
BRIEF COMMUNICATION

Impaired financial capacity in late life depression is associated with cognitive performance on measures of executive functioning and attention

R. SCOTT MACKIN AND PATRICIA A. AREÁN

Department of Psychiatry, University of California, San Francisco, San Francisco, California

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Abstract

Few studies have evaluated the prevalence of impairments of financial capacity among individuals with psychiatric disorders. Late life depression (LLD) is a common psychiatric disorder associated with significant disability and cognitive impairment. The purpose of this investigation was to determine the prevalence and cognitive correlates of impairments of financial capacity among individuals with LLD. Participants included 65 LLD individuals and 32 comparison subjects. Assessments included measures of financial capacity, cognitive functioning, and depression symptom severity. Individuals with LLD exhibited a significantly higher rate of impaired financial capacity (22%) than the comparison group (6%). Results of a multiple regression analysis indicated that performance on measures of executive functioning and attention, but not depression severity, were most strongly associated with financial capacity performance in LLD. Our results suggest impairments of financial capacity in LLD are largely explained by cognitive functioning in these domains. (*JINS*, 2009, *15*, 793–798.)

Keywords: Financial capacity, Late life depression, Mild cognitive impairment, Abstract reasoning, Executive dysfunction, Attention

INTRODUCTION

Financial capacity is a construct that encompasses knowledge and skills related to financial matters, planning and calculation ability, organization, memory, and judgment (Marson et al., 2000). Although there are currently no gold standards for assessing financial capacity, several measures of functional status routinely utilized with elderly patients include the assessment of financial skills and knowledge (Loeb, 1996; Loewenstein et al., 1989), and at least one measure is being developed specifically to assess financial capacity (Marson et al., 2000). In recent years, the study of loss of financial capacity associated with neurodegenerative disease has emerged as a critical area of research and has primarily been studied as a consequence of Alzheimer's disease and Mild Cognitive Impairment (Marson et al., 2000; Sherod et al., 2009). In these studies, impaired financial capacity has

been associated with measures of arithmetic achievement and neuropsychological measures of executive functioning, visuomotor sequencing, and verbal memory (Sherod et al., 2009). To date, impairments of financial capacity have not yet been studied in individuals with late life depression (LLD), a prevalent and debilitating psychiatric disorder that is commonly associated with a wide range of cognitive dysfunction.

It has been estimated that up to 14% of the general elderly population experience depressive symptoms meeting criteria for Major Depressive Disorder (Anstey, von Sanden, Sargent-Cox, & Luszcz, 2007). Major Depressive Disorder is now recognized as being the leading cause of lifetime disability and the fourth leading contributor to the global burden of disability worldwide (Chisholm, Sanderson, Ayuso-Mateos, & Saxena, 2004). LLD is particularly debilitating and estimates suggest that up to 60% of patients with LLD exhibit mild cognitive deficits (Butters et al., 2004). Executive dysfunction is the cognitive impairment most commonly associated with LLD; however, deficits of memory, speed of information processing, attention, language, and visuospatial ability are all also common in LLD (Butters et al., 2004).

Correspondence and reprint requests to: R. Scott Mackin, Ph.D., University of California, San Francisco, Department of Psychiatry and Langley Porter Psychiatric Institute, 401 Parnassus Avenue, Box F-0984, San Francisco, CA 94143-0984. E-mail: scottm@lppi.ucsf.edu

It is well known that LLD is often a concurrent aspect of several neurodegenerative disorders of late life (Schweitzer, Tuckwell, O'Brien, & Ames, 2002) that cause cognitive impairments, and as such, much of the variability in cognitive symptoms of LLD may be a result of these concurrent conditions. Nevertheless, the cognitive impairments associated with LLD may put these individuals at greater risk for impairments of financial capacity. Furthermore, a depressed mood state, in the absence of cognitive impairment, may also contribute to poor financial management skills resulting from apathy or motivational deficits, which could also contribute to a higher risk for experiencing difficulties managing finances. Financial capacity is critical for independent living, and the early identification of impairments of financial capacity may prevent financial hardships among older adults related to spending excesses, poor financial planning, and the many forms of financial elder abuse.

The current study was conducted to test the hypotheses that individuals with LLD will demonstrate poorer performance on a screening measure of financial capacity than age and education matched control participants, and that financial capacity performance will be associated with measures of cognitive functioning.

METHODS

Participants

Participants included 97 older adults who completed a neuropsychological evaluation as part of a larger study investigating cognitive functioning and disability in LLD. Participants consisted of 65 individuals who received a diagnosis of current Major Depressive Disorder and were age 65 or older (LLD) and 32 age and education matched control participants. Control participants were individuals with no current psychiatric disorder ($n = 17$), with a diagnosis of dysthymia ($n = 11$), or with a diagnosis of adjustment disorder with symptoms of depressed mood ($n = 4$). Psychiatric diagnoses were made by licensed psychologists utilizing the *Diagnostic and Statistical Manual*, 4th edition (DSM-IV) criteria and the Structured Clinical Interview for the Diagnosis of DSM-IV Disorders (First, Spitzer, Gibbon, & Williams, 1997). All psychiatric diagnoses were reviewed at a consensus conference comprised of psychologists, social workers, and a neuropsychologist. Measures of cognitive functioning, financial capacity, and depression severity were administered by a trained research staff under the supervision of a licensed neuropsychologist. Participants were recruited through media advertisements and were financially compensated. Participants were excluded from participation in the larger study if they had a prior diagnosis of dementia or a had a Mini-Mental State Exam (MMSE) score of <25 at the initial screening evaluation ($n = 5$), if they were taking antidepressant medications ($n = 9$), if they reported psychotic symptoms, or had a past diagnosis of psychotic disorder ($n = 13$), if they had acute medical illness ($n = 2$), or substance abuse disorder ($n = 4$), had a history of significant head trauma ($n = 3$), if they were not fluent in English

($n = 1$), or if they had sensory limitations that precluded participation in neuropsychological testing ($n = 2$). All participants provided informed consent to participate in the study, and all study procedures were approved by a committee for human research institutional review board.

Measures

Measures of financial capacity, cognitive functioning, and severity of symptoms of depression were obtained for each participant during a single assessment period. The specific measures utilized and outcome variables for each of these measures are described below. Additionally, demographic information (age, years of education, ethnicity) was obtained for each participant.

Financial capacity

The Independent Living Scales, Managing Money Scale (ILS MM) (Loeb, 1996). This scale assesses an individual's ability to count money, complete monetary calculations, pay bills, and take precautions with money. This scale is comprised of 17 items, with scores for each item rated on a scale of 0–2 with a total possible score of 34. The ILS MM has been validated for use among individuals with mild cognitive impairment, dementia, and a range of psychiatric conditions (Loeb, 1996). Performance falling below an ILS standard score of 40 was categorized as “impaired,” in accordance with interpretation procedures for the most conservative estimate of impaired performance on this subtest provided in the test manual.

Memory

Brief Visuospatial Memory Test–Revised (BVMT-R) (Benedict, 1997). The BVMT-R is a measure of visual memory. The outcome variable utilized was the number of total correct responses for the delayed free recall trial.

Hopkins Verbal Learning Test–Revised (HVLTR) (Brandt & Benedict, 2001). The HVLTR is a measure of memory for lists of verbally presented information. The outcome variable utilized was the total number of correct responses on the delayed free recall trial.

Visuospatial functioning

Motor Free Visual Perception Test–Third edition (MVPT-3) (Colarusso & Hammill, 2005). The MVPT-3 is a motor free test of visual perception ability. The outcome utilized was the total number of correct responses.

Attention/working memory

Wechsler Adult Intelligence Scale–Third edition, Letter Number Sequencing (LNS) subtest (Wechsler, 1997). The LNS subtest is a measure of attention, working memory, sequencing ability, and cognitive set shifting. The outcome variable utilized was the total number of correct responses.

Wechsler Adult Intelligence Scale–Third edition, Digit Span subtest (Wechsler, 1997). This test assesses working memory and focused attention. The outcome variable utilized was the total number of correct responses.

Speed of information processing

Symbol Digit Modalities Test–Oral version (SDMT) (Smith, 2002). The oral version of the SDMT is a motor free measure of information processing speed and working memory. The outcome variable utilized for this measure was the total number of correct responses.

Trail Making Test, Part A (TMT A) (Reitan & Wolfson, 1993). The TMT A is a measure of sequencing ability, information processing speed, and visuomotor speed. The outcome variable utilized was time to completion.

Abstract reasoning

Wechsler Adult Intelligence Test–Third edition, Similarities subtest (Wechsler, 1997). The similarities subtest is a measure of abstract verbal reasoning ability. The outcome variable was the total number of correct responses.

Language

The Boston Naming Test–15 item (BNT) (Kaplan, Goodglass, & Weintraub, 1983). The BNT is a measure of confrontation naming ability. The total number of correct responses was utilized as the outcome variable.

Semantic Fluency Test (Benton, Hamsher, & Sivan, 1983). This test is a measure of semantic fluency; the total number of correct responses was utilized as the outcome variable.

Executive function

Controlled Oral Word Association Test (COWAT) (Benton et al., 1983). The COWAT is a measure of phonemic fluency and speed of information processing consisting of three trials. The total number of correct responses for the three trials was utilized as the outcome variable.

Wisconsin Card Sorting Test-64, Computer version 4 (WCST-64) (Heaton, 2000). The WCST is a measure of problem-solving ability, cognitive flexibility, and ability to maintain a cognitive set. The outcome variable was the total number of errors.

The Stroop Color and Word Test (SCWT) (Golden & Freshwater, 2002). The SCWT is a commonly utilized instrument of response inhibition and ability to maintain cognitive set. The total number of correct responses on the color word trial was utilized as the outcome variable.

Trail Making Test, Part B (TMT B) (Reitan & Wolfson, 1993). This test is a measure of sequencing skill, ability to maintain a complex response set, response inhibition, and

visuomotor speed. The time required to complete the task was utilized as the outcome variable.

Severity of symptoms of depression and anxiety

Hamilton Depression Rating Scale (HDRS) (Hamilton, 1960). The HDRS is a 24-item instrument utilized to assess severity of depressive symptoms; high scores indicate greater severity of depression. The outcome variable for this measure was the total score.

Arithmetic achievement

The Wide Range Achievement Test–Third edition (WRAT-3) (Wilkinson, 1993). The Arithmetic subtest of the WRAT-3 was utilized as a measure of academic achievement in arithmetic skills. The total number correct for the Arithmetic subtest was utilized as the outcome variable.

Procedures and Statistical Analyses

We first conducted an analysis of variance (ANOVA) to evaluate group differences (LLD, comparison group) on demographic variables (age, education), and then conducted nonparametric analyses to evaluate gender and ethnicity differences between the two groups. Subsequently, we conducted a series of ANOVA analyses to compare the two groups on ILS MM performance, cognitive performance, and measures of depression symptom severity. Pearson correlations were then calculated to evaluate the relationship between ILS MM scaled score performance and neuropsychological variables for the LLD group. Three of the neuropsychological measures with the highest univariate correlations (LNS, COWAT, Similarities) were selected for entry into the stepwise multiple regression analysis to assess the impact of cognitive functioning on ILS MM scores after accounting for the contribution of demographic variables, arithmetic achievement, and depression severity. An alpha level of .05 was utilized for all analyses.

RESULTS

Participants included 64 females and 33 males. The mean age for participants was 70.1 years ($SD = 7.1$) and the mean level of education was 16.0 years ($SD = 2.4$). The ethnic distribution of the sample was made up of Caucasian (75%), African American (9%), Asian (7%), Pacific Islander (2%), and Hispanic (7%) individuals. The LLD group did not differ from the comparison group with respect to age, education, gender, or ethnicity. Depressed individuals showed a significantly greater prevalence of impairment on the ILS MM than the comparison group (22% vs. 6%; $\chi^2 = 3.6$, $p = .047$). On measures of neuropsychological functioning, there were no significant differences between the two groups with respect to raw scores for each measure (Table 1). LLD individuals had significantly higher ratings of depression symptom severity than the comparison group [$F(1,96) = 130.3$, $p = .000$, $\eta_p^2 = .581$]. The results of a multivariate regression

Table 1. Group comparisons on financial capacity and neuropsychological measures ($n = 97$)

	Major Depression ($n = 65$) Mean (<i>SD</i>)	Controls ($n = 32$) Mean (<i>SD</i>)
Financial Capacity		
ILS Managing Money Scale	27.2 (4.4)	29.4 (3.6)
Memory		
Brief Visuospatial Memory Test-Revised	6.8 (3.5)	7.2 (3.1)
Hopkins Verbal Learning Test-Revised	7.4 (3.2)	7.2 (2.6)
Visual		
Motor-Free Visual Perception Test	50.5 (6.7)	51.7 (6.0)
Attention		
WAIS-III Letter Number Sequencing	8.8 (3.0)	9.0 (2.7)
WAIS-III Digit Span	16.6 (4.5)	17.7 (3.9)
Processing Speed		
Symbol Digit Modalities Test	41.8 (12.8)	44.2 (7.8)
Trail Making Test, Part A	45.7 (22.7)	46.5 (17.9)
Executive Functioning		
Wisconsin Card Sorting Test	25.8 (12.4)	24.5 (12.4)
Stroop Color Word Test	27.7 (9.7)	31.3 (7.1)
Trail Making Test, Part B	121.9 (74.6)	121.8 (70.2)
Controlled Oral Word Association Test	39.2 (14.2)	39.5 (11.4)
Oral Language		
Boston Naming Test	12.6 (2.8)	13.4 (1.8)
Semantic Fluency Test	16.6 (5.1)	17.2 (4.0)
Abstract Reasoning		
WAIS-III Similarities	23.0 (7.7)	24.0 (5.4)
Arithmetic		
WRAT-3 Arithmetic Subtest	38.0 (8.4)	38.4 (5.5)

Note. WAIS-III = Wechsler Adult Intelligence Scale-Third Edition, ILS = Independent Living Scales, WRAT-3 = Wide Range Achievement Test-Third Edition.

analysis conducted to determine the relationship between demographic variables, severity of depression, cognitive performance and ILS MM standard score performance for individuals with LLD is shown in Table 2. In this regression model, age and education accounted for 37% of the variance in ILS MM standard scores, with cognitive performance on measures of attention and executive functioning accounting for an additional 27% of the variance in ILS MM scores above and beyond sociodemographics, arithmetic achievement performance and depression severity. Depression severity and arithmetic achievement were not significant predictors of ILS MM standard scores in the LLD group.

DISCUSSION

Our results suggest that individuals with LLD show significantly elevated rates of clinical impairment on a measure of financial capacity relative to our comparison group. This distinction is important and we would suggest that our finding that 22% of our LLD sample demonstrated clinically significant impairment on the ILS MM is the most salient finding from our study. Given the rates of impaired financial capacity among individuals with mild cognitive impairment (Marson et al., 2000; Sherod et al., 2009), and the incidence of mild cognitive impairment in LLD (Butters et al., 2004), these findings are not surprising, but they do underscore the potential for individuals with LLD to exhibit impairments of

financial capacity. To our knowledge this is the first study to evaluate the incidence of impaired financial capacity specifically in a sample of individuals with LLD.

Our findings that performance on measures of attention and executive functioning were significant predictors of ILS MM scores also warrants further discussion on two levels. First, our findings that cognitive functioning in these domains, and not depression severity, was associated with performance on a measure of financial capacity would suggest that cognitive dysfunction related to depression may be a primary factor in the elevated rates of impaired financial capacity in this patient population. Second, we would conclude that the specific cognitive functions identified as predictors of ILS MM performance in our sample represent critical aspects of financial capacity for those tasks that we specifically assessed, that is, counting money, completing monetary calculations, paying attention to details of writing checks and performing monetary calculations, and the ability to explain how to take precautions with money. We recognize that financial capacity *in vivo* would also likely require individuals to utilize other cognitive skills, for example, remembering to pay bills at specific times and keeping financial records organized, etc., that were not assessed with the ILS MM. Therefore, we interpret our findings cautiously and expect that when utilizing more comprehensive measures of financial capacity, other cognitive domains, such as memory, would also be implicated as being critical cognitive components for successful performance.

Table 2. Summary of multivariate regression analysis for prediction of ILS Money Management scores in LLD participants ($n = 65$)

Variable	Beta	Standard Error	Standard Beta
Step 1. Demographic Variables			
Age	-.180	.068	-.299*
Education	.810	.195	.471**
Step 2. Demographic Variables, Arithmetic Achievement			
Age	-.172	.068	-.287*
Education	.752	.199	.438**
WRAT Arithmetic	.071	.055	.149
Step 3. Demographics, Arithmetic Achievement, Depression Severity			
Age	-.177	.068	-.294*
Education	.695	.204	.410**
WRAT Arithmetic	.075	.055	.157
HDRS	-.181	.149	-.137
Step 4. Demographics, Arithmetic Achievement, Depression, Cognitive Variables			
Age	-.041	.058	-.069
Education	.104	.190	.060
WRAT Arithmetic	.029	.045	.061
HDRS	-.011	.118	-.008
Controlled Oral Word Association Test	.096	.039	.326*
WAIS-III Letter Number Sequencing	.437	.162	.320**
WAIS-III Similarities	.112	.066	.205

Note. WRAT-3 = Wide Range Achievement Test-Third Edition; HDRS = Hamilton Depression Rating Scale; WAIS-III = Wechsler Adult Intelligence Scale-Third Edition.

* = $p < .05$.

** = $p < .01$.

Step 1 $R^2 \Delta = .368$.

Step 2 $R^2 \Delta = .021$.

Step 3 $R^2 \Delta = .018$.

Step 4 $R^2 \Delta = .267$.

Our research design is not without limitations. Foremost in this discussion of limitations is our choice of the ILS MM as our outcome measure for assessing financial capacity. As previously mentioned, there is currently no gold standard for assessing financial capacity. Financial capacity encompasses a broad number of diverse skills and abilities, and the measurement of this construct is therefore difficult. We chose the ILS MM as our dependent measure of financial capacity, because this measure has established psychometric properties, it has been shown to be a valid measure of money management skills and knowledge of financial matters in a number of patient populations, and it is widely utilized in clinical applications. Nonetheless, the ILS MM assesses a relatively focused number of skills and knowledge and thus may lack the ability to comprehensively assess all of the skills related to financial capacity. This limitation may explain why we did not find an association between arithmetic achievement and financial capacity, as has been found in another recent study (Sherod et al., 2009) that evaluated financial capacity in older adults with mild cognitive impairment and dementia with a more comprehensive instrument that may be impacted by arithmetic achievement to a greater extent. Furthermore, the inclusion of individuals with Dysthymia and Adjustment Disorder in our comparison group may have limited our ability to determine group differences on total ILS MM standard scores, and may have made it more difficult to evaluate the

relationship between severity of depressive symptoms and ILS MM scores. A related issue is the relatively small size of our sample, which also limited our ability to identify other potential cognitive predictors of ILS MM standard scores.

LLD is a prevalent psychiatric disorder in the elderly and is associated with significant disability and cognitive dysfunction. Based on our findings, we would propose that financial capacity may be an important contributor to disability in this population. As such, we would recommend further study of financial capacity in individuals with LLD that may implicate the need for more routine assessment of financial capacity among older depressed adults.

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