ABSTRACT

Background. The Overall Assessment of the Speaker's Experience of Stuttering for Adults (OASES-A; Yaruss & Quesal, 2016) is a widely used measurement tool designed to evaluate the adverse impact associated with stuttering. Items examine general perceptions of stuttering, personal reactions to stuttering, functional communication difficulties, and consequences for quality of life. This paper presents a shortened research version of the OASES-A response form (OASES-A-R) that can be used by researchers in scientific studies involving adults who stutter that reflect the Section and Total Scores of the original OASES-A using fewer items.

Method: Previously collected OASES-A data (N = 315) were analyzed via graded response modeling to identify discrimination values of each OASES-A item in measuring each OASES-A Section Total Score. Items with the highest discrimination and items judged to be more important in measuring adverse impact by expert clinicians (N = 27) were used to create a shortened OASES-A-R. The shortened OASES-A-R response form was then validated and compared to the full OASES-A response form in an independent sample (N = 156).

Results: The shortened 25-item OASES-A-R response form demonstrated very high and positive correlations with the full OASES-A response form. Similarly, each OASES-A-R Section demonstrated high internal reliability coefficients similar to those of the OASES-A.

Discussion: The resulting 25-item OASES-A-R response form provides a reflection of the speaker's experience of stuttering as measured by the original 100-item OASES-A that is

suitable for use in certain research studies of adults who stutter. Clinical use is not

recommended, as the full OASES-A provides additional insights about a client's experience of

stuttering that are necessary for effective treatment planning and intervention.

Keywords: Stuttering, Adverse Impact, OASES-A, OASES-A-R, Item Response Theory

1   The *Overall Assessment of the Speaker's Experience of Stuttering*™ (OASES™; Yaruss

2   & Quesal, 2006, 2016) is a measurement instrument that assesses the impact of stuttering on a

3   stutterer's life. The OASES is based on the World Health Organization's *International*

4   *Classification of Functioning, Disability, and Health* (ICF, WHO, 2001) to ensure a

5   comprehensive approach to understanding stuttering; it asks people who stutter about their

6   knowledge of stuttering, their reactions to stuttering, how much stuttering negatively impacts

7   their communication in daily situations, and how much their stuttering negatively affects their

8   quality of life. At the time of this writing, there are three published versions of the OASES used

9   for different age groups—School-Age (OASES-S; ages 7-12), Teen (OASES-T; ages 13-17), and

10   Adult (OASES-A; ages 18 +), with forthcoming versions that examine adverse impact in Early

11   Childhood (ages 3-6) as reported both by young children (OASES-E-C) and their

12   parents/caregivers (OASES-E-P; ages 3-6), as well as a version examining adverse impact of

13   stuttering on the family (OASES-F) (Yaruss & Yaruss, in prep). Many studies have used the

14   OASES-S, -T, or -A response forms in both research and clinical settings, and the protocols have

15   been translated to numerous languages.

16   The OASES-A response form contains 100 items in four sub-sections: General

17   Information, Speaker's Reactions to Stuttering, Daily Communication, Quality of Life. Items

18   were selected through an iterative analysis and revision process that involved focus groups,

19   several rounds of preliminary test data, and individual item analyses to ensure relevance to the

20   daily experiences of adults who stutter (Yaruss & Quesal, 2006, 2016). Because the main focus

21   of the OASES is to provide meaningful information about stuttering for use in a clinical setting,

22   items were included in the OASES protocols if they addressed a topic of clinical relevance for

23   people living with stuttering. Ample research has also shown that the OASES *also* provides

24   valuable information for research endeavors (e.g., Beilby et al, 2013; Bleek et al, 2012; Bricker-

25   Katz et al, 2009; Caughter et al, 2017; Euler et al, 2021; Ma et al, 2023; Samson et al, 2021;

26   Węsierska et al., 2023); however, the length of the response form may pose a potential barrier to

27   its use in some research contexts. Although the full OASES-A protocol typically requires only

28   15 to 20 minutes for respondents to complete, it would nevertheless be beneficial for researchers

29   to have access to a shorter, more focused version of the OASES-A response form that still

30   reflects participant's adverse impact of stuttering. Such an instrument would be beneficial for

31   research paradigms involving multiple instruments for which there may be time constraints or in

32   remote or survey-based studies where the full 100 item OASES-A may increase the risk of

33   attrition. Such an instrument would also be beneficial when researchers simply wish to

34   categorize participants into high versus low adverse impact, or where collecting a full clinical

35   profile of adverse impact is beyond the research questions of the study. Therefore, the purpose of

36   this study was to develop a research version of the OASES-A (hereafter, OASES-A-R) to aid

37   researchers in capturing adverse impact related to stuttering without requiring a research

38   participant to complete the full 100 item OASES-A measure.

39   **METHOD**

40   **Participants and Overall Procedures**

41   This study involved data from three samples of participants. Sample 1 included adults

42   who stutter (N = 315) who previously completed the OASES-A response form from the authors'

43   survey research in recent years. Sample 2 involved clinicians and researchers who are experts in

44   the area of stuttering (N = 27) who were selected by the authors based on their prior familiarity

45   and experience with using the OASES protocols. Of these experts, 25 respondents indicated that

46   they worked at a university, with a primary focus in research (N = 12), teaching (N = 4), clinical

47   work (N = 1), or multiple areas (N = 8). Experts also indicated various other workplaces,

48   including private practice (N = 5), hospital (N = 1), and school (N = 1); one respondent indicated

49   that they were retired (N = 1). Experts reported holding a master's degree (N = 7), clinical

50   doctorate (N = 1), and PhD or EdD (N = 20). Twelve reported having the certificate of clinical

51   competence (CCC) from the American Speech-Language and Hearing Association (ASHA), and

52   four reported that they were board certified (BCS-SCF) or held other international specialty

53   certifications. Sample 3 involved a second sample of adults who stutter (N = 156) who

54   completed the OASES-A for the purposes of validating the shortened measure. Table 1 presents

55   full demographic information for all three participant samples.

56   Each of the three participant samples was involved in one of the three arms of the study

57   based on established best practice for shortening clinical instruments (Goetz et al., 2013). The

58   first arm used graded response modeling (a form of latent variable modeling in Item Response

59   Theory, see Rizopoulos, 2006) to analyze previously collected OASES-A data (Sample 1) in

60   order to evaluate discriminability of each OASES-A item (i.e., how well the item loads on each

61   OASES-A Section Total Score). The second arm involved surveying expert clinician and

62   researchers to evaluate their opinions of how well each OASES-A item captures the construct of

63   adverse impact related to stuttering. Information from these two independent arms—one data-

64   driven (bottom-up, Sample 1) and one expert-oriented (top-down, Sample 2)— was used by the

65   authors to create a list of potential items to be tested for the shortened measure. This draft

66   research version of the OASES-A (OASES-A-R) was validated in an independent sample in the

67   third arm (Sample 3) and compared statistically and descriptively to the full OASES-A measure.

68   **The Surveys**

69   Adults who stutter (Sample 1 and Sample 3) completed the current, full, published

70   version of the *Overall Assessment of the Speaker's Experience of Stuttering- Adult* measure

71   (Yaruss & Quesal, 2016). The full OASES-A measure has previously been shown to be a reliable

72   measure of the impact stuttering has on a person's life (Yaruss & Quesal, 2006, 2016).

73   Expert clinicians and researchers (Sample 2) completed a modified version of OASES-A

74   response form in which the agreement or frequency 5-point Likert scales that appear in the

75   published version were replaced with a different 5-point scale designed to gauge importance of

76   the item in measuring of adverse impact related to stuttering (*Not Important, Of Little*

77   *Importance, Of Average Importance, Very Important, Absolutely or Critically Important*). Expert

78   clinicians and researchers were instructed that the purpose of completing this modified version of

79   the OASES-A was to assist in the development of a shorter research version of the measure that

80   would be based, in part, on their expert opinions about the existing items. Participants were also

81   provided the following definition of adverse impact before they evaluated the items:

82   The OASES is designed to capture a stutterer's adverse impact related to stuttering. We

83   define adverse impact related to stuttering as the summative effect of the negative

84   thoughts, feelings, and behaviors that a person develops in reaction to the underlying

85   impairment, combined with the real-world limitations that result from living with the

86   stuttering condition (Tichenor & Yaruss, 2019; Yaruss & Quesal, 2004).

87   **Data Collection and Analysis**

88   All three surveys described above were collected via Qualtrics, and data were analyzed in

89   R Studio (Qualtrics, 2023; R Core Team, 2023). Multiple R packages were used for data

90   management, analysis, and visualization (car; Fox & Weisberg, 2019; ggpubr; Kassambara,

91   2020; sjPlot; Ludecke, 2020; ggiraphExtra; Moon, 2020; psych; Revelle, 2022; ltm; Rizopoulos,

92   2006; tidyverse; Wickham et al., 2019).

93   ***Data Analysis Procedures for OASES-A Data from Adults who Stutter, Sample 1***

94   Given that OASES-A data is polytomous (i.e., it is ordinal and consists of 5-point Likert

95   scales), a Graded Response Model was used for parameter estimation (Rizopoulos, 2006), where

96   each parameter was one of the four OASES Section Total Scores (4 individual latent variables).

97   Estimating parameters in each OASES sub-section preserved the theoretical structure of the data

98   in accordance with the ICF (Yaruss & Quesal, 2004), and follows best practices in shortened

99   scale development (Goetz et al., 2013). Constrained and unconstrained models were calculated

100   for each of these five models. Constrained models assume an equal discriminability across all

101   questions while unconstrained models do not (Rizopoulos, 2006). Each constrained and

102   unconstrained pair were compared for model fit. In each pair, the unconstrained model fit

103   significantly better ($p < .001$) and was used for all subsequent analyses.

104   Each unconstrained model yielded a discrimination value, which indicated how good an

105   item was at discriminating among respondents in regard to the underlying latent variable. This

106   discrimination value was interpreted via the suggestions of Baker (2018) to yield no (0), very

107   low (.01 - .34), low (.35 - .64), moderate (.65 – 1.34), high (1.35 – 1.69), and very high (> 1.7)

108   discrimination. (See supplementary tables ST1-ST4 for graded response model results. For an

109   example of an item with very high discrimination, see Figure 1.) The item response category

110   characteristic curve plots the probability of each Likert response at different levels of the latent

111   variable, indicating that the item itself is very good at measuring levels of the latent variable.

112   These raw discrimination values were tabulated, and items with high or very high discrimination

113   were considered for inclusion in the OASES-A-R response form.

114   Test Information Function Curves concatenate information about how well each item

115   measures the latent variable (i.e., the respective section of the OASES-A response form). If the

116   response scales were capturing normally distributed data, this line would peak at midline. Figure

117   2 presents these plots for the four OASES sections with data collected from Sample 1. These

118   plots were later visually compared to the plots made from the shortened measure as a validity

119   check. Finally, Spearman correlations were run comparing the OASES-A-R Section Total Scores

120   with the corresponding OASES-A Section Total Scores from the full OASES-A measure as a

121   final validity measure.

122   *Data Analysis Procedures, Expert Opinion, OASES-A-R Creation*

123   The Sample 2 raw data from the 27 expert clinicians and researchers were graphed

124   visually to determine which OASES-A items were judged to be more or less important in

125   measuring the construct of adverse impact (See Supplementary Data, Figures SF1-SF4). The

126   items that showed the highest level of discrimination and were judged to be most important by

127   expert judges were considered by the authors for possible inclusion in the OASES-A-R response

128   form. Both authors retained a balance of items across the four sub-sections of the OASES to

129   retain the factor structure. The first author created a preliminary list of 20 items for retention,

130   while the second author's list contained 30 items. Through a discussion, a consensus was formed

131   and a final 25-item OASES-A-R was created.

132   *Data Analysis Procedures, OASES-A-R Validation*

133   This OASES-A-R response form was validated with a new sample of adults who stutter

134   who completed the full OASES-A response form (Sample 3). Spearman Rank Correlation

135   Coefficients were computed for each OASES-A-R and OASES-A Section Score and Total

136   Score. Finally, Cronbach's alpha was computed as a final comparison between Sample 1

137   OASES-A and Sample 3 OASES-A-R data.

138

139   **RESULTS**

140   The resulting OASES-A-R response form contains four items from Section 1, eight items

141   from Section 2, six items from Section 3, and seven items from Section 4. These items cover

142   various aspects of the adverse impact of stuttering, including self-perceptions of stuttering or

143   speaking ability; negative thoughts, feelings, and behaviors that people who stutter may develop;

144   difficulty that people may have when communicating in various contexts; and ratings of how

145   much stuttering interferes with a person's quality of life.

146   The Test Information Function Curves were plotted from the OASES-A-R data collected

147   from Sample 3 (see Figure 3), with the peak at or near midline indicated. Visually, these Test

148   Information Function Curves resemble the data from Sample 1 (see Figure 2). Spearman rank

149   correlation coefficient calculations also similarly yielded very strong, positive, near monotonic

150   relationships between the shortened OASES-A-R and OASES-A Section Scores for *General*

151   *Information* ($r_s = .86$, $p < .001$), *Speaker's Reactions* ($r_s = .95$, $p < .001$), *Daily Communication*

152   ($r_s = .91$, $p < .001$), and *Quality of Life* ($r_s = .96$, $p < .001$). The Spearman correlation between

153   OASES-A-R Total Score and OASES-A Total Score was also very strong ($r_s = .97$, $p < .001$).

154   These correlations are visualized in Figures 4 and 5.

155   Internal reliability coefficients were calculated to compare OASES-A (Sample 1) and

156   OASES-A-R (Sample 3) data. Internal consistently was good to excellent OASES-A data from

157   Sample 1: *General Information* ($\alpha = .84$), *Speaker's Reactions* ($\alpha = .95$), *Daily Communication*

158   ($\alpha = .94$), and *Quality of Life* ($\alpha = .97$). Internal consistently was good to excellent OASES-A-R

159   data from Sample 3: *General Information* (α = .83), *Speaker's Reactions* (α =.88), *Daily*

160   *Communication* (α = .84) and *Quality of Life* (α = .93). These data indicate that the 25-item

161   OASES-A-R is a valid and internally consistent measure of adverse impact related to stuttering.

162

163   **DISCUSSION**

164   This study was designed to develop a shortened version of the OASES-A response form

165   (OASES-A-R) that scientists can use in certain research contexts when they want a briefer yet

166   still valid method for measuring the adverse impact of stuttering (OASES-A-R). The procedures

167   involved three components: (a) an analysis of previously collected OASES data, (b) an expert

168   analysis of each item in the original OASES-A response form to determine which items were

169   judged to be highly reflective of adverse impact, and (c) an analysis of newly collected data for

170   which the subset of potential items in the OASES-A-R were compared to the full OASES-A

171   dataset. These analyses resulted in a subset of 25 items in the OASES-A-R response form that

172   adequately represent the overall adverse impact of stuttering as measured in the full OASES-A

173   protocol. Appropriateness of the shortened OASES-A-R response form was confirmed through

174   Test Information Function Curves, correlations, and internal reliability and consistency

175   analyses—all in accordance with best practices in scale reduction in Item Response Theory.

176   The authors are *not* proposing that the OASES-A-R response form take the place of the

177   original OASES-A response form. As described in prior publications (e.g., Yaruss & Quesal,

178   2006, 2016), an intentional decision was made during the development of the original OASES-A

179   response form to include certain items that reflected the broader experience of stuttering even if

180   those items were judged to relate highly to other items or possess item characteristics that were

181   less-than-optimal. This was done specifically to retain information about stuttering that was

182   judged to be important for both scientific and clinical purposes. Therefore, it is still

183   recommended that researchers use the full OASES-A response form when a complete clinical

184   profile of adverse impact is warranted and appropriate for their research questions. Similarly, the

185   original OASES-A response form should be used in clinical settings because it provides valuable

186   information that is necessary for appropriate treatment planning and intervention.

187   The shortened OASES-A-R response form should be viewed as an *option* that researchers

188   can select intentionally, based on their research questions and other study considerations to gain

189   a measure of adverse impact when the 15 to 20 minute administration time of the original

190   OASES-A might pose a barrier. (The estimated time required for completing the OASES-A-R is

191   3 to 5 minutes.) The development and validation results outlined in this paper show that OASES-

192   A-R scores will approximate those of the full OASES-A administration, and this will help

193   researchers incorporate the study of adverse impact into their investigations in cases where they

194   might not otherwise do so.

195   Future investigations can apply similar methods for the development of research versions

196   of the other OASES response forms (e.g., those for younger respondents). Researchers should

197   continue to evaluate the extent to which the OASES protocols accurately reflects the experiences

198   of people who stutter, so that improvements can be made in the field's understanding of

199   stuttering from the perspective of individuals who stutter. Such future endeavors will add to the

200   field's growing knowledge of adverse impact related to stuttering, improve the assessment of

201   adverse impact, and improve understanding of the various ways in which different individuals

202   experience stuttering.

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Figure Captions:

Figure 1: Figure 1 represents an example response category characteristic curve which plots the probability of each Likert response at different levels of the underlying latent variable (i.e., the OASES-A Section Total Score from which the item resides). As can be seen by the non-overlapping peaks, each level of the Likert scale responses for this item captures different levels

of the latent variable, suggesting this item has a high discriminability in measuring the latent variable.

Figure 2: The Test Information Function Curves for each of the four OASES-A sections are plotted.

Figure 3: The Test Information Function Curves for each of the four OASES-A-R sections are plotted.

Figure 4: Spearman rank correlations are plotted comparing the OASES-A and OASES-A-R Section Total Scores (Section 1: quadrant 'a'; Section 2: quadrant 'b'; Section 3: quadrant 'c'; Section 4: quadrant 'd'). As can be seen from each of the plots, both the full and reduced measures demonstrate very strong and positive relationships.

Figure 5: A Spearman rank correlation was calculated and plotted comparing the OASES-A Total Score with the OASES-A-R Total Score. As can be seen from the plot, the full and reduced measure's Total Score demonstrates a very strong and positive relationship.

Demographic Variable	Adult Stutterers, Sample 1 (n=315)	Clinicians & Researchers, Sample 2 (n=27)	Adult Stutterers, Sample 3 (n=156)
Age			
Mean(Standard Deviation)	42.68 (17.13)	47.32 (10.8)	45.21 (17.59)
Range, min-max	70, 18 - 86	38, 33 - 71	70, 18 - 86
Sex			
Female	85 (27.0%)	19 (70.4%)	46 (29.5%)
Male	139 (44.1%)	8 (29.6%)	98 (62.8%)
Prefer not to say/Missing Data	91 (28.9%)	0 (0.0%)	12 (7.7%)
Gender			
Female	82 (26.0%)	18 (66.7%)	43 (27.6%)
Male	137 (43.5%)	8 (29.6%)	98 (62.8)
Non-Binary/Third Gender	4 (1.2%)	0 (0.0%)	5 (3.2%)
Prefer not to say/Missing Data	92 (29.2%)	1 (3.7%)	10 (6.4%)
Racial Category			
Asian	6 (1.9%)	2 (7.4%)	9 (5.8%)
Black or African American	8 (2.5%)	1 (3.7%)	3 (1.9%)
American Indian or Alaskan Native	0 (0.0%)	0 (0.0%)	0 (0.0%)
White	196 (62.2%)	24 (88.9%)	123 (78.9%)
Mixed/Other	13 (4.1%)	0 (0.0%)	12 (7.7%)
Prefer not to say/Missing Data	92 (29.2%)	0 (0.0%)	16 (10.3%)
Ethnicity			
Hispanic or Latinx	15 (4.8%)	1 (3.7%)	13 (8.3%)
Not Hispanic or Latinx	210 (66.7%)	26 (96.3%)	134 (85.9%)
Prefer not to say/Missing Data	90 (28.6%)	0 (0.0%)	9 (5.8%)
History of Therapy			
Yes	194 (61.6%)	*	133 (85.3%)
No	28 (8.9%)	*	13 (8.3%)
Prefer not to say/Missing Data	92 (29.5%)	*	10 (6.4%)
History of Self-Help/Support			
Yes	194 (61.6%)	*	89 ((57.1%)
No	28 (8.9%)	*	58 (37.2%)
Prefer not to say/Missing Data	92 (29.5%)	*	9 (5.8%)
Country/Continent of Origin			
United States of America	288 (67.5%)	20 (74.1%)	108 (69.2%)
North America (Not USA)	7 (2.2%%)	0 (0.0%)	4 (2.6%)
Europe	31 (9.8%%)	4 (14.8%)	21 (13.5%)
South America	1 (<1.0%)	0 (0.0%)	1 (<1.0%)
Asia	6 (1.9%%)	0 (0.0%)	4 (2.6%)
Africa	0 (0.0%)	0 (0.0%)	1 (<1.0%)
Australia (or Oceania)	2 (<1.0%)	2 (3.7%)	2 (1.3%)
Prefer not to say/Missing Data	89 (28.2%%)	1 (3.7%)	15 (9.6%)

Note: * indicates question not asked