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Comparing Depression Screening Tools in Persons With Multiple Sclerosis (MS)

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Objective: Depression is more common among persons with multiple sclerosis (MS) than the general population. Depression in MS is associated with reduced quality of life, transition to unemployment, and cognitive impairment. Two proposed screening measures for depression in MS populations are the Hospital Anxiety and Depression Scale (HADS) and the Beck Depression Inventory-Fast Screen (BDI-FS). Our objective was to compared the associations of the BDI-FS and the HADS-D scores with history of depressive symptoms, fatigue, and functional outcomes to determine the differential clinical utility of these screening measures among persons with MS. ***Method:*** We reviewed charts of 133 persons with MS for demographic information; scores on the HADS, BDI-FS, a fatigue measure, and a processing speed measure; and employment status. ***Results:*** Structural equation modeling results indicated the HADS-D predicted employment status, disability status, and processing speed more effectively than did the BDI-FS, whereas both measures predicted fatigue. ***Conclusions:*** This study suggests the HADS-D is more effective than the BDI-FS in predicting functional outcomes known to be associated with depression among persons with MS.

Impact and Implications

Depression is common among people with MS, supporting the importance of screening. This article compares two common depression screening tools among people with multiple sclerosis. This study supports the use of the Hospital Anxiety Depression

Scale.

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Introduction

Multiple sclerosis (MS) is a chronic neurological disorder with a prevalence of 240 out of 100,000, affecting approximately three female persons to every one male in Canada, with similar ratios reported in American samples (C. A. Beck, Metz, Svenson, & Patten, 2005; Orton et al., 2006; Wallin, Page, & Kurtzke, 2004). Major depression is more common among community samples with MS (15.7%) than among the general population (7.4%), and populations with other chronic conditions (9.1%; Patten, Beck, Williams, Barbui, & Metz, 2003). Illness intrusiveness and uncertainty are related to psychological distress and mood disturbance in medical patients (Feinstein & Feinstein, 2001; Mullins et al., 2001). There is some evidence suggesting suicide attempt rates of 6.4% among samples with MS and reports of suicide representing the cause of death of 12% of the populations of two MS clinics, highlighting the need for effective clinical screening measures (Sadovnick, Eisen, Ebers, & Paty, 1991; Stenager et al., 1992). Depressive symptoms among persons with MS are associated with reduced quality of

life (Dubayova et al., 2013; Fernandez-Jimenez & Arnett, 2015). Further, depressive symptoms in MS have been prospectively associated with transitioning to unemployment (Pat- ten, Williams, Lavorato, Koch, & Metz, 2013). Correlational work has associated depressive symptoms among persons with MS with cognitive impairment, particularly in the area of processing speed (Diamond, Johnson, Kaufman, & Graves, 2008; Nunnari et al., 2015). Because MS populations are at high risk for depression and its associated quality of life and functional outcomes, clinical screening measures are important for early detection in order to promptly initiate and subsequently monitor treatment as indicated.

Accurate one-time clinical screening informs treatment plans for depressive symptoms and allows case triage in a manner that results in cost efficiency and the delivery of effective care (Shiner et al., 2014; Valenstein, Vijan, Zeber, Boehm, & Buttar, 2001). Some symptoms common to MS and depression, such as fatigue, can complicate the screening process (Beeney & Arnett, 2008; Rabinowitz, Fisher, & Arnett, 2011; Randolph, Arnett, Higginson, & Voss, 2000). Mohr initially suggested fatigue be removed from the Beck Depression Inventory for individuals with MS but later found a unique effect of depression on fatigue for those with MS and therefore decided to recommend the use of the full Beck Depression Inventory (Miller, Mohr, & Patten, 2014; Mohr et al., 1997; Mohr, Hart, & Goldberg, 2003). Two proposed screening measures for depression in MS populations are the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) and the Beck Depression Inventory–Fast Screen (BDI-FS; Beck, Steer, & Brown, 2000; see Benedict et al., 2002, 2006; Goldman Consensus Group, 2005). Both tests are short self-report measures, ideal for use in a clinical setting because they can be easily completed. The HADS is composed of two scales, one for depression (HADS-D), the other for anxiety (HADS-A). The HADS has been evaluated using clinical interviews within the MS populations and has strong sensitivity and specificity. The BDI-FS cutoff was validated on a general inpatient sample and only later among MS populations using depression history rather than an interview (A. T. Beck, Guth, Steer, & Ball, 1997; Benedict, Fishman, Mc- Clellan, Bakshi, & Weinstock-Guttman, 2003; Honarmand & Feinstein, 2009).

The goal of this study was to determine whether the clinical utility of the HADS-D

and BDI-FS were comparable, by examining the ability of the two screening tests to predict functional outcomes. We aimed to compare the associations of the BDI-FS and the HADS-D scores with history of depressive symptoms and fatigue and with functional outcomes such as employment, dis- ability, and processing speed in persons with MS.

Method

Participants

The present study is a chart review of 133 persons with MS seen in an MS cognitive clinic between January 2011 and December 2014. To be included, individuals had to meet the following criteria: (a) be between the ages of 18 –59, inclusive; (b) have an MS diagnosis of any type based on McDonald's (2010) criteria (Polman et al., 2011); (c) had not received corticosteroids in the last 30 days; (d) had achieved at least a ninth-grade education; and (e) be fluent in English. Persons with MS were not included if reported either of the following: (a) a history of a major psychiatric disorder such as bipolar disorder, schizophrenia or posttraumatic stress disorder or (b) daily significant marijuana use.

Measures

Demographics, MS history, Expanded Disability Status Scale (EDSS) score (Kurtzke, 1983), employment status, and history of depressive symptoms (previous diagnosis of depression or treatment with antidepressant drugs) were gathered from medical charts. Employment was categorized as either employed or unemployed.

HADS-D (Honarmand & Feinstein, 2009; Zigmond & Snaith, 1983). The full HADS is a 14-item scale, of which seven items constitute the depression subscale, answered on a scale from 0 to 3 resulting in total potential scores from 0 to 21. A cutoff of 8 was identified in a validation study as the most sensitive (90%) and specific (87.3%) criteria for depression screening in an MS population (Honarmand & Feinstein, 2009).

BDI-FS (A. T. Beck et al., 1997, 2000; Benedict et al., 2003). The BDI-FS is a seven-item version of the Beck Depression Inventory, with each item answered on a scale from 0 to 3 for a total potential score of 21. A validation study with a general

medical inpatient population suggested a cutoff score of 4 has been validated as sensitive (100%) and specific (89%) to the presence of diagnosable depression, so that score was used as a criterion in the present study (A. T. Beck et al., 1997; Strober & Arnett, 2015).

Fatigue Severity Scale (FSS; Krupp, LaRocca, Muir-Nash, & Steinberg, 1989). Fatigue was measured with the nine-item FSS, which has been validated in MS populations. Each item is scored using a Likert-style 1–7 scale, and total score is averaged for a range from 1 to 7.

Symbol Digit Modalities Test (SDMT; Rao, 1990). A measure of processing speed validated among persons with MS, the SDMT is recommended as one measure of cognition by consensus committee (Benedict et al., 2002, 2006).

Statistical Analysis

Pearson's correlation was used to examine the relationship between BDI-FS score, HADS-D score, FSS score, EDSS, vocational status, disease duration, and age. Independent-samples *t* tests were used to determine whether history of depression was associated with scoring differences on the HADS-D and the BDI-FS. Chi-square tests were used to test the association between validated cutoff scores (scoring 4+ on the BDI-FS or 8+ on the HADS-D, with cutoff scores indicative of possible clinical depression) and history of depression. Exploratory structural equation models were run to examine which depression measure better related to depression history and functional outcomes, specifically vocational status, EDSS score, FSS score, and SDMT performance, thereby accounting for shared associations between all the variables of interest in the study using age, education, gender, MS duration, and MS course as covariates.

Results

Participants were on average 46.5 (*SD* = 8.3) years of age with 13.8 (*SD* = 2.0) years of education. The majority of the sample was female (*n* = 100; 75.2%), and White (*n* = 122; 91.7%). Average time since diagnosis was 11.9 years (*SD* = 8.0); most (92; 69.2%) had a relapsing–remitting MS course. Median EDSS was 3.0 (range = .0 –

7.0). History of depression was indicated in $n = 36$ (27.1%) charts.

The HADS-D and the BDI-FS screening measures correlated strongly with one another, $r(133) = .7$, $p < .001$; see Table 1). Persons with MS and a history of depression had significantly higher scores on the HADS-D (history $M = 8.0$, $SD = 4.1$, vs. no history $M = 5.6$, $SD = 3.6$), $t(126) = 3.2$, $p = .002$, and on the BDI-FS (history $M = 6.2$, $SD = 4.5$, vs. no history $M = 4.0$, $SD = 2.8$), $t(126) = 3.4$, $p = .008$, than did those without a history of depression.

The HADS-D showed significant association with depression history, $x^2(1, N = 128) = 4.0$, $p = .047$. Nineteen (52.8%) persons with MS and a history of depression fell above the validated clinical cutoff score. Among persons with MS without history of depression, 61 (66.3%) scored below this cutoff. A cutoff score of 4 on the BDI-FS did not significantly associate with depression history, $x^2(1, N = 128) = 1.9$, *ns.*

Using structural equation modeling, we regressed the outcomes on the two measures of depression, beginning first with the BDI-FS and then the HADS-D so as to account for their shared association. Only one significant association emerged with BDI- FS, a positive correlate of fatigue ($b = .16$, [3 = .38, $z = 5.12$, $p < .05$), explaining 14.4% of variability. Next, we added the HADS-D as a predictor of the outcomes. The HADS-D did predict vocational status ($b = -.18$, [3 = -.25, $z = 2.20$, $p < .05$), EDSS ($b = .14$, [3 = .31, $z = 2.82$, $p < .05$), fatigue ($b = .14$, [3 = .37, $z = 3.75$, $p < .05$), and SDMT ($b = -.76$, [3 = -.25, $z = 2.21$, $p < .05$). The depression scales explained 4.8% of the variability in vocational status, 5.4% of the variability in EDSS, 22.1% for fatigue (an additional 7.7% more than the BDI-FS alone), and 3.7% of the SDMT variability.

Next, we tested a model wherein the outcomes were regressed on both depression scales controlling for the effect of depression history on depression. Depression history was a significant positive predictor of both BDI-FS ($b = 2.21$, [3 = .29, $z = 3.53$, $p < .05$) and the HADS-D ($b = 2.33$, [3 = .27, z = 3.32, $p < .05$), and the two depression scales were positively correlated with each other ($r = .65$, $p < .05$). The resulting model was a good fit to the data, $x^2(4, N = 123) = 4.71$, $p > .05$, comparative fit index (CFI) = .99, root-mean-square error of approximation (RMSEA) = .04, standardized root-mean-square residual (SRMR) = .03; see Figure 1). Finally, we added age, education, gender, MS duration, and MS course as covariates in the model

to see whether any of the associations between the depression scales and the outcomes changed. The correlation matrix lists the various associations be- tween the covariates and the outcomes (see Table 1). The associations between the depression scales and the outcomes did not change once the covariates were introduced. The final model remained a good fit to the data, $x^2(14, N = 123) = 17.48$, $p > .05$, CFI = .98, RMSEA = .05, SRMR = .05.

Discussion

The present study examined the relative ability of the HADS-D scale and the BDI-FS to predict functional outcomes. The HADS-D predicted outcomes including vocational status, EDSS, and processing speed more effectively than did the BDI-FS, whereas both measures predicted fatigue.

Depression history influenced scores on both screening measures. However, depression history influenced the average score to fall into the clinical range of the HADS-D but not the BDI-FS. This finding suggests that depression history should be considered, particularly when assessing depressive symptomatology using the HADS-D. The HADS-D significantly predicted vocational status, EDSS, fatigue, and processing speed impairment above and be- yond any association made using the BDI-FS, whereas the BDI-FS predicted fatigue only when associations with the HADS-D were considered. These findings are supported by past research suggest- ing depressive symptoms in MS predict job loss (Patten et al., 2013). Whereas people with MS tend to experience processing speed deficits, previous studies have suggested depression is as- sociated with further processing impairment (Diamond et al., 2008; Nunnari et al., 2015; Van Schependom et al., 2015). The HADS-D showed significantly greater association with functional outcomes, which support the convergent validity of the measure with established depression sequelae.

Although the association with depression correlates supports the utility of the HADS-D, the BDI-FS includes an item on suicidal ideation, which is clinically important due to relatively high suicide rates among persons with MS (A. T. Beck et al., 1997; Feinstein, 2002; Sadovnick et al., 1991; Stenager et al., 1992). Because the HADS-D does not feature any items measuring suicidal ideation, it is important for clinicians to

query suicidal ideation during interviews to supplement the measure.

Table 1
Correlations Between Participants Demographics and MS Characteristics

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Age (years)	—	-.08	-.05	.42**	.35**	-.13	.24**	.02	-.24**	-.16	-.10	.02
2. Education (years)	-.08	—	.26**	-.13	-.08	.20*	-.12	-.07	.32**	.01	-.04	-.01
3. Gender	-.05	.26**	—	.10	-.14	.10	-.04	-.05	.24**	-.10	-.15	.08
4. MS duration (years)	.42**	-.13	.10	—	.12	-.05	.30**	.05	-.13	-.19*	-.16	.08
5. MS course	.35**	-.08	-.14	.12	—	-.27**	.41**	.17	-.17	-.04	.09	-.01
6. Vocation	-.13	.20*	.10	-.05	-.27**	—	-.43**	-.32**	.26**	-.11	-.21*	-.05
7. EDSS	.24**	-.12	-.04	.30**	.41**	-.43**	—	.34**	-.29**	.02	.19*	.16
8. Fatigue	.02	-.07	-.05	.05	.17	-.32**	.34**	—	-.25**	.38**	.46**	.25**
9. SDMT	-.24**	.32**	.24**	-.13	-.17	.26**	-.29**	-.25**	—	-.05	-.17*	-.02
10. BDI-FS	-.16	.01	-.10	-.19*	-.04	-.11	.02	.38**	-.05	—	.67**	.29**
11. HADS-D	-.10	-.04	-.15	-.16	.09	-.21*	.19*	.46**	-.17*	.67**	—	.27**
12. Depression history	.02	-.01	.08	.08	-.01	-.05	.16	.25**	-.02	.29**	.27**	—
Mean	46.50	13.80	1.75	11.98	1.38	3.94	3.38	4.99	46.13	4.64	6.25	.28
SD	8.26	2.02	.43	8.01	.72	2.71	1.75	1.42	11.63	3.42	3.83	.45

Note. MS = multiple sclerosis; EDSS = Expanded Disability Status Scale; SDMT = Symbol Digit Modalities Test; BDI-FS = Beck Depression Inventory–Fast Screen; HADS-D = Hospital Anxiety and Depression Scale, Depression Scale.
* $p = .05$. ** $p = .01$.

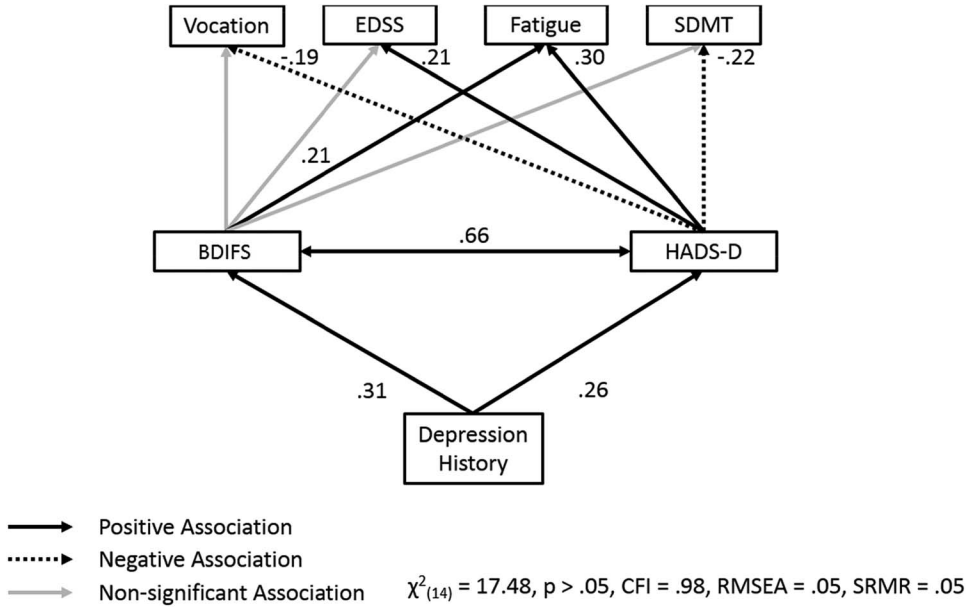

Figure 1. Final structural equation path model. EDSS = Expanded Disability Status Scale; SDMT = Symbol Digit Modalities Test; BDIFS = Beck Depression Inventory–Fast Screen; HADS-D = Hospital Anxiety and Depression Scale, Depression Scale; CFI = comparative fit index; RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual.

Limitations

This study has several limitations. First, this is a retrospective study. Second, due to availability of data we used a dichotomous depression history variable. This variable lacks detail on severity or frequency of depression. Because the present study featured only one time point, it is not possible to draw conclusions about the ability of either measure to predict future functional outcomes. Because the sample in the present study came from a hospital- based outpatient clinic, the severity of MS might be greater than in comparable community samples. As the sample was predominantly Caucasian, future research might examine the utility of depression screening instruments among people of other ethnic groups. In future research, larger randomized samples could be used to examine the relative validity of the screening instruments using other depression symptom correlates. Comparative validation studies might use interview-based depression assessments to understand which tests better capture the presence of major de- pressive episodes in order to inform appropriate clinical use.

Conclusions

Overall, findings of this study suggest the HADS-D is more effective than the BDI-FS at predicting functional outcomes known to be associated with depression among persons with MS. However, because the HADS-D lacks items assessing suicidal ideation, we suggest verbal screening for suicidal ideation among individuals with clinically significant depressive symptoms.

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