behaviors meeting necessary criteria are not accounted for by psychological, neurological, or developmental conditions (Slick et al., 2010). In order to specify and rule out uncertainty within these criteria, the authors proposed that the evidence of neuropsychological testing can be comprised of a negative response bias, probable response bias, or a discrepancy between test data and brain functioning, observed behavior, collateral reports, or documented background history (Slick et al., 2010). Similarly, the authors detailed that evidence from self-report needs to encompass a discrepancy between self-reported history/symptoms and documented history, patterns of brain functioning, behavioral observations, collateral information, or exaggerated psychological dysfunction, as evidenced by a scale such as the MMPI-2-RF (Slick et al., 2010). For the purpose of the current study, patients who met criteria for Definite, Probable, and Possible Malingering of Neurocognitive Dysfunction defined by Slick et al. (2010) were included in the Poor Effort group for analysis.

The current study used the reviewed neurocognitive profiles to postulate self-reported memory impairment, employing the Memory Complaints Inventory (MCI). Taking into consideration the severity of Alzheimer's Disease, consisting of significant cognitive deficits, anosognosia, and functional impairment, it was hypothesized that individuals in the Alzheimer's Disease sample group would produce an MCI profile consisting of the least amount of memory complaints in relation to the subgroups being analyzed in this study. With respect to the severity and variations of Vascular Dementia, it was hypothesized that individuals in the Vascular Dementia sample group would produce an MCI profile consisting of more reported memory complaints than those with Alzheimer's Disease, but fewer memory complaints than those diagnosed with Mild

Cognitive Impairment, Pseudodementia, or those found to display poor effort. Because of the variations in etiology and severity of Mild Cognitive Impairment, in addition to the high comorbidity of Depression, it was postulated individuals in the Mild Cognitive Impairment sample group would produce an MCI profile consisting of more reported memory complaints than those with Alzheimer's Disease and Vascular Dementia, but fewer memory complaints than those diagnosed with Pseudodementia or found to display poor effort. Finally, it was proposed that the individuals in the Pseudodementia or Depression-Related Cognitive Impairment sample group would produce an MCI profile consisting of the most reported memory complaints compared to those classified in the Alzheimer's Disease, Vascular Dementia, or Mild Cognitive Impairment diagnostic categories. Although Pseudodementia was predicted to produce the greatest number of overall memory complaints with respect to the dementia subgroups, the authors proposed that the Poor Effort subgroup would produce the greatest overall memory complaint profile while simultaneously producing the highest number of memory complaints on the imbedded Implausible memory scale of the MCI. To clarify, the current study hypothesized an inverse relationship of self-reported memory complaints utilizing the MCI and the severity of dementia diagnosis. Further, due to the literature review, the researchers postulated that a comorbidity of depression accompanying the primary dementia diagnosis would have an impact on self-reported memory complaints.

METHODS

Participants

Participants were selected from the archival database at CoxHealth Hospital Neuropsychology Services in the Midwest. Individuals presented to the outpatient clinic for various concerns, including memory complaints, attentional difficulties, interpersonal and occupational conflicts, and neurology referrals. Protected Health Information release forms (Appendix A) were signed at the time of their initial interviews, endorsing their results may be used in research studies. Further, this study was approved by the Institutional Review Board at Missouri State University, clarifying this research does not permit any harm to the subjects involved (see Appendix B). Those selected for inclusion in this project were all adults assessed at the outpatient Neuropsychology clinic who were administered the Memory Complaints Inventory and an individualized neuropsychological test battery for diagnostic purposes. Data gathered included the individual's age, gender, ethnicity, handedness, education level, Memory Complaints Inventory results, and diagnoses.

Two hundred forty-four (n = 244) total participants were determined as meeting inclusion criteria for the current study after data screening analyses. The average age was 63.6 years (SD = 13.67; 25 – 89 years of age) and consisted of 39.75% males (n = 97) and 60.25% females (n = 147). Ethnicity of the sample was 98.36% (n = 240) White, 0.41% (n = 1) Mexican-American, 0.82% (n = 2) Native American, and 0.41% (n = 1) West Indian. All other ethnicities were not represented in this study due to the limited sample provided in the archival database from the Midwestern hospital in which data

were collected. Additionally, 90.98% (n = 222) of the sample was right-handed, meaning 9.02% (n = 22) of the sample was left-handed. Table 1 depicts the complete demographics of the sample for the study.

Table 1

Sample Demographics

	Primary Diagnostic Category				
	Alzheimer's Disease	Vascular Dementia	Mild Cognitive Impairment	Pseudo-dementia	Poor Effort
Total *n*	21	33	88	53	49
Age *M* (*SD*)	77.00 (5.61)	75.94 (8.01)	66.98 (8.78)	57.85 (12.77)	49.69 (11.62)
Gender					
Male	9	14	45	11	18
Female	12	19	43	42	31
Self-Identified Ethnicity					
White	21	31	88	51	49
Mexican American	--	--	--	1	--
Native American	--	1	--	1	--
West Indian	--	1	--	--	--
Education					
7-11 Years	4	6	10	10	9
High School Graduate	12	20	26	21	17
1 Year College	1	2	11	4	4
2 Years College	1	1	7	6	6
3 Years College	--	1	1	2	5
College Degree	2	1	13	7	7
Master's Degree	1	1	15	2	1
Post Master's Work	--	--	3	1	--
Doctoral Degree	--	1	2	--	--
Handedness					
Right	12	33	80	49	43
Left	4	--	8	4	6

Note: Ethnicity was self-identified; Education was separated by categories imbedded in the Memory Complaints Inventory

Materials

The Memory Complaints Inventory (Green, 2004) was embedded in each individual's neuropsychological assessment battery conducted in the outpatient clinic. It was designed to measure memory complaints by categorizing the complaints into nine

separate scales, consisting of General Memory Problems (GMP), Numerical Information Processing and Memory Problems (NIP), Visual-Spatial Memory Problems (VSMP), Verbal Memory Problems (VMP), Pain Interferes with Memory (PIM), Memory Interferes with Work (MIW), Impairment of Remote Memory (IRM), Amnesia for Complex Behavior (ACB), and Amnesia for Antisocial Behavior (AAB). Participants are asked how true a statement is for them within the last month. The Memory Complaints Inventory is comprised of 58 Likert-type items on a zero- to four-point scale ranging from "not at all true" to "extremely true." The first seven scales make up the Plausible memory items, indicating true memory impairment, while the last two scales, ACB and AAB, present the Implausible memory complaints category which may indicate symptom validity concerns when the Implausible scales are elevated. The MCI has high reliability ($\alpha = 0.93$) for all nine scales, as well as high internal reliability, assessed by split-thirds reliability standards. High scores on the first seven scales represent one's subjective memory complaints are greater than that of a normal population, while high scores on the ACB and AAB scales suggest an exaggerated subjective memory experience.

Procedure

Data were collected over a two-year period in an outpatient Neuropsychology Services Clinic. Every patient who presented to the outpatient clinic and complained of memory complaints was administered the MCI as a part of their Neuropsychological testing battery. The MCI was randomly administered throughout the course of the assessment process.

Data Screening

All data were screened for accuracy and missing data. Participants with more than 5% missing data (i.e., 2 or more items) were excluded, as Tabachnick and Fidell (2012) have suggested that 5% or less of missing data may be safely filled in with minimal effects on hypothesis testing. In this particular dataset, there was no missing data, as all participants were required to complete every question to finish the MCI in their neuropsychological testing batteries. The final sample sizes, as shown in Table 1 remained sufficient for analyses described below. Of note, however, is the Alzheimer's Disease group, of which failed to meet the central limit theorem necessary for powerful analyses, thus, the results of the Alzheimer's Disease group analysis should be interpreted with caution, as it may represent an overestimation or underestimation of scores that would be seen with a larger sample size.

Next, each dataset was examined for multivariate outliers using Mahalanobis distance (Tabachnick & Fidell, 2012). As described in Tabachnick and Fidell (2012), Mahalanobis values were calculated for each participant based on their answer choice patterns for each of the fifty-eight questions. These D values are compared to a $\chi 2(58)$ $p<.001 = 32.91$, and observations with D values greater than this score were counted as outliers. For this dataset, there were four outliers that met the Mahalanobis distance criteria and were excluded from this analysis. This analysis is similar to using a z-score criterion of three standard deviations away from the mean.

Finally, the dataset was screened for multivariate assumptions of additivity, linearity, normality, homogeneity, and homoscedasticity. There were high correlations between the General Memory Problems (GMP) subscale and the Plausible imbedded

validity scale (r = .93), as well as the GMP subscale and the Overall score (r = .92) on the MCI. Additionally, the Plausible scale was highly correlated with the Verbal Memory Problems (VMP) subscale (r = .92) and the Memory Interferes with Work (MIW) subscale (r = .91). While high correlations between subscales on a measure typically indicate poor measure structure and collapsible subscales, in this case, we would anticipate high correlations among the GMP, VMP, and MIW subscales with the Plausible scale and Overall score due to the impact these difficulties have on individuals in everyday life and the way in which the MCI was created. For example, General Memory Problems should weigh heavily into the Plausible validity scale and Overall score, meaning the General Memory Problems reported represent genuine impairment and reflect overarching self-identified impairment derived from the Overall total score. Further, the Amnesia for Complex Behavior (ACB) subscale was highly correlated with the Implausible imbedded validity scale (r = .94) and the Overall total score (r = .91). Again, these correlations are anticipated since the Implausible validity scale was derived from scores on the ACB and AAB (Amnesia for Antisocial Behavior), which ultimately impact Overall total score by self-identified impairment. Finally, large correlations were observed on the Overall total score compared with both the Plausible (r = .98) and Implausible (r = .93) imbedded validity measures, commensurate with expectation considering the development of the scale referenced previously.

Data met the assumption for linearity, and data were only slightly kurtotic meeting the assumption for normality. Additionally, the assumptions of homogeneity and homoscedasticity were met for the overall dataset.

Data Analysis

One-way between-subjects analysis of variance (ANOVA) statistics were conducted to compare the effect of dementia diagnosis on self-reported memory complaints for each subscale of the MCI. Thus, twelve one-way ANOVAs were utilized to encompass all subscales of the MCI, including overall score for memory complaints and the plausible and implausible validity scales imbedded into the MCI. Pairwise independent t-tests were conducted to compare the distinct differences between dementia subgroups with Bonferroni corrections to account for the inflation of type I error. Cohen's *d* effect size analyses were run for every comparison to provide additional evidentiary value and to provide a practical source of significance in addition to the traditional view of statistical significance of *p*-values. Further, a 3 (diagnostic category: Vascular Dementia vs. Mild Cognitive Impairment vs. Poor Effort) X 2 (presence secondary diagnosis of depression: secondary depression vs. no secondary depression) between-subjects ANOVA was conducted to determine if a secondary diagnosis of depression had an interaction with participants' overall score on the MCI, as postulated by the researchers. The Alzheimer's Disease diagnostic condition was omitted from this two-factor ANOVA due to the limited number of Alzheimer's participants concurringly diagnosed with depression in this sample ($n = 7$), resulting in low statistical power for this analysis, thus not reasonable to evaluate. Further, the Pseudodementia group was omitted from the two-factor ANOVA due to depression as the primary diagnosis rather than the secondary diagnosis, as a result of the neuropsychological profile associated with Pseudodementia.

RESULTS

Data from adults presenting to a neuropsychology outpatient clinic were analyzed to determine differences in memory complaint profiles on the Memory Complaints Inventory (MCI). Five subgroups of patients were derived from their primary diagnosis in the archives, consisting of Alzheimer's Disease patients, Vascular Dementia patients, Mild Cognitive Impairment patients, Pseudodementia patients, and patients who presented to the clinic for memory complaints that were considered to produce a profile consistent with poor effort on their individualized neuropsychological testing battery. The researchers hypothesized an inverse relationship of memory complaints and diagnostic severity of dementia. Specifically, it was postulated the Alzheimer's Disease patients would produce the least amount of memory complaints based on the literature of the typical neurocognitive profile. It was predicted Vascular Dementia patients would present with the second lowest number of overall memory complaints on the MCI. The Mild Cognitive Impairment group was hypothesized to report a larger amount of memory complaints on the MCI relative to Vascular Dementia patients, yet a lower number of memory complaints than the Pseudodementia group. Finally, the Pseudodementia patients were predicted to encompass the greatest amount of memory complaints relative to the dementia subgroups; however, the Poor Effort subset of patients were hypothesized to surpass all dementia diagnostic categories and produce the greatest number of overall memory complaints on the MCI while also elevating the imbedded validity scales.

The hypotheses for the study were tested using one-way between-subjects ANOVAs to compare differences in scores between primary diagnostic groups on all nine

subscales of the MCI, the overall number of memory complaints, and the Plausible and Implausible imbedded validity scales. The results of the 12 one-way ANOVAs can be seen in Table 2, below. Welch corrections were utilized for the ANOVAs in which Levene's test of homogeneity was significant. There was a significant effect of primary dementia diagnosis on overall memory complaints $F(4, 91.11) = 41.02$, $p < .001$, $\eta^2 = .74$. Post hoc independent t-tests with a Bonferroni correction were used to find differences in overall memory scores between each primary diagnosis. For overall memory scores, Alzheimer's Disease significantly differed from the Pseudodementia group ($p = .002$, $d = 0.93$) and the Poor Effort group ($p < .001$, $d = 2.58$) with large effect sizes for both significant differences. Pseudodementia was significantly different from the Poor Effort group ($p < .001$, $d = 1.27$) with regard to overall memory complaints. The Mild Cognitive Impairment group significantly differed in overall memory complaints from the Poor Effort group ($p < .001$, $d = 1.86$), and the Poor Effort group significantly differed from the Vascular Dementia group ($p < .001$, $d = 2.03$). All post hoc comparisons can be found in Appendix C. The data obtained followed the trend predicted in that Alzheimer's Disease patients reported the least amount of overall memory complaints on the MCI, while those in the Poor Effort group reported the greatest amount of overall memory complaints, in a step-wise progression with a decrease of severity in diagnosis.

Primary dementia diagnosis also resulted in significant differences on the Plausible memory scale $F(4, 90.39) = 41.78$, $p < .001$, $\eta^2 = .75$, which represents one of the imbedded validity measures of the MCI and alludes that patients are being honest in the memory complaints they are reporting. Post hoc independent t-tests with a Bonferroni correction were utilized to examine the differences in Plausible memory subscale scores

between each primary diagnosis. Significant results were found when comparing Alzheimer's Disease to Pseudodementia ($p = .002$, $d = 0.94$), Alzheimer's Disease to Poor Effort ($p < .001$, $d = 2.65$), Pseudodementia to Poor Effort ($p < .001$, $d = 1.27$), Pseudodementia to Vascular Dementia ($p = .05$, $d = 0.58$), Mild Cognitive Impairment to Poor Effort ($p < .001$, $d = 1.80$), and Poor Effort to Vascular Dementia ($p < .001$, $d = 2.08$). All significant post hoc comparisons with the Plausible memory subscale resulted in large effect sizes with the exception of the comparison of Pseudodementia to Vascular Dementia, of which resulted in a medium effect.

Finally, primary dementia diagnosis had significant effects on the Implausible memory scale of the MCI $F(4, 92.31) = 23.43$, $p < .001$, $\eta^2 = .64$, which represents the second imbedded validity scale and indicates patients are likely not being honest in their memory complaint presentation. Again, post hoc independent t-tests with a Bonferroni correction were conducted to examine the differences in Implausible memory subscale scores between each primary dementia diagnosis. Significant results were found when comparing Alzheimer's Disease to Pseudodementia ($p = .03$, $d = 0.80$), Alzheimer's Disease to Poor Effort ($p < .001$, $d = 1.85$), Pseudodementia to Poor Effort ($p < .001$, $d = 1.04$), Mild Cognitive Impairment to Poor Effort ($p < .001$, $d = 1.57$), and Poor Effort to Vascular Dementia ($p < .001$, $d = 1.50$). All significant post hoc comparisons with the Plausible memory subscale resulted in large effect sizes.

A general trend is seen in most of the nine subscales in Table 2 in which Alzheimer's Disease patients reported the least amount of memory complaints, while the Poor Effort group reported the greatest amount of memory complaints.

Table 2

Primary Diagnosis Effects on Memory Complaints Inventory Subscales

	Alzheimer's Disease *M* (*SD*)	Vascular Dementia *M* (*SD*)	Mild Cognitive Impairment *M* (*SD*)	Pseudo-dementia *M* (*SD*)	Poor Effort *M* (*SD*)	*F*(df,df) = F	*p*	*Ƞ2*
n	21	33	88	53	49			
GMP	4.08 (3.14)	6.06 (4.65)	6.70 (4.78)	8.87 (5.68)	15.65 (5.33)	*F*(4, 90.06) = 36.08	<.001*	.69*
NIP	6.00 (3.52)	7.21 (4.26)	7.67 (4.72)	9.35 (5.67)	15.31 (4.87)	*F*(1, 239) = 692.20	<.001*	.74*
VSMP	4.10 (3.03)	4.30 (3.79)	4.80 (3.90)	5.30 (4.14)	9.71 (3.97)	*F*(1, 239) = 409.10	<.001*	.63*
VMP	4.62 (2.52)	6.27 (4.35)	7.66 (4.35)	9.68 (5.09)	13.73 (3.55)	*F*(4, 91.21) = 41.77	<.001*	.76*
PIM	1.14 (1.85)	1.12 (1.62)	2.17 (2.76)	3.06 (3.46)	5.92 (3.98)	*F*(4, 91.88) = 16.35	<.001*	.39*
MIW	3.57 (2.99)	6.15 (4.21)	6.24 (5.55)	8.49 (6.14)	13.96 (4.48)	*F*(4, 93.33) = 36.03	<.001*	.64*
IRM	3.19 (2.77)	5.42 (3.90)	5.34 (4.46)	7.09 (6.22)	11.45 (6.76)	*F*(4, 92.03) = 13.71	<.001*	.56*
ACB	5.48 (3.82)	7.06 (5.59)	6.99 (6.63)	10.49 (7.61)	18.47 (8.33)	*F*(4, 93) = 22.93	<.001*	.61*
AAB	0.90 (1.22)	1.27 (2.07)	1.31 (2.23)	1.34 (2.02)	3.55 (3.32)	*F*(4, 92.71) = 5.97	<.001*	.29*
Plaus	3.91 (2.34)	5.19 (3.40)	5.87 (3.68)	7.46 (4.20)	12.38 (3.49)	*F*(4, 90.39) = 41.78	<.001*	.75*
Implaus	3.19 (2.23)	4.59 (3.37)	4.55 (3.77)	6.31 (4.37)	11.16 (4.93)	*F*(4, 92.31) = 23.43	<.001*	.64*
Overall	3.67 (2.16)	4.99 (3.23)	5.43 (3.50)	7.07 (4.10)	11.97 (3.56)	*F*(4, 91.11) = 41.02	<.001*	.74*

*Note: GMP = General Memory Problems; NIP = Numerical Information Processing; VSMP = Visual-Spatial Memory Problems; VMP = Verbal Memory Problems; PIM = Pain Interferes with Memory; MIW = Memory Interferes with Work; IRM = Impairment of Remote Memory; ACB = Amnesia for Complex Behavior; AAB = Amnesia for Antisocial Behavior; Plaus = Plausible Memory Complaints; Implaus = Implausible Memory Complaints; * indicates significance*

Additionally, a 3 (diagnostic category: Vascular Dementia vs. Mild Cognitive Impairment vs. Poor Effort) X 2 (presence secondary diagnosis of depression: secondary depression vs. no secondary depression) between-subjects ANOVA was conducted to determine if a secondary diagnosis of depression had an interaction with participants' overall score on the MCI. The Alzheimer's Disease patients were omitted from this analysis due to the small sample size who were concurrently diagnosed with depression. Table 3 below displays the results of the analysis.

Table 3

Interaction of Secondary Diagnosis of Depression on Overall Memory Complaints

	F(df, df) = F	*p*	*Ƞ2*
Overall	*F*(1, 164) = 657.14	<.001*	.80*
Primary Diagnosis	*F*(2, 164) = 63.89	<.001*	.44*
Secondary Diagnosis of Depression	*F*(1, 164) = 0.85	.36	.01
Primary and Secondary Interaction	*F*(2, 164) = 0.15	.86	.002

*Note: * denotes significance*

The overall 3 X 2 between-subjects ANOVA was significant $F(1, 164) = 657.14$, $p < .001$, $\eta^2 = .80$, with a large effect. The data suggests there is no interaction between a secondary diagnosis of depression and primary diagnosis of dementia on overall memory complaints reported on the MCI $F(2, 164) = 0.15$, $p < .36$, $\eta^2 = .01$; however, the analysis indicates a primary diagnosis of dementia is significant on overall memory complaints $F(2, 164) = 63.89$, $p < .001$, $\eta^2 = .44$, with a large effect, which is explained in the primary

results, above. Therefore, post hoc analyses were not conducted due to non-significant results of a secondary diagnosis of depression.

DISCUSSION

As the field of Neuropsychology has progressed, our research and understanding of the neurocognitive disorders has also progressed. Yet, there is often unclear distinction between the neurodegenerative disorders and their objective presentations in a general practice setting. Many researchers have endeavored to make distinctions in behavioral presentations of dementia and objective test data that facilitate general medical practice and comprise our neuropsychological profiles; however, the use of short questionnaires and scores on the commonly used Mini Mental Status Exam (MMSE), Saint Louis University Mental Status (SLUMS) exam, or the Montreal Cognitive Assessment (MOCA) rarely provide insight into diagnostic specificity of dementia. The lack of available specificity in generalized medical practice assessments may often result in poor treatment modalities since the differentiation of diagnosis has a large impact on prognosis and interpersonal relationships. This study highlights the Memory Complaints Inventory (MCI) as a tool to be utilized in general practice to provide insight into diagnostic specificity of dementia while also differentiating from those who are misrepresenting themselves and offering poor effort for a multitude of reasons.

Based on the review of the literature, the researchers hypothesized an inverse relationship between diagnostic severity of dementia and overall scores on the MCI, suggesting a pattern in which Alzheimer's patients would report the fewest memory complaints due to the association of anosognosia (Clare et al., 2004; Ecklund-Johnson & Torres, 2005; Lehrner et al., 2015). Vascular Dementia patients were predicted to report more overall memory complaints than Alzheimer's patients, yet fewer complaints than

individuals diagnosed with Mild Cognitive Impairment, Pseudodementia, or those meeting the requirements for Poor Effort. The researchers also proposed Mild Cognitive Impairment patients would produce a profile of memory complaints greater than those with Vascular Dementia and less than those with Pseudodementia or Poor Effort; while, Pseudodementia patients were to represent the greatest number of memory complaints in the dementia category. Poor Effort patients were postulated to produce the greatest number of memory complaints overall and to significantly deviate in responses on the Implausible imbedded validity scale. Finally, patients of whom received a secondary diagnosis of depression were ascertained to produce significantly different results on the Overall scores of the MCI.

Significant results were found on all one-way between-subjects ANOVAs, as seen in Table 2, which supports the idea that individuals of different subgroups of dementia produce statistically different and practically different profiles with regard to their self-reported memory complaints. Although the predicted trend was met, there were not significant differences between all subgroups, suggesting the differences in self-reported memory complaints may not be as substantial as the researchers first predicted. It appears the greatest difference can be found between the primary dementia diagnoses and the Poor Effort group with regard to overall memory complaints, as the Poor Effort group was found to significantly differ from all dementia subgroups with large effect sizes. In addition, the Poor Effort subgroup significantly deviated from all other dementia subgroups on the Implausible validity scale of the MCI. These findings further support the utilization of the Memory Complaints Inventory in its intended use as a symptom validity scale (Green, 2004), even in populations with neurodegenerative disorders.

Additionally, since a plethora of authors suggest an association of depression with all of the dementia subgroups being tested in the current study (Park et al., 2007; Payne et al., 1998; Ravdin & Katzen, 2013; Starkstein et al., 2005), a two-way between-subjects ANOVA was conducted to test the theory that a comorbid diagnosis of depression would significantly impact overall self-reported memory complaints. The results of this analysis were nonsignificant and may indicate that although depression is often a concurring factor among the dementia populations, it may not be impacting the perception of patients' memory more than the genuine neurological impairment patients experience as a result of a neurodegenerative disorder. This finding is particularly important since the Pseudodementia subgroup produced a memory complaints profile which consisted of a higher number of overall memory complaints than all other dementia subgroups (Alzheimer's Disease, Vascular Dementia, and Mild Cognitive Impairment), meaning depression as a single occurring construct substantially impacts one's view of their overall memory functioning; though, concurrently with a primary diagnosis of dementia, the effects of depression dissipate.

This study was conducted on adult outpatients from a Midwestern hospital in which 98% of the sample was white. It would be advantageous to conduct the same research utilizing a more diverse sample from across the United States to replicate the results found in this study. Further, the Alzheimer's Disease group was comprised of only 21 patients, thus under-powering the results of this specific subgroup. A dataset containing more Alzheimer's Disease patients would add to the robustness of the results found in the current study. Consistent with the Alzheimer's sample limitation, the sample of comorbidity of depression with Alzheimer's Disease was too small to include in the

two-way analysis, thus leaving the question of depression impacting overall memory complaints in Alzheimer's patients unanswered. Overall, future research differentiating self-reported memory complaints in dementia populations should consist of larger sample sizes, including those who obtained a secondary diagnosis of depression.

Future research with the Memory Complaints Inventory would be advantageous in comparison with performance validity tests (PVTs), as well as performance on objective memory measures, such as the California Verbal Learning Test (CVLT), the Hopkins Verbal Learning Test (HVLT), and the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) to investigate differences in subjective memory complaints and objective memory performance, rather than diagnostic outcome, which was the focus of the current study.

With the addition of further support of the results found in this study with a variety of dementia patient samples, accurate genuine memory impairment profiles can be developed and utilized in general practice settings to facilitate more effective treatment planning and prognostic descriptions given to patients and loved ones. The utilization of the MCI in general practice settings surpasses other measures of self-reported memory complaints due to its added value of the imbedded symptom validity scales, indicating its complementary value in quick assessment scenarios.

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APPENDIX A

Patients' Informed Consent

AUTHOR

CoxHealth
Health Information Management

Name: _____
Age: _____ DOB: _____
Acct or SSN: _____
(or Patient Sticker Here)

AUTHORIZATION, FINANCIAL OBLIGATION and CONSENT

Covered Entities. This Authorization, Financial Obligation and Consent form applies to CoxHealth, its employed and independently contracted physicians, inpatient and outpatient departments, clinics and other Affiliated Covered Entities, including but not limited to, Cox Medical Group, Emergency Physicians of Springfield, Cox Medical Center Branson, Litton & Giddings Radiological Associates, Inc., Cox-Monett Hospital, and Oxford Healthcare (hereinafter collectively referred to as "CoxHealth").

I UNDERSTAND I MAY RECEIVE SEPARATE BILLS FROM EACH COXHEALTH ENTITY.

Authorization to Release Information. The Notice of Privacy Practices sets forth my rights regarding my personal health information and the manner in which it may be used or disclosed. This includes the sharing and/or receiving of prescription information with a prescription database utilized in electronically prescribing medications for my treatment, including the review and access to prescriptions prescribed to me outside of the CoxHealth system. I understand that I have the following rights, among others, regarding my information: to receive the Notice of Privacy Practices prior to signing this form; to object to the use of my personal health information in the facility directory; and to revoke this form in writing, except to the extent that CoxHealth has already taken action in reliance on this form. I authorize the review, copying, release and disclosure of any and all information in my medical or accounting record(s), including information regarding the diagnosis or treatment of HIV, AIDS, mental illness or substance abuse, to any person, corporation or agency responsible for determining the necessity, appropriateness, payment, continuity of care or other matters related to the treatment or services rendered to me by CoxHealth. I further agree that if my injury is work-related, I authorize the disclosure of my records related to my work-related injury to my employer or employer's representative.

Assignment of Benefits. I assign to CoxHealth the benefits otherwise payable to me for any hospitalization, outpatient services, and clinical treatment from my insurance carrier or company, managed care plan, health maintenance organization, self-insured health plan, Medicaid or Medicare and its intermediaries and carriers.

Medicare Beneficiaries. I authorize CoxHealth to obtain information from the Social Security Administration or other government agency regarding my entitlement to benefits and my health insurance claim numbers.

Financial Obligation. I understand that I am financially responsible for payment of all amounts due for services provided by CoxHealth regardless of whether I have insurance coverage or whether other parties may also be responsible for paying for my care. I will not be responsible to pay for such services rendered if my financial obligation is waived by contractual agreement or prohibited by applicable state or federal laws or regulations. I understand that, as a courtesy to me, CoxHealth will submit claims for third-party coverage to my disclosed insurance carriers and that CoxHealth is authorized to complete any forms which are needed in order to obtain payment from said third-party payers. For all past due accounts, I agree to pay interest at the legal rate if the amount for which I am responsible is not paid within thirty (30) days of receipt of the bill. As part of the collections process, I authorize CoxHealth and any of its agents attempting to collect an unpaid account balance to contact me at any telephone number or address I have provided to CoxHealth using any manner, including the use of an auto-dialing device, at any time until my debts are paid in full. I understand that the cost of collections on past due accounts, including reasonable attorney's fees and court costs, will be included as part of my financial obligation. This agreement shall be governed by Missouri law. I hereby agree venue shall be appropriate in Greene County, Missouri. I also understand, pursuant to the Missouri hospital lien statutes, that if my injuries were caused by the negligence or wrongful act of another, CoxHealth may have a lien on any and all claims or rights of action I may have against the person causing my injuries and CoxHealth may have the right to enforce the lien for payment of services rendered rather than seek payment from any third-party payer.

Consent for Treatment. I agree, request and authorize CoxHealth to provide healthcare services to me and further consent to any examinations, tests (including tests for drugs and/or alcohol) or procedures that may be advisable or necessary for routine diagnostic purposes, or to diagnose or treat my medical condition. I realize that among those who attend to patients at CoxHealth facilities are medical, nursing and other healthcare personnel in training who may be present and participating in my care as part of their education. I also understand that CoxHealth utilizes the services of Non-Physician Practitioners, that I may be evaluated and treated by one of these Non-Physician Practitioners and that I have the right to see that provider's collaborating physician. I authorize the taking of photographs, videos or other images of parts of my body for use in medical evaluation, education and security purposes. I am aware that the practice of medicine is not an exact science and I understand that no promise, guarantee or warranty has been made regarding the results of the examination or treatment I receive. I agree to have my blood tested for hepatitis or HIV infection if my physician determines that it is necessary or if an employee, provider, volunteer, contractor, treating physician, emergency worker or law enforcement personnel is exposed to my blood or bodily fluids. If my blood indicates infection, my physician will be notified as well as any other individual, entity or agency required by law.

Release of Responsibility for Valuables. I understand CoxHealth strongly recommends all personal belongings and valuables not be kept in its facilities. I understand CoxHealth will not be liable for loss or damage to any personal property remaining in my possession and will not replace any personal items if they are lost or stolen.

Acknowledgments and Certifications. I acknowledge a copy of the Notice of Privacy Practices, the Notice of Patient Rights, and the Patient Bill of Rights and Responsibilities has been made available to me. I certify that I have read all parts of this Authorization, Financial Obligation and Consent form, that I accept all its terms and conditions, that all representations made by me are true, and that a copy of this form is effective and valid as the original. This form expires (unless expressly revoked at an earlier date) one (1) year after the date indicated below.

_____ _____ _____ _____
Patient parent if minor child, or guardian, (If Patient unable to sign, Representative name and Relationship) Date

__ Primary insured if different from patient
__ Secondary insured if different from patient
__ Guarantor if different from patient

Date

_____ _____
Witness Date

CPS-256 Lawson 4883 (Orig 01-90 Rev 02-17) (Ref 51082-000,0255,5277,3026)

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APPENDIX B

Human Subjects IRB Approval

Date: 3-30-2018

IRB #: IRB-FY2018-459
Title: Memory Complaint Profiles in Dementia Populations Utilizing the Memory Complaints Inventory
Creation Date: 1-8-2018
End Date: 2-5-2019
Status: Approved
Principal Investigator: Steven Capps
Review Board: MSU
Sponsor:

Study History

Submission Type	Review Type	Decision
Initial	Expedited	Exempt

Key Study Contacts

Member Steven Capps	Role Principal Investigator	Contact stevencapps@missouristate.edu
Member Becca Johnson	Role Primary Contact	Contact becca894@live.missouristate.edu
Member William Deal	Role Co-Principal Investigator	Contact pauldeal@missouristate.edu
Member Ann Rost	Role Co-Principal Investigator	Contact annrost@missouristate.edu

APPENDIX C

Post Hoc Comparisons

Appendix C-1

Post Hoc Comparison of Alzheimer's Disease and Pseudodementia

DV	Group 1	Group 2	*p*	*d*
GMP	AD	Pseudo	.002*	0.95***
NIP	AD	Pseudo	.08	0.65**
VSMP	AD	Pseudo	1.00	0.31*
VMP	AD	Pseudo	<.001*	1.12***
PIM	AD	Pseudo	.15	0.62**
MIW	AD	Pseudo	.003*	0.90***
IRM	AD	Pseudo	.04*	0.71**
ACB	AD	Pseudo	.05*	0.74**
AAB	AD	Pseudo	1.00	0.24*
Plausible	AD	Pseudo	.002*	0.94***
Implausible	AD	Pseudo	.03*	0.80***
Overall	AD	Pseudo	.002*	0.93***

*Note: * indicates statistical significance for p-values; * indicates small effect sizes, ** indicates medium effect sizes, and *** indicates large effect sizes*

Appendix C-2

Post Hoc Comparison of Alzheimer's Disease and Mild Cognitive Impairment

DV	Group 1	Group 2	*p*	*d*
GMP	AD	Mild CI	.29	0.59**
NIP	AD	Mild CI	1.00	0.37*
VSMP	AD	Mild CI	1.00	0.19
VMP	AD	Mild CI	.04*	0.75**
PIM	AD	Mild CI	1.00	0.39
MIW	AD	Mild CI	.34	0.52**
IRM	AD	Mild CI	.93	0.51**
ACB	AD	Mild CI	1.00	0.24*
AAB	AD	Mild CI	1.00	0.20*
Plausible	AD	Mild CI	.27	0.56**
Implausible	AD	Mild CI	1.00	0.38*
Overall	AD	Mild CI	.41	0.53**

*Note: * indicates statistical significance for p-values; * indicates small effect sizes, ** indicates medium effect sizes, and *** indicates large effect sizes*

Appendix C-3

Post Hoc Comparison of Alzheimer's Disease and Poor Effort

DV	Group 1	Group 2	*p*	*d*
GMP	AD	PE	<.001*	2.42***
NIP	AD	PE	<.001*	2.06***
VSMP	AD	PE	<.001*	1.51***
VMP	AD	PE	<.001*	2.78***
PIM	AD	PE	<.001*	1.37***
MIW	AD	PE	<.001*	2.54***
IRM	AD	PE	<.001*	1.41***
ACB	AD	PE	<.001*	1.78***
AAB	AD	PE	<.001*	0.92***
Plausible	AD	PE	<.001*	2.65***
Implausible	AD	PE	<.001*	1.85***
Overall	AD	PE	<.001*	2.58***

*Note: * indicates statistical significance for p-values; * indicates small effect sizes, ** indicates medium effect sizes, and *** indicates large effect sizes*

Appendix C-4

Post Hoc Comparison of Alzheimer's Disease and Vascular Dementia

DV	Group 1	Group 2	*p*	*d*
GMP	AD	VD	1.00	0.49*
NIP	AD	VD	1.00	0.30*
VSMP	AD	VD	1.00	0.06
VMP	AD	VD	1.00	0.44*
PIM	AD	VD	1.00	0.01
MIW	AD	VD	.74	0.68**
IRM	AD	VD	1.00	0.64**
ACB	AD	VD	1.00	0.32*
AAB	AD	VD	1.00	0.21*
Plausible	AD	VD	1.00	0.42*
Implausible	AD	VD	1.00	0.47*
Overall	AD	VD	1.00	0.46*

*Note: * indicates statistical significance for p-values; * indicates small effect sizes, ** indicates medium effect sizes, and *** indicates large effect sizes*

Appendix C-5

Post Hoc Comparison of Pseudodementia and Mild Cognitive Impairment

DV	Group 1	Group 2	*p*	*d*
GMP	Pseudo	Mild CI	.13	0.42*
NIP	Pseudo	Mild CI	.46	0.33*
VSMP	Pseudo	Mild CI	1.00	0.13
VMP	Pseudo	Mild CI	.07	0.44*
PIM	Pseudo	Mild CI	.94	0.29*
MIW	Pseudo	Mild CI	.13	0.39*
IRM	Pseudo	Mild CI	.56	0.34*
ACB	Pseudo	Mild CI	.04*	0.50**
AAB	Pseudo	Mild CI	1.00	0.01
Plausible	Pseudo	Mild CI	.13	0.41*
Implausible	Pseudo	Mild CI	.12	0.44*
Overall	Pseudo	Mild CI	.08	0.44*

*Note: * indicates statistical significance for p-values; * indicates small effect sizes, ** indicates medium effect sizes, and *** indicates large effect sizes*

Appendix C-6

Post Hoc Comparison of Pseudodementia and Poor Effort

DV	Group 1	Group 2	*p*	*d*
GMP	Pseudo	PE	<.001*	1.23***
NIP	Pseudo	PE	<.001*	1.12***
VSMP	Pseudo	PE	<.001*	1.09***
VMP	Pseudo	PE	<.001*	0.92***
PIM	Pseudo	PE	<.001*	0.77**
MIW	Pseudo	PE	<.001*	1.01***
IRM	Pseudo	PE	<.001*	0.67**
ACB	Pseudo	PE	<.001*	1.00***
AAB	Pseudo	PE	<.001*	0.81***
Plausible	Pseudo	PE	<.001*	1.27***
Implausible	Pseudo	PE	<.001*	1.04***
Overall	Pseudo	PE	<.001*	1.27***

*Note: * indicates statistical significance for p-values; * indicates small effect sizes, ** indicates medium effect sizes, and *** indicates large effect sizes*

Appendix C-7

Post Hoc Comparison of Pseudodementia and Poor Vascular Dementia

DV	Group 1	Group 2	*p*	*d*
GMP	Pseudo	VD	.12	0.53**
NIP	Pseudo	VD	.46	0.42*
VSMP	Pseudo	VD	1.00	0.25*
VMP	Pseudo	VD	.004*	0.71**
PIM	Pseudo	VD	.04*	0.67**
MIW	Pseudo	VD	.42	0.43*
IRM	Pseudo	VD	1.00	0.31*
ACB	Pseudo	VD	.27	0.50**
AAB	Pseudo	VD	1.00	0.03
Plausible	Pseudo	VD	.05*	0.58**
Implausible	Pseudo	VD	.55	0.43*
Overall	Pseudo	VD	.08	0.55**

*Note: * indicates statistical significance for p-values; * indicates small effect sizes, ** indicates medium effect sizes, and *** indicates large effect sizes*

Appendix C-8

Post Hoc Comparison of Mild Cognitive Impairment and Poor Effort

DV	Group 1	Group 2	*p*	*d*
GMP	Mild CI	PE	<.001*	1.8***
NIP	Mild CI	PE	<.001*	1.6***
VSMP	Mild CI	PE	<.001*	1.25***
VMP	Mild CI	PE	<.001*	1.49***
PIM	Mild CI	PE	<.001*	1.16***
MIW	Mild CI	PE	<.001*	1.49***
IRM	Mild CI	PE	<.001*	1.13***
ACB	Mild CI	PE	<.001*	1.58***
AAB	Mild CI	PE	<.001*	0.84***
Plausible	Mild CI	PE	<.001*	1.80***
Implausible	Mild CI	PE	<.001*	1.57***
Overall	Mild CI	PE	<.001*	1.86***

*Note: * indicates statistical significance for p-values; * indicates small effect sizes, ** indicates medium effect sizes, and *** indicates large effect sizes*

Appendix C-9

Post Hoc Comparison of Mild Cognitive Impairment and Vascular Dementia

DV	Group 1	Group 2	*p*	*d*
GMP	Mild CI	VD	1.00	0.13
NIP	Mild CI	VD	1.00	0.10
VSMP	Mild CI	VD	1.00	0.13
VMP	Mild CI	VD	1.00	0.32*
PIM	Mild CI	VD	.92	0.42*
MIW	Mild CI	VD	1.00	0.02
IRM	Mild CI	VD	1.00	0.02
ACB	Mild CI	VD	1.00	0.01
AAB	Mild CI	VD	1.00	0.02
Plausible	Mild CI	VD	1.00	0.19
Implausible	Mild CI	VD	1.00	0.01
Overall	Mild CI	VD	1.00	0.13

*Note: * indicates statistical significance for p-values; * indicates small effect sizes, ** indicates medium effect sizes, and *** indicates large effect sizes*

Appendix C-10

Post Hoc Comparison of Poor Effort and Vascular Dementia

DV	Group 1	Group 2	*p*	*d*
GMP	PE	VD	<.001*	1.90***
NIP	PE	VD	<.001*	1.78***
VSMP	PE	VD	<.001*	1.39***
VMP	PE	VD	<.001*	1.92***
PIM	PE	VD	<.001*	1.48***
MIW	PE	VD	<.001*	1.79***
IRM	PE	VD	<.001*	1.04***
ACB	PE	VD	<.001*	1.55***
AAB	PE	VD	<.001*	0.79**
Plausible	PE	VD	<.001*	2.08***
Implausible	PE	VD	<.001*	1.50***
Overall	PE	VD	<.001*	2.03***

*Note: * indicates statistical significance for p-values; * indicates small effect sizes, ** indicates medium effect sizes, and *** indicates large effect sizes*