Intact Cognition in Depressed Elderly Veterans Providing Adequate Effort

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Abstract

Geriatric depression has been associated with cognitive impairments, but whether suboptimal effort contributes to these deficits is unknown. This study investigated differences in cognitive functioning between depressed and nondepressed elderly veterans, before and after excluding patients who provided suboptimal effort on testing at a memory disorders clinic. Patients diagnosed with a depressive disorder performed more poorly than nondepressed patients on almost all Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) indices, but these differences became nonstatistically significant after excluding patients who provided suboptimal effort. However, when patients were classified as normal, mildly, or severely depressed based on Geriatric Depression Scale scores, these groups were not significantly different on RBANS indices, regardless of whether patients who provided suboptimal effort were included or excluded from analyses. The findings suggest that cognitive deficits in depression reported in previous research may be attributable to suboptimal effort and that identifying depression via clinical diagnosis or psychometric data may affect this trend.

Keywords: Depression; Elderly/geriatrics/aging; Suboptimal effort; Cognition; Repeatable Battery for the Assessment of Neuropsychological Status; Geriatric Depression Scale

Introduction

Geriatric depression has been associated with impairments in multiple cognitive domains (Herrmann, Goodwin, & Ebmeier, 2007). However, the extent to which diminished motivation or suboptimal effort contributes to these deficits has had limited exploration. This may be a consequential limitation of past studies, since as many as 28% of depressed individuals have been estimated to demonstrate suboptimal effort on testing, potentially resulting in spuriously attenuated cognitive test scores that have been reported in previous research (Green, 2009). Thus, the current study investigated whether suboptimal effort contributes to differences in cognitive functioning between depressed and nondepressed elderly veterans.

Clinically significant depressive symptoms are prevalent in as many as 8%–16% of older adults (Blazer, 2003; Steffens, Fisher, Langa, Potter, & Plassman, 2009). These individuals have been shown to demonstrate worse cognitive morbidity than nondepressed controls (Gualtieri & Johnson, 2008), with evidence suggesting that depression may be a prodrome or a risk factor for dementia (Butters et al., 2008; Jorm, 2001). Specific cognitive domains affected in depression in elderly populations include memory (Kindermann & Brown, 1997), psychomotor and processing speed (Baune, Suslow, Engelien, Arolt, & Berger, 2006), and executive functions (Alexopoulos et al., 2005; Elderkin-Thompson, Mintz, Haroon, Lavretsky, & Kumar, 2007; Lockwood, Alexopoulos, & van Gorp, 2002), with the magnitude of these deficits having been described in a meta-analysis as small-to-moderate compared with normal controls (Herrmann et al., 2007).

Despite evidence supporting the impact of depression on cognition, there is considerable heterogeneity in study outcomes and methodology across previous research that precludes certainty (cf. McClintock, Husain, Greer, & Cullum, 2010). For instance, research studies vary widely in the ways in which depression is defined, with some studies adhering to criteria.
outlined in a diagnostic system and with others identifying depression groups based on psychometric data from self-report depression inventories. In addition, studies included in reviews do not always systematically assess for and exclude participants who demonstrate suboptimal effort on testing. Assessing for effort is necessary in order to maximize confidence in the results (Bush et al., 2005), as it is possible that patients undergoing neuropsychological assessments, albeit encouraged to perform to the best of their ability, do not exert maximal effort for various reasons (see Millis, 2008). This is particularly important in the geriatric population, where depression versus dementia is a frequent and challenging differential diagnosis (Charney et al., 2003; Wright & Persad, 2007). Irrespective of the reasons why a patient may not provide adequate effort on testing, effort tests ensure that patients who provide suboptimal effort and score in the impaired ranges are not misclassified as cognitively impaired.

There are several reasons why depressed older adults, including elderly veterans, may provide suboptimal effort on testing (Cimino, 2000). First, they may be motivated to portray themselves as cognitively impaired to assume a patient role such as in a factitious disorder (American Psychiatric Association, 2000), to avoid responsibility, or to receive secondary gains such as in disability-seeking situations (Boone, 2007). Second, and perhaps more commonly, depressed older adults may provide variable or suboptimal effort due to conditions associated with depression and aging, such as fatigue, apathy, inattention, disinterest, or lack of engagement in the assessment, carelessness, acute mood changes, or feelings of inefficacy on cognitive tasks in which they have self-perceived difficulties (Williams, Watts, MacLeod, & Mathews, 1997). In both situations, symptom validity tests are often administered to ascertain whether observed impairments are attributable to true cognitive deficits or to suboptimal performance. Studies of nonlitigating clinical and community-dwelling older adult samples have shown that although depression can mitigate motivation or performance on cognitive testing, symptom validity tests remain robust to these effects and have low false-positive rates in detecting depressed individuals as providing suboptimal effort. That is, symptom validity tests have been shown to be unrelated to self-reported depression in older adults (Ashendorf, Constantinou, & McCaffrey, 2004; Lee et al., 2000) and to maintain sufficient classification accuracy when assessing effort in nondemented elderly (Dean, Victor, Boone, Philpott, & Hess, 2009; Merten, Bossink, & Schmand, 2007; Teichner & Wagner, 2004). As such, symptom validity tests are of significant utility in a depressed older adult population with nonsevere cognitive impairment. To our knowledge, there have been no published studies to date that have examined depression and cognitive functioning in depressed elderly veterans in whom effort was formally assessed.

One study that has examined depression and cognitive performance in patients who passed symptom validity tests found no differences between depressed and nondepressed patients (Rohling, Green, Allen, & Iverson, 2002). In this study, two groups of demographically matched (i.e., in their 40’s and with at least 12 years of education), low- and high-depression patients (per Beck Depression Inventory [Beck & Steer, 1993] scores ≤10 and ≥25, respectively) were compared on a battery of neuropsychological measures. Noteworthy in their study was the exclusion of patients who failed two symptom validity tests (i.e., Computerized Assessment of Response Bias [Allen, Conder, Green, & Cox, 1997] and Word Memory Test [Green, Allen, & Astner, 1996]), which was particularly relevant as their study participants were compensation-seeking disability claimants. The researchers hypothesized that high-depression patients would perform worse on measures that required effortful processing, such as measures of memory encoding and retrieval (Hartlage, Alloy, Vazquez, & Dykman, 1993). Contrary to their expectations, there were no differences between these groups on cognitive tests, concluding that the impact of depression on test performance is negligible to nonexistent after excluding participants who provided suboptimal effort, despite a high degree of subjective cognitive complaints in the high-depression group. The extent to which these results would generalize to nondisability-seeking populations is unknown.

In the present study, we explored the potential contribution of suboptimal effort to the cognitive profile of depressed elderly veterans examined in an outpatient memory disorders clinic (MDC) to whom a brief neuropsychological test battery (i.e., the Repeatable Battery for the Assessment of Neuropsychological Status [RBANS; Randolph, 1998]) was administered. Although the RBANS does not comprise all relevant neuropsychological domains in which impairments can be observed among depressed elderly, the relative brevity of this battery may contribute to its more prevalent use in other MDCs, wherein concerns of potential cognitive deficits due to depression are often assessed. To investigate the impact of effort to this differential, we examined whether excluding patients who provided suboptimal effort would affect the differences in RBANS performance between nondemented, depressed, and nondepressed elderly veterans in a clinic setting.

First, we hypothesized that depressed elderly veterans would have poorer cognitive performance than a nondepressed comparative sample in the same small-to-moderate effect size magnitudes that have been reported in previous research (Herrmann et al., 2007). However, we also predicted that these differences would be attenuated and rendered nonstatistically significant after excluding patients who provided suboptimal effort from analyses. That is, depressed and nondepressed elderly veterans would differ on cognitive measures, but that these differences would no longer be apparent after excluding patients who provided suboptimal effort on testing.
A secondary aim of this study was to examine if this trend persisted whether the depressed groups were identified via diagnostic criteria or psychometric data. As previous meta-analytic results support cognitive deficits in depressed older adults regardless of diagnostic strategy (Christensen, Griffiths, MacKinnon, & Jacomb, 1997; Kindermann & Brown, 1997), it was expected that depressed elderly veterans (defined either by the DSM-IV-TR [American Psychiatric Association, 2000] or using the Geriatric Depression Scale [GDS]) would perform worse than nondepressed elderly veterans on a cognitive test battery, but that these differences would be attributable to suboptimal effort.

**Methods**

This study was a retrospective analysis of data collected during clinical services provided by the geriatric MDC at a Southeastern VA Medical Center. Patients were referred to the MDC primarily from Neurology, Mental Health, or Primary Care. Patients received a multidisciplinary evaluation, including a brief clinical neuropsychological assessment (i.e., clinical interview and neuropsychological testing) and a psychiatric and neurological evaluation.

The initial pool of patients consecutively seen at the MDC (N = 526) was reviewed, and patients who met criteria for dementia were excluded from this study to eliminate the risk of confounding the results with deficits attributable to neurodegenerative etiologies. Excluding these patients from the current study is also supported by aforementioned research that suggests that many effort measures in current use can be “failed” by patients with adequate motivation but with very severe cognitive impairment or dementia. Patients for whom effort could not be assessed with reasonable certainty due to insufficient information or lack of compelling arguments for or against adequate effort were also excluded (n = 68). Examples of these instances include cases in which not all tests were administered for unclear reasons, and wherein variable effort throughout testing was markedly obvious, therefore rendering it very difficult to determine the extent to which patient scores were affected by suboptimal effort. For patients who were evaluated in the MDC more than once, only data from their first visit were included. Only patients who were able to complete the full evaluation were included in the analyses.

**Participants**

The participants in this study represent a subsample of all MDC patients who met the following criteria for inclusion into one or both sets of analyses. First, to investigate the extent to which nondepressed patients differed from clinically depressed patients on cognitive measures, 58 patients who did not meet criteria for any psychiatric or cognitive disorder (“NON”) were compared with 40 patients who met criteria for a DSM-IV depressive disorder (“DEP”). The patients comprising the DEP group were diagnosed with major depressive disorder, depressive disorder NOS, or other depressive disorders; none were diagnosed with dementia or any other cognitive disorder.

Second, a separate subsample of MDC patients who completed the GDS were “psychometrically” identified by their GDS scores as being in the normal (0–9; “GDS-Normal”), mild (10–19; “GDS-Mild”), or severe (20–30; “GDS-Severe”) ranges for depression (as delineated in Yesavage et al., 1983). One hundred sixty-eight patients were classified into the GDS-Normal group, 95 patients were classified into the GDS-Mild group, and 45 patients were classified into the GDS-Severe group. The patients comprising the psychometrically defined groups had various diagnoses including major depressive disorder, depressive disorder NOS, cognitive disorder NOS, mild cognitive impairment, diagnosis deferred (i.e., could not be determined at time of evaluation), or no diagnosis (i.e., normal). None of the patients in the psychometrically defined groups were diagnosed with dementia.

**Procedures**

A full evaluation from the MDC consisted of neurological and neuropsychological evaluations. The neurological evaluation was conducted by a behavioral neurologist or psychiatry resident and included the administration of the Mini-Mental Status Exam (MMSE; Folstein, Folstein, McHugh, & Fanjiang, 2001). The neuropsychological evaluation, which included a brief clinical interview and cognitive testing, was conducted by a clinical neuropsychologist, geropsychologist, or predoctoral psychology intern. The following measures comprise the tests included in the full test battery that are relevant to this study: The Test of Memory Malingering (TOMM; Tombaugh, 1996), the RBANS (Randolph, 1998), and the GDS (Yesavage et al., 1983). The Information and Orientation subtest of the Wechsler Memory Scale-III (Wechsler, 1997) and the Trail Making Test (Reitan, 1958) were two other measures included in the neuropsychological test battery, but were excluded from this study for methodological and conceptual reasons. First, due to the numerous analyses needed to answer our research hypotheses, we decided to limit our research to the RBANS to keep the number of our statistical comparisons at a minimum. Second, the presence of a more frequently used measure of global cognitive functioning (i.e., MMSE) did not necessitate our inclusion...
of the Information and Orientation subtest results. Lastly, although including Trails B in this study would permit us to present information regarding executive functioning, our data were insufficiently coded. In that many cases had incomplete (i.e., only identified as having completed the task in >300 s) or missing (e.g., patient was identified as not having completed the task, but the reasons for this were not consistently specified) data. Thus, we opted to only include data from conceptually relevant and statistically viable variables.

Following the evaluation, each patient was assigned a diagnosis during a multidisciplinary team meeting that included neuropsychology, behavioral neurology, and psychiatry; all diagnoses were made at a team meeting according to specified criteria and after review of all clinical and neuropsychological test information. The team used the DSM-IV-TR (American Psychiatric Association, 2000) criteria for depressive disorders. Patients were diagnosed with depression at the exclusion of a neurological or cognitive diagnosis; none of the patients with a clinical diagnosis of depression concurrently met criteria for dementia or any other cognitive disorder. The Petersen criteria were used to diagnose mild cognitive impairment (Petersen et al., 2001). All subjects with definite cognitive impairment but who did not meet other specific diagnostic criteria, by consensus of the neuropsychologist, neuropsychologist, and other team members, were diagnosed with cognitive disorder NOS per DSM-IV-TR criteria. Patients with dementia were diagnosed using DSM-IV-TR or NINDS (McKhann et al., 1984; Roman et al., 1993) criteria and were excluded from the present study.

In regard to effort, the TOMM was the primary measure used in this study. Generally, if patients passed the TOMM, they were deemed to have provided adequate effort on cognitive testing; if patients failed the TOMM, they were regarded as having provided suboptimal effort. However, because symptom validity tests like the TOMM are administered during discrete periods within evaluations, it is possible that these measures are less effective in predicting variations in effort throughout testing periods. As such, it is possible that patients can fail the TOMM but be regarded as providing adequate effort. Conversely, patients can pass the TOMM but be regarded as providing suboptimal effort on the basis of other indicators of data invalidity.

Consistent with the multimethod approach recommended by Bush and colleagues (2005), determination of suboptimal effort was based on TOMM performance and any one or a combination of the following: Unusual error patterns across test items, neuropsychological deficits that were deemed disproportionate to observed or reported functional level, or impairment on testing that was inconsistent with known patterns of brain functioning. In this study, 17 patients passed the TOMM but were classified as having provided suboptimal effort. Some common reasons why these patients were deemed to have provided suboptimal effort include: Completion of tests in a hasty manner, very impaired memory test performance despite having provided detailed accounts of autobiographical information that were corroborated by reviews of medical records, and notable lack of engagement with the assessment toward the end of testing. The assignment of adequate or suboptimal effort was a decision made as a consensus of the team based on the entire clinical encounter and rendered prior to the present study.

Measures

Test of Memory Malingering. The TOMM (Tombaugh, 1996) was administered according to the standard instructions. This test consists of two trials and an optional retention trial. A score <45 on Trial 2 or the retention trial indicated suboptimal effort. Sixty-five (21%) of the participants were given only Trial 1 of the TOMM, but scored >45 on this trial, which suggests a 99% likelihood of passing the standard administration of the TOMM (Horner, Bedwell, & Duong, 2006; O’Bryant, Engel, Kleiner, Vasterling, & Black, 2007). The retention trial was not routinely administered to all patients.

Repeatable Battery for the Assessment of Neuropsychological Status. The RBANS (Randolph, 1998) is a brief, individually administered test battery composed of 12 subtests that yield index scores for the following cognitive domains: Immediate, Visuospatial/Construcational, Language, Attention, and Delayed Memory. A Total Scale index score, a composite of the five domains, is also provided. All tests were administered and scored following the test manual. Age-corrected index scores were analyzed in this study, which have a mean of 100 and a standard deviation of 15. As the current study is composed of patients who visited the MDC for the first time, only RBANS Form A was administered.

Geriatric Depression Scale. The GDS (Yesavage et al., 1983) is a 30-item questionnaire of depressive symptoms for older adults. It is provided in a yes/no format to facilitate ease of completion and excludes questions regarding somatic or vegetative symptoms of depression, which can overlap with symptoms of concurrent medical conditions common in older adults. The measure has demonstrated good sensitivity (75.3%) and specificity (77.0%) in detecting depression in geriatric settings (Wancata, Alexandrowicz, Marquart, Weiss, & Friedrich, 2006).
Analyses

Demographic (e.g., age, education, sex) and relevant descriptive information (e.g., GDS and MMSE scores) were examined using analysis of variance with post hoc testing and chi-squared analyses to identify possible covariates. Multivariate analyses of covariance were used with the total sample to test RBANS index score differences for the following comparisons: (1) NON and DEP, and (2) GDS-Normal, GDS-Mild, and GDS-Severe. Only when the overall multivariate analyses were statistically significant were the univariate results interpreted. Additionally, partial correlations controlling for age were conducted between RBANS index scores and GDS scores to examine whether results differed if psychometric data were treated as categorical or continuous variables, as both approaches have been used in previous research. All these analyses were repeated after patients who provided suboptimal effort were excluded.

Results

Demographic Characteristics

Groups were compared on demographic and clinical characteristics using independent samples t-tests and the Pearson chi-squared tests (Tables 1 and 2). None of the demographic and descriptive variables (i.e., years of education, gender, MMSE) significantly differentiated the groups, with the exception of age. For both the total sample and subsample of patients who provided adequate effort, the nondepressed (NON) and “normal” GDS scoring patients were older than the depressed groups to a statistically significant degree. Specifically, using the total sample (Table 1), the NON group was older than the DEP group, \( t(96) = 3.82, p < .001 \), and the GDS-Normal group was older than the GDS-Mild and GDS-Severe groups, \( F(2, 305) = 27.16, p < .001 \). A similar trend was found when patients who provided suboptimal effort were excluded (Table 2), wherein the NON group was significantly older than the DEP group, \( t(77) = 2.91, p < .01 \), and the GDS-Normal group was older than the GDS-Mild and GDS-Severe groups, \( F(2, 213) = 12.75, p < .001 \). Thus, age was used as a covariate in all subsequent analyses.

In general, the participants were elderly, almost exclusively male veterans who completed approximately a high-school education. Although this sample is predominantly male with the exception of very few female veterans, these patients were a subsample of all patients who have been consecutively seen in the MDC, of which 97.9% were men. Although GDS scores statistically differed between the comparison groups, GDS scores were not used as covariates, but were included in the tables for descriptive purposes.

RBANS Performance

Multivariate analyses of covariance (controlling for age) were used to compare the RBANS index scores of the following comparison groups: (1) NON and DEP, and (2) GDS-Normal, GDS-Mild, and GDS-Severe. The results of separate analyses using the total sample and the subsample of patients who provided adequate effort are presented in Tables 3 and 4.

Clinically diagnosed groups. A MANCOVA (controlling for age) was conducted to compare the NON and the DEP groups’ RBANS index scores. A statistically significant omnibus group difference was found between the groups: \( F(6, 90) = 5.58, p < .001 \), with significant univariate differences on all index scores except for the Visuospatial/Constructional index (Table 3). Specifically, the DEP group produced lower scores than the NON group with large effect size magnitudes for the following

| Table 1. Demographic and relevant descriptive information (total sample, including patients who provided adequate and suboptimal effort) |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Clinically diagnosed groups (M [SD]) | Psychometrically defined groups (M [SD]) |
| NON (n = 58) | DEP (n = 40) | GDS-Normal (n = 168) | GDS-Mild (n = 95) | GDS-Severe (n = 45) |
| Age | 70.16 (8.86)\(^A\) | 63.65 (8.07)\(^B\) | 73.42 (8.14)\(^B\) | 68.67 (9.18)\(^B\) | 63.32 (9.39)\(^B\) |
| Education | 13.56 (3.13) | 12.71 (2.95) | 12.23 (3.37) | 12.75 (3.25) | 12.49 (3.00) |
| Men (%) | 98.41 | 100 | 98.81 | 98.95 | 95.56 |
| MMSE | 27.98 (1.90) | 26.33 (2.79) | 25.83 (3.53) | 26.17 (3.75) | 25.48 (3.53) |
| GDS | 7.95 (5.84)\(^C\) | 18.73 (5.98)\(^C\) | 4.76 (2.57)\(^D\) | 14.01 (2.77)\(^D\) | 23.59 (2.65)\(^D\) |

Notes: NON = nondepressed disorder; DEP = depressed disorder; GDS = Geriatric Depression Scale; MMSE = Mini-Mental Status Exam. Means with superscripts in same-letter upper case represent significant differences between means at the \( p < .01 \) level.
Table 2. Demographic and relevant descriptive information (subsample of patients, excluding patients who provided suboptimal effort)

<table>
<thead>
<tr>
<th></th>
<th>Clinically diagnosed groups (M [SD])</th>
<th>Psychometrically defined groups (M [SD])</th>
<th>Pearson’s <em>r</em> (n = 308)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NON (n = 54)</td>
<td>DEP (n = 25)</td>
<td>GDS-Normal (n = 125)</td>
</tr>
<tr>
<td>Age (yr)</td>
<td>69.70 (8.75)</td>
<td>63.76 (7.62)</td>
<td>73.49 (8.00)</td>
</tr>
<tr>
<td>Education (%)</td>
<td>13.74 (3.17)</td>
<td>12.40 (3.24)</td>
<td>12.74 (3.30)</td>
</tr>
<tr>
<td>Men (%)</td>
<td>98.15</td>
<td>100</td>
<td>98.4</td>
</tr>
<tr>
<td>MMSE</td>
<td>28.04 (1.84)</td>
<td>27.20 (2.10)</td>
<td>26.94 (2.31)</td>
</tr>
<tr>
<td>GDS</td>
<td>7.74 (5.86)</td>
<td>17.33 (5.73)</td>
<td>4.83 (2.65)</td>
</tr>
</tbody>
</table>

Notes: NON = nondepressed; DEP = depressed; GDS = Geriatric Depression Scale; MMSE = Mini-Mental Status Exam. Means with superscripts in same-letter upper case represent significant differences between means at the p < .01 level, whereas means with superscripts in same-letter lower case represent significant differences between means at the p < .05 level.

Table 3. Mean RBANS index scores and correlations (total sample, including patients who provided adequate and suboptimal effort)

<table>
<thead>
<tr>
<th>RBANS index</th>
<th>Clinically diagnosed groups (M [SD])</th>
<th>Psychometrically defined groups (M [SD])</th>
<th>Pearson’s <em>r</em> (n = 308)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NON (n = 58)</td>
<td>DEP (n = 40)</td>
<td>GDS-Normal (n = 168)</td>
</tr>
<tr>
<td>Immediate Memory</td>
<td>89.19 (12.60)</td>
<td>75.55 (17.22)</td>
<td>75.88 (15.94)</td>
</tr>
<tr>
<td>Visuos./Constructional Language</td>
<td>93.41 (16.65)</td>
<td>91.78 (16.57)</td>
<td>82.98 (18.01)</td>
</tr>
<tr>
<td>Attention</td>
<td>95.83 (6.73)</td>
<td>89.33 (8.99)</td>
<td>88.12 (12.27)</td>
</tr>
<tr>
<td>Delayed Memory</td>
<td>95.83 (8.73)</td>
<td>92.90 (19.25)</td>
<td>76.30 (20.06)</td>
</tr>
<tr>
<td>Total</td>
<td>90.81 (8.27)</td>
<td>78.98 (12.82)</td>
<td>75.98 (14.97)</td>
</tr>
</tbody>
</table>

Notes: NON = nondepressed; DEP = depressed; GDS = Geriatric Depression Scale; RBANS = Repeatable Battery for the Assessment of Neuropsychological Status. Means with superscripts in same-letter upper case represent significant differences between means at the p < .01 level. *p < .05.

indices: Immediate Memory, *F*(1, 96) = 17.74, *p* < .001, *d* = 0.90; Language, *F*(1, 96) = 11.52, *p* = .001, *d* = 0.82; Attention, *F*(1, 96) = 15.19, *p* < .001, *d* = 0.97; Delayed Memory, *F*(1, 96) = 20.24, *p* < .001, *d* = 0.87; and the Total index score *F*(1, 96) = 24.91, *p* < .001, *d* = 1.10. Of the means for these indices, scores were in the borderline to low average ranges for the DEP group, and in the low average to average ranges for the NON group.

In contrast, when patients who provided suboptimal effort were excluded (Table 4), the MANCOVA conducted with this subsample yielded nonstatistically significant findings *F*(6, 71) = 2.12, *p* = .062, with both groups producing mean index scores in the low average to average ranges. Four patients from the NON group and 15 patients from the DEP group were excluded, indicating that 6.9% and 37.5% of patients from these groups provided suboptimal effort on testing, respectively.

Psychometrically defined groups. A MANCOVA (controlling for age) was conducted comparing RBANS index scores of the patients who were classified as GDS-Normal, GDS-Mild, or GDS-Severe. Regardless of whether the total sample or subsample of patients who provided adequate effort was analyzed, no statistically significant omnibus or univariate differences were observed, and the three groups produced mean index scores across the borderline, low average, and average ranges. Specifically, the MANCOVA was nonstatistically significant using the total sample, *F*(12, 580) = 1.64, *p* = .077, and subsample excluding patients who provided suboptimal effort, *F*(12, 410) = 0.99, *p* = .456. Forty-three patients from the GDS-Normal group, 26 patients from the GDS-Mild group, and 49 patients from the GDS-Severe were excluded, indicating that 25.6%, 27.4%, and 51.1% of patients from these groups provided suboptimal effort on testing, respectively.

In contrast, partial correlations (controlling for age) between GDS scores and RBANS index scores revealed that GDS scores were consistently, negatively correlated with the Attention Index even after excluding patients who provided suboptimal effort (Tables 3 and 4). This indicates that higher scores on the GDS correspond with poorer attention, although the strength of this association was quite low (i.e., *r* = −.11 and −.12).

Discussion

The current study examined the contribution of suboptimal effort to the cognitive differences between nondemented, depressed, and nondepressed elderly veterans referred to the MDC. Patients diagnosed with a clinically diagnosed depressive
do not necessarily produce impaired cognitive test scores that corroborate their prominent cognitive complaints (Fischer et al., 1997; Kindermann & Brown, 1997). Clinically diagnosed, depressed elderly veterans (inclusive of those who provided either adequate or suboptimal effort) performed more poorly than nondepressed elderly veterans on the RBANS in this study, whereas this trend was not reflected when classifying patients according to their depression scores via the GDS. It is possible that the criterion of impairment in social or occupational functioning that must be met for a DSM-IV diagnosis may make it more likely to identify patients who have more significant psychopathology and who demonstrate poorer performance on cognitive measures. Additionally, although GDS scores were correlated with attention in the expected direction, the magnitude of this association was quite low and may simply reflect a slightly slowed approach to testing. To our knowledge, this is the first study that has simultaneously used clinical diagnostic and psychometric strategies in identifying depression in investigating effort and cognitive deficits in an elderly veteran sample. Although it appears important to use both clinical diagnoses and psychometric data, future research on effort and how this relates to endorsement of depressive symptoms in older adults would further clarify these findings.

Some characteristics of this study limit the generalizability of the results. First, the patients in the current study were almost exclusively elderly male veterans referred to an MDC, and the nondepressed patients were significantly older and therefore cannot be considered matched controls. Since this archival study made use of data from consecutive patients who availed

### Table 4. Mean RBANS index scores and correlations (subsample of patients, excluding patients who provided suboptimal effort)

<table>
<thead>
<tr>
<th>RBANS index</th>
<th>Clinically diagnosed groups (M [SD])</th>
<th>Psychometrically defined groups (M [SD])</th>
<th>Pearsons r (n = 216)</th>
</tr>
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<td>NON (n = 54)</td>
<td>DEP (n = 25)</td>
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</tr>
<tr>
<td>Immediate Memory</td>
<td>89.31 (12.49)</td>
<td>83.88 (14.07)</td>
<td>80.32 (13.69)</td>
</tr>
<tr>
<td>Visuos./Constructional</td>
<td>93.76 (16.80)</td>
<td>94.80 (14.78)</td>
<td>86.98 (17.35)</td>
</tr>
<tr>
<td>Language</td>
<td>95.35 (6.49)</td>
<td>90.56 (8.76)</td>
<td>91.40 (8.20)</td>
</tr>
<tr>
<td>Attention</td>
<td>93.85 (13.01)</td>
<td>84.76 (12.51)</td>
<td>86.36 (14.45)</td>
</tr>
<tr>
<td>Delayed Memory</td>
<td>96.59 (8.06)</td>
<td>92.72 (11.12)</td>
<td>82.19 (16.60)</td>
</tr>
<tr>
<td>Total</td>
<td>91.04 (8.23)</td>
<td>85.44 (8.08)</td>
<td>80.93 (11.95)</td>
</tr>
</tbody>
</table>

Notes: NON = nondepressed; DEP = depressed; GDS = Geriatric Depression Scale; RBANS = Repeatable Battery for the Assessment of Neuropsychological Status.

*p < .05.
of the services of the MDC, improving the demographic diversity of our study was not possible as the decided majority of patients referred to this clinic were men. Thus, it is important that these findings be replicated in future research using a case–control prospective design with more demographically diverse patients in other clinical settings (e.g., outpatient mental health, inpatient psychiatry). In addition, by eliminating patients with poor effort, we reduced our sample size, which may have increased the likelihood of Type II error in our analyses. A larger sample size may be necessary to confirm our results.

Second, our study is limited in the use of a brief cognitive battery and reliance on one measure of effort, although these measures are well-validated and frequently used when the administration of a more comprehensive neuropsychological test battery is not possible (Humphreys, Dempsey, O’Bryant, & Sutker, 2006; Sharland & Gfeller, 2007). The RBANS does not assess executive functioning which has been shown to be impaired in depressed older adults (Alexopoulos et al., 2005), and neither does it include tests that may be more sensitive to subtle cognitive deficits in this population, such as perceptual auditory or attention and tracking tasks which have shown large effect sizes in previous meta-analyses (Christensen et al., 1997). Similarly, although the TOMM has demonstrated adequate classification accuracy in nondemented older adult samples, employing multiple sensitive tests of effort could detect more patients providing suboptimal effort, or increase the specificity of clinical judgments as to a patient’s effort on testing.

A third potential limitation is the methodology used in setting exclusionary and inclusionary criteria. In examining elderly veterans who met DSM-IV criteria for a depressive disorder (DEP), patients who concurrently met criteria for a cognitive disorder were excluded from analysis. Data from the RBANS were used to render the cognitive diagnoses, and as such, the diagnoses were not entirely independent of the test data and depressed elderly veterans who may have had bona fide cognitive impairment were excluded from the study. That is to say, it is possible that patients with a diagnosis of MCI or cognitive disorder NOS concurrently met criteria for a depressive disorder, but were not included in analyses, resulting in a group of depressed patients from which those with cognitive impairment had been excluded. As such, our findings may differ from other studies that opt to examine cognitive functioning in depressed older adults with comorbid cognitive disorders and could underestimate the effect of depression on cognition. This possibility was indirectly examined in subsequent analyses, as patients with cognitive disorders (i.e., MCI, cognitive disorder NOS) were among the sample of patients who were “psychometrically” classified using the GDS. Although it is possible that RBANS scores could have been influenced by the unequal representation of patients with psychiatric or cognitive disorders in the GDS-Normal, GDS-Mild, and GDS-Severe groups, χ²(12) = 43.24, p < .001, subsequent examination of the RBANS scores stratified according to the GDS category within each diagnostic group revealed that this is unlikely. Specifically, each diagnostic group (i.e., major depressive disorder, depression NOS or depression other than major depressive disorder, cognitive disorder NOS, mild cognitive impairment, diagnosis deferred, and no diagnosis) was examined individually and patients within each diagnostic group were stratified according to GDS scores. In doing this, we found that there were no significant differences between the GDS-Normal, GDS-Mild, and GDS-Severe groups on the RBANS scores within each diagnostic group. Thus, we assume that the disproportionate distribution of diagnoses within each GDS group did not systematically influence the current results.

Lastly, there was limited information regarding the depression diagnoses. As depression onset, recurrence, concurrent treatment, and psychopathologic comorbidity have some impact on the extent and type of cognitive deficits observed (Beaudreau & O’Hara, 2009; Kindermann & Brown, 1997), it is difficult to ascertain the degree to which the findings from this study will generalize to other depressed populations.

Despite these limitations, this study suggests the possibility that cognitive deficits previously attributed to depression in older adults might reflect suboptimal effort, although this may be more likely in elderly, predominantly male, veterans as in the patients comprising this study. Strengths of this study include having been conducted in a clinical setting where patients were referred generally at their own request or the request of their families. Study subjects were drawn from a large pool of clinic patients, all of whom underwent an identical, systematic assessment with final clinical diagnoses rendered according to the specific criteria in a collaborative team setting involving different specialists. The determination of suboptimal effort was a consensus determination and was therefore less likely to be biased by a single clinician or a single test.

Future studies attempting to replicate and expand these findings could include a comprehensive system or multimethod approach to assessing and identifying depression, as patients identified using a diagnostic system or by psychometric data may perform differently on cognitive tests. Other depression-specific factors (e.g., onset, recurrence, treatment) may moderate these differences and must be accounted for in future research. Most importantly, the findings of this study suggest that assessing for effort, even in the absence of overt secondary gains, is prudent when assessing cognitive functioning in depressed older adults, considering the potentially consequential rates of suboptimal effort in this population and the importance of minimizing the likelihood of ascribing incorrect cognitive diagnoses to patients.
Conflict of Interest

None declared.

References


