Published in final edited form as:

Top Stroke Rehabil. 2017 March ; 24(2): 114–118. doi:10.1080/10749357.2016.1198528.

Stress and Depression Scales in Aphasia: Relation between the Aphasia Depression Rating Scale, Stroke Aphasia Depression Questionnaire-10, and the Perceived Stress Scale

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Abstract

Background—Assessment and diagnosis of post-stroke depression (PSD) among patients with aphasia presents unique challenges. A gold-standard assessment of PSD among this population has yet to be identified.

Objectives—The first aim was to investigate the association between two depression scales developed for assessing depressive symptoms among patients with aphasia. The second aim was to evaluate the relation between these scales and a measure of perceived stress.

Method—Twenty-five (16 male; 9 female) individuals with history of left-hemisphere cerebrovascular accident (CVA) were assessed for depression and perceived stress using the *Stroke Aphasic Depression Questionnaire-10* (SADQ-10), the *Aphasia Depression Rating Scale* (ADRS), and the *Perceived Stress Scale* (PSS).

Results—SADQ-10 and ADRS ratings were strongly correlated with each other ($r = 0.708$, $p < 0.001$). SADQ-10 ratings were strongly correlated with PSS ratings ($r = 0.620$, $p = 0.003$), while ADRS ratings were moderately correlated ($r = 0.492$, $p = 0.027$). Item analysis of each scale identified items which increased both inter-scale correlation and intra-scale consistency when excluded.

Conclusions—The SADQ-10 and ADRS appear to be acceptable measures of depressive symptoms in aphasia patients. Measurements of perceived stress may also be an important factor in assessment of depressive symptoms.

Keywords

aphasia; depression; stress; stroke

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Conflict of Interest Statement: No conflict of interests or disclosures

Post-stroke depression (PSD) exists in one third of the stroke population,¹ however, additional reports indicate a much larger range of prevalence.² Because there is no “gold standard” for diagnosing PSD,³ differences in diagnostic methods may be the primary variable contributing to these numerical discrepancies. Behavioral observation, interview, questionnaires, and mood scales are the most commonly used diagnostic approaches, all having some disadvantages.^{4,5} Specifically, for a subpopulation of post-stroke patients demonstrating aphasia, a language disorder characterized by reading, writing, auditory comprehension, and verbal expressive impairments; the linguistic burden of many of these approaches complicates the accuracy of depression diagnosis in this group. Because depression is well-known as a contributor to poorer functional outcome in post-stroke recovery in general,^{6,7} and more specifically aphasia,^{8,9} it is important that a “gold standard” for accurate depression diagnosis in adults with aphasia is developed. Accurate diagnosis of depression will lead to better treatment which will result in better functional outcomes for adults with aphasia.

Although multiple depression or low mood scales/questionnaires have been used with the aphasia population,⁵ only a few proxy-based questionnaires have been developed specifically targeting adults with aphasia. The Stroke Aphasia Depression Questionnaire (SADQ/SADQ-10/SADQH-10)^{10,11} and the Aphasia Depression Rating Scale³ represent the available measures. The ADRS was developed in response to the SADQ series, as the authors of the ADRS point out the SADQ development was methodologically flawed because it was validated with depression measures standardized on non-aphasic patients. Both the ADRS and SADQ use observations by others to measure the presence or absence of depressive symptoms. However, the ADRS used a psychiatrist and the rehabilitation team in development of the measure and the SADQ/SADQ-10 used caregivers as raters. Neither measure has been directly compared with the other to evaluate their relation. A comparison may further lead to identification of the best route for accurate depression diagnosis in adults with aphasia.

Relatedly, assessment of perceived stress may contribute to the accurate diagnosis of depression in post-stroke patients. Recently, Laures-Gore and DeFife¹² found that the perception of stress as measured by the Perceived Stress Scale¹³ predicted depressive symptoms as measured by SADQ-10 in stroke patients. Indeed, perceived stress was a better predictor of depressive symptoms than severity of neurological impairment. Although a subset of the 31 participants in that study demonstrated aphasia, some of the participants did not. Whether perceived stress is a predictor of depressive symptoms in adults with aphasia should be further explored as it may lead to a different, and overlooked, route to accurate depression diagnosis in adults with aphasia. Perceived stress has been linked to depression in another population.¹⁴

The purpose of the current study is to (1) investigate the relation between two depressive symptoms scales developed specifically for the aphasia population in order to move toward a gold standard for depression diagnosis in aphasia; (2) evaluate the relation between the two depression measures and perceived stress in adults with aphasia. The latter will build upon earlier findings and may lead to further consideration of stress as a variable in diagnosing

depression. The current study is part of a larger project developing diagnostic indices for depression and stress in adults with aphasia.

Method

Participants

Participants were recruited through area speech-language pathology departments. Twenty-six adults consented to participation. One participant was excluded because documentation of stroke could not be obtained, resulting in a total of 25 participants (16 males; 9 females) with a history of one or more left-hemisphere strokes and aphasia. The mean age of participants was 48.69 years ($SD=13.75$; range = 19.95-70.57). The mean time since most recent stroke was 2.70 years ($SD=3.00$; range = 0.06-11.61). All participants reported receiving speech-language therapy services post-stroke. Thirteen participants reported they were currently receiving speech-language services. Aphasia type and severity, as determined by the *Western Aphasia Battery-Revised* (WAB-R)¹⁵ revealed the following: Broca's (N=6), Wernicke's (N=2), Conduction (N=2), and Anomic aphasia (N=15); mean Aphasia Quotient was 73.14 ($SD=22.55$; range = 22.0-99.4). According to the *WAB AQ* 1 participant demonstrated very severe aphasia, 4 severe aphasia, 5 moderate aphasia, 13 mild aphasia, and 2 were beyond the aphasia cut-off, however, they continued to self-identify as living with aphasia. Presence of dysarthria and apraxia of speech was determined by the *Frenchay Dysarthria Assessment*¹⁶ and the *Apraxia Battery for Adults—second edition*.¹⁷ Thirteen participants demonstrated a mild or mild-moderate dysarthria and 17 demonstrated some degree of apraxia of speech.

Medical history was used to confirm history of left hemisphere stroke. Eighteen participants provided a list of current medications. Ten were prescribed at least one medication commonly used to treat depression. Three participants self-reported a clinical diagnosis of depression post-stroke, while two participants reported a potential or pending diagnosis.

Measures and Procedures

Testing occurred during one session on the campus of Georgia State University. Participants were tested for aphasia using the *Western Aphasia Battery—Revised*.¹⁵ They were also assessed for stress (*Perceived Stress Scale*)¹³ and depression (*Stroke Aphasic Depression Questionnaire-10*; *Aphasic Depression Rating Scale*).^{10,3}

Western Aphasia Battery – Revised (WAB-R).¹⁵—The presence of aphasia was determined using the WAB-R. Subtest scores of spontaneous speech, auditory comprehension, repetition, naming, and word finding were used to classify aphasia type. Aphasia severity was determined using the WAB-R Aphasia Quotient.

Perceived Stress Scale (PSS).¹³—The PSS is a 14-item questionnaire regarding thoughts and feelings experienced over the past month. The PSS is scored by assigning a numeric value between zero and four. Seven of the items are scored such that “never” receives a score of zero and “very often” receives a score of four, while the remaining items are scored in reverse. Item scores are added to obtain a combined score, with a higher score indicating more stress. Seven of the items are scored in reverse. Investigators read

instructions aloud, including explanation of the ratings, and wrote the participants' responses. Participants were asked to rate how often each statement pertained to themselves within the last month by selecting "never," "almost never," "sometimes," "fairly often," or "very often." PSS scores were obtained for 22 participants. Three participants were unable to complete the scale.

The Stroke Aphasic Depression Questionnaire-10 (SADQ-10).¹⁰—The SADQ-10 is a 10-item questionnaire comprised of questions regarding the presence of depressive behaviors. It was developed using a sample of stroke patients with aphasia. The SADQ-10 is scored by assigning corresponding numeric values to observer selections ("Never" = 0, "Always" = 3), with a higher score indicating more depressive symptoms. In a subsequent study among patients without aphasia, a threshold of 14/30 was found to indicate clinically significant symptoms of depression (70% sensitivity and 77% specificity).¹⁸ The SADQ-10 was completed by the participant's caregiver or another individual with whom they had at least weekly contact. SADQ-10 scores were received for 24 participants.

Aphasic Depression Rating Scale (ADRS).³—The ADRS is a nine-item questionnaire that rates external symptoms of depression such as insomnia, weight loss, outward signs of anxiety, and fatigability. The ADRS is scored by adding item scores into a combined score, with a higher score indicating more depressive symptoms. The authors established a threshold of 9/30 to suggest the presence of depression (83% sensitivity and 71% specificity).³ The ADRS was completed by caregivers or another individual with at least weekly contact with the participant. Investigators provided explanations of unfamiliar terms when requested by respondents. Completed ADRSs were received for 23 participants.

Data Analyses

Pearson's correlation analysis was conducted to determine the associations between scores on the SADQ-10, ADRS, and PSS. Item analysis using inter-item correlation and Cronbach's alpha was conducted to determine reliability and validity of scale items. Analyses were completed using SPSS (v. 22).

Results

Cut-off scores for ADRS and SADQ-10 ratings were used to determine agreement among the two scales. The mean ADRS score was 7.48 (N=23). Ten participants obtained a score of nine or higher and received a positive depression marker. The mean SADQ-10 score was 14.42 (N=24). Twelve participants received a score of 14 or higher and received a positive depression marker. Ten participants met the threshold scores on both the ADRS and SADQ-10.

To determine the association between depression ratings, tests of correlation were performed. A Pearson correlation test was conducted among SADQ-10 and ADRS ratings for the entire sample. This resulted in a strong positive correlation ($r = 0.708$, $p < 0.001$). See Figure 1 for a scatter plot of SADQ-10 and ADRS scores. Additional Pearson correlation tests were used to determine the association between depression and stress ratings. SADQ-10 ratings correlated most strongly with the PSS ($r = 0.620$, $p = 0.003$). However,

ADRS ratings were also moderately correlated with PSS ratings ($r = 0.492$, $p = 0.027$). A post-hoc correlational analysis of the relation between other variables (age, WAB-AQ, time post-onset) with the ADRS, SADQ-10, and PSS ratings did not reveal significance (See Table 1).

Cronbach's alpha was calculated to evaluate the internal consistency of test items within both depression scales. Cronbach's alpha for SADQ-10 and ADRS were 0.793 and .671, respectively. Item-level analysis identified questions that decreased the internal consistency of each scale. Removal of question ten of the SADQ-10 resulted in a Cronbach's alpha of 0.828. Removal of question nine of the ADRS resulted in a Cronbach's alpha of 0.742.

To determine how the removal of unreliable items from each scale affected the strength of the associations among scales, additional tests of correlation were conducted. Scale sums excluding item ten of the SADQ-10 and item nine of the ADRS were used. The correlation between the SADQ-10 and ADRS increased ($r = 0.769$, $p < 0.001$). The correlation between the ADRS and the PSS decreased ($r = 0.468$, $p = 0.038$) as did the correlation between the SADQ-10 and PSS ($r = 0.597$, $p = 0.004$).

Discussion

The current study investigated the relation between two aphasia depressive symptoms rating scales and perceived stress. Findings indicate that the ADRS and the SADQ-10 are highly associated. Utilization of either scale in the process of identifying depressive symptoms in aphasia patients appears feasible. Removal of questions related to fatigability and activity improved the relation between the scales. This suggests that those questions should be further explored for inclusion, although previous work justifies their necessity.^{10,3}

Interestingly, the SADQ-10 captured high depressive symptoms in two participants not identified with the ADRS. This could reflect a cut-off score difference between the two scales and not a difference in content. The ten participants identified by both measures as having depressive symptoms were all receiving anti-depressants, but did not all self-report a current clinical diagnosis of depression. Although verification of presence or absence of a clinical depression diagnosis was not verified through medical records, it is notable that participants were already being treated pharmacologically for depression. Use of anti-depressants post-stroke is common and appears not to have any disadvantage for the patient.¹⁹

Additionally, the perception of stress in adults with aphasia predicts depressive symptoms in both the *ADRS* and *SADQ-10*. This finding supports and expands the previous results of Laures-Gore and Defife¹² indicating that the perception of stress is an important variable in the development of depression in not just stroke patients, but also patients with aphasia. This finding also aligns with recent work in the general area of post-stroke anxiety (PSA) and PSD. Anxiety and depression appear to be closely related post-stroke.²⁰ Perceived stress is related to anxiety.²¹ Although the current study did not directly assess anxiety, it is possible that those with higher levels of perceived stress could also have higher levels of anxiety contributing to higher depressive symptoms. Future work should include assessment of

anxiety in adults with aphasia to get a better understanding of mood disorders and the variables contributing to them.

Conclusion

As we move toward developing a gold standard for depression diagnosis in adults with aphasia, it appears the ADRS and the SADQ-10 are feasible candidates for identification of depressive symptoms as both demonstrate a strong relation. Furthermore, perceived stress may be a variable that should be considered in depression diagnosis as it is predictive of depressive symptoms in adults with aphasia.

Acknowledgments

Supported by the Emory-Georgia Institute of Technology Healthcare Innovation Program and the National Center for Advancing Translational Sciences of the National Institutes of Health under Award Number UL1TR000454. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

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Figure 1. A scatter plot of SADQ-10 and ADRS scores

Table 1
A correlation table of stress and depression scales

	SADQ-10	ADRS	PSS
SADQ-10	-	.708 **	.620 **
ADRS	.708 **	-	.492 *
PSS	.620 **	.492 *	-

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)