Original Article

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Stuttering severity in adults: is there an association between self-report and clinical assessment?

Gravidade da gagueira em adultos: existe associação entre autorrelato e avaliação clínica?

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ABSTRACT

Purpose: To verify the association between the self-reported degree of stuttering severity, the stuttering severity index, and the percentage of speech discontinuity in adults who stutter. **Methods:** Cross-sectional, analytical, observational study that analyzed fluency and stuttering severity in 56 adults who self-reported stuttering. Participants completed a sample characterization questionnaire and underwent spontaneous speech recording via Zoom. Fluency was analyzed using the Fluency Profile Assessment Protocol, considering 200 fluent syllables. Severity was assessed using the Stuttering Severity Instrument, examining frequency, duration of disfluencies, and physical concomitants. Data were analyzed using SPSS software, with the chi-square and Kruskal-Wallis tests, considering $p \leq 0.05$. **Results:** There were significant associations between the self-reported degree of stuttering severity and the percentage of speech discontinuity ($p = 0.020$), and between the severity index and the percentage of speech discontinuity ($p = 0.001$). **Conclusion:** The study highlights the relevance of aligning self-perception with the assessment of stuttering severity, demonstrating the need to understand the individuals in their entirety, from a broad biopsychosocial perspective.

Keywords: Speech, Language and Hearing Sciences; Language; Stuttering; Childhood-onset fluency disorder; Self report

RESUMO

Objetivo: verificar a associação entre o grau autorrelatado de gravidade da gagueira, o índice de gravidade da gagueira e o percentual de descontinuidade de fala de adultos que gaguejam. **Métodos:** estudo observacional analítico transversal que analisou a fluência e a gravidade da gagueira em 56 adultos autorrelatados com gagueira. Os participantes preencheram o questionário de caracterização da amostra e foram submetidos à gravação de amostras de fala espontânea pela plataforma *Zoom*. Para análise da fluência, utilizou-se o Protocolo de Avaliação do Perfil da Fluência, considerando 200 sílabas fluentes. A gravidade foi avaliada pelo *Stuttering Severity Instrument*, examinando frequência, duração das disfluências e concomitantes físicos. Os dados foram analisados no *software* SPSS, com os testes Qui-quadrado e Kruskal-Wallis, considerando $p \leq 0,05$. **Resultados:** houve associações significativas entre o grau autorrelatado de gravidade da gagueira e o percentual de descontinuidade de fala ($p=0,020$), e entre o índice de gravidade e o percentual de descontinuidade de fala ($p=0,001$). **Conclusão:** o estudo destaca a relevância de alinhar a autopercepção com a avaliação de gravidade da gagueira, evidenciando a necessidade de compreender o indivíduo integralmente, em uma perspectiva biopsicossocial ampla.

Palavras-chave: Fonoaudiologia; Linguagem; Gagueira; Transtorno da fluência com início na infância; Autorrelato

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INTRODUCTION

Stuttering, or childhood-onset fluency disorder, is identified by involuntary disruptions in the flow of speech, characterized by repetitions of monosyllabic sounds, syllables, and words, blocks, prolongations, extended pauses, and intrusions, which interrupt the continuous and smooth flow of speech[1]. It can be defined as the result of a genetically based dysfunction of the central nervous system, which typically appears between 18 months and 7 years of age, during the period of language development[2]. The disorder becomes chronic in approximately 20% of cases, resulting in a prevalence of 1% in adulthood, with a higher incidence in males[2].

Disfluency in stuttering has varied frequency, intensity, and duration. It can vary significantly depending on the day and the situation experienced by the speaker[3], which can be challenging for a person who stutters, since the variability and inconsistency of manifestations are frequent. The variability of stuttering is influenced by contextual factors such as the situation in which the speaker communicates, stress, emotional, linguistic, and paralinguistic aspects[3]. However, there is insufficient evidence to calculate the magnitude and effect of stuttering variability from one day to the next or over a week. This can affect analyses in clinical treatment and research, as well as the self-perception of the speaker who stutters[3]. In turn, severity can be perceived in different ways (by the subject themselves and by objective measures)[4].

According to evidence-based practice, the evolution of a clinical case should be assessed considering the person's and the therapist's perspectives to adapt the treatment to each patient's needs[4]. Thus, investigating the self-reported severity of stuttering is an important and reliable clinical tool for data collection and provides the clinician with the perception that speakers have about their own stuttering[5].

The severity of stuttering is generally assessed by the frequency and intensity with which disfluencies occur[3]. According to a previous study[6], there are three widely used instruments in the assessment of stuttering: the Stuttering Severity Instrument-4 (SSI-4)[7], the Overall Assessment of the Speaker's Experience of Stuttering (OASES)[8], and the Unhelpful Thoughts and Beliefs About Stuttering (UTBAS)[9]. SSI-4 assesses fluency by considering the frequency and duration of typical stuttering disruptions and the presence of associated physical components in spontaneous speech and reading. It defines severity as very mild, mild, moderate, severe, and very severe[10]. The OASES is based on the International Classification of Functioning, Disability, and Health and includes the speaker's self-perception of their fluency, naturalness of speech, knowledge about the disorder, general attitudes about stuttering, affective, behavioral and cognitive reactions, functional communication difficulties, and judgment on how stuttering affects overall quality of life[8]. The UTBAS measures speech-related anxiety in the person who stutters[11]. Assessments play an important role in the initial stage of diagnosis and in the evolution of the disorder, with the percentage of typical stuttering disfluencies considered the gold standard for behavioral assessment of this fluency disorder[12]. Moreover, the classification of stuttering severity is indicated in the diagnostic process.

The use of standardized tests in fluency assessment facilitates analysis and comparison with standardization[13]. The Fluency Profile Assessment Protocol (FPAP)[14] is widely used in Brazil for analysis, considering the speech rate, the typology of disfluencies (common and typical stuttering disfluencies), the percentage of speech discontinuity, and the percentage of typical stuttering disfluencies[14]. The typology of disfluencies is characterized by disruptions in the flow of speech that may be present in different stuttering patterns[15]. These include hesitations, interjections, revisions, unfinished words, and repetitions of words, segments, and phrases. These disfluencies are common in the speech of all people and reflect both linguistic uncertainties and attempts to make the message more understandable[16]. The typical disfluencies of stuttering occur most frequently in the speech of individuals who stutter, constituting the main criterion for the diagnosis of this disorder. They include repetitions of sounds, syllables, parts of words and monosyllabic words, blocks, intrusions of sounds and segments, prolongations, and pauses of more than 2 seconds.

When assessing stuttering in adults, it is important to consider not only typical but also common disfluencies. While the former are the first clinical markers of stuttering, common disfluencies can also affect the perception of speech naturalness and the individual's communicative experience. Stuttering in adulthood presents peculiarities that go beyond counting disfluencies, as they involve biopsychosocial aspects that significantly interfere with quality of life.

One's perception of their stuttering does not always align with the degree of disfluency. Furthermore, the literature still lacks research that systematically relates the objective assessment of disfluencies and speech discontinuity to the self-report of stutterers. Considering that the communicative effect perceived by adults who stutter may differ from traditional clinical analysis, understanding this relationship is essential to facilitate appropriate therapeutic intervention. Therefore, this study is justified by the need to expand knowledge about the severity of stuttering in adults and to verify whether severity is associated with parameters related to speech discontinuity and typical stuttering disfluencies analyzed using the SSI-4, which can contribute to more effective, parameterized, and individualized clinical practices.

After discussing reports regarding the severity of stuttering and the importance of considering self-perceived and self-reported stuttering manifestations in speech-language-hearing therapy, this study presents its objective: to verify the association between the self-reported degree of stuttering severity, the stuttering severity index, and the percentage of speech discontinuity in adults who stutter.

METHODS

This is an analytical, observational, cross-sectional study, approved by the Research Ethics Committee of the Federal University of Minas Gerais (CEP/UFMG), through protocol CAAE 32144820.7.0000.5149. The sample consisted of 56 adults aged 18 to 54 years, recruited through social media (Instagram and Facebook), announcing therapeutic workshops promoted by a university outreach and research project, with a mean age of 29.09 years, a standard deviation of 9.27, and a median of 27.00 years. Most participants were female (53.6%).

Participants signed an informed consent form and completed the questionnaire for sample characterization (sex, age, and self-reported degree of stuttering), sent via Google Forms. Inclusion criteria were completion of the questionnaire and

recording of a speech sample for fluency analysis, using the FPAP[14] and SSI-4[7], presenting at least 3% of typical stuttering disfluencies in spontaneous speech on the FPAP. Exclusion criteria were cognitive impairment and other associated language and neurodevelopmental disorders (self-reported). Thus, the following variables were considered: the severity index (SSI-4), the self-reported degree of stuttering severity, and the percentage of speech discontinuity.

Data were collected via videoconference (audio and video), using the Zoom platform to record spontaneous speech samples elicited by the request to give a personal presentation addressing aspects of work, study, and family life.

The first 200 fluent syllables of the samples were transcribed and analyzed for speech fluency profile analysis, as indicated in FPAP[14]. The number of typical stuttering disfluencies and other disfluencies (or common disfluencies) was verified to calculate the percentage of speech discontinuity – i.e., the rate of disruptions in discourse. The percentage was calculated based on the total number of syllables in the sample (200), applying the percentage relationship to the total number of disruptions.

The severity of stuttering was analyzed with SSI-4[7], verifying (1) the frequency of typical stuttering disruptions (corresponding score in spontaneous speech); (2) the duration of disfluency events, with the score calculated as the average of the three longest events in seconds; and (3) the score of concomitant physical symptoms observed in the sample. Each participant's stuttering severity index was determined by summing the scores obtained from the three initial parameters, classified as very mild, mild, moderate, severe, and very severe. The data were tabulated and recorded in a Microsoft Excel database.

The self-reported stuttering severity level was considered as the response variable, and sex, age, percentage of speech discontinuity, and stuttering severity index were considered as explanatory variables. For better analysis, the variables "self-reported stuttering severity level" and "stuttering severity index" were grouped as very mild/mild = mild; moderate; and severe/very severe = severe.

A descriptive analysis of the data was performed to meet the study objective, using the frequency distribution of categorical variables and analysis of measures of central tendency and dispersion of continuous variables.

Pearson's chi-square and Kruskal-Wallis tests were used for association analyses. The non-parametric Kruskal-Wallis test was used because the non-numerical variables did not present a normal distribution, confirmed by the Shapiro-Wilk and Kolmogorov-Smirnov tests, whose values were less than 0.05. Results with a p-value ≤ 0.05 were considered significant. In the case of the Kruskal-Wallis test, if the result was significant ($p \leq 0.05$), the multiple comparisons test (Nemenyi test) was performed to identify in which pair(s) the associations were significant – i.e., likewise with $p \leq 0.05$. The SPSS software, version 25.0, was used for data entry, processing, and analysis.

RESULTS

Most participants self-reported moderate stuttering (69.6%), while the majority had a mild stuttering severity index (58.9%). The mean percentage of speech discontinuity was 21.41, standard deviation 12.76 (Table 1).

Self-reported stuttering severity was statistically significantly associated with stuttering severity index ($p = 0.002$). Since the table is not 2 x 2, it was not possible to indicate the trend of the association. However, all participants who self-reported mild stuttering were classified as mild in the stuttering severity index. Also, 37 participants who reported moderate stuttering and five who reported it as severe had different SSI-4 results. The other associations had no statistically significant results (Table 2).

The Kruskal-Wallis test, using the association analysis between self-reported stuttering severity, age, and speech discontinuity percentage, revealed statistical significance between self-reported stuttering severity and speech discontinuity percentage ($p = 0.020$). The Nemenyi test showed that the difference lay between self-reported mild and severe stuttering, with a higher median for severe. The other associations had no statistically significant results (Table 3).

The association analysis between stuttering severity index and sex (using Pearson's chi-square test), age, and percentage of speech discontinuity (using the Kruskal-Wallis test) revealed a statistically significant result between stuttering severity index and percentage of speech discontinuity ($p = 0.001$). The Nemenyi test showed that the difference lay between the mild and moderate index, with a higher median for the moderate index (Table 4).

Table 1. Descriptive analysis – self-reported severity of stuttering and stuttering severity index

Variables	N	%
Self-reported severity of stuttering		
Mild	7	12.5
Moderate	39	69.6
Severe	10	17.9
Total	56	100.0
Stuttering severity index		
Mild	49	87.5
Moderate	2	3.6
Severe	5	8.9
Total	56	100.0
Percentage of speech discontinuity	56	
Mean	**SD**	
21.41	12.76	

Subtitle: N = number of individuals; SD = standard deviation; % = percentage

Table 2. Association analysis between self-reported stuttering severity, sex, and stuttering severity index

Variables	Self-reported severity of stuttering			p-value
	Mild N (%)	Moderate N (%)	Severe N (%)	
Sex				
Males	3 (42.9)	19 (48.7)	4 (40.0)	0.868
Females	4 (57.1)	20 (51.3)	6 (60.0)	
Total	7 (100.0)	39 (100.0)	10 (100.0)	
Stuttering severity index				
Mild	**7** (100.0)	37 (94.9)	5 (50.0)	0.002*
Moderate	0 (0.0)	0 (0.0)	2 (20.0)	
Severe	0 (0.0)	2 (5.1)	**3** (30.0)	
Total	7 (100.0)	39 (100.0)	10 (100.0)	

Pearson's chi-square test; *p-value ≤ 0.05
Subtitle: N = number of participants; % = percentage

Table 3. Association analysis between self-reported stuttering severity, age, and percentage of speech discontinuity

Variables	Self-reported severity of stuttering			p-value
	Mild	Moderate	Severe	
Age				
Mean±SD	28.57±11.55	29.36±8.94	28.40±9.89	0.852
Median	25.00	28.00	27.50	
Percentage of speech discontinuity (%)				
Mean±SD	13.63±6.39	19.83±10.39	33.03±17.46	0.020*
Median	14.50[a]	17.50	27.15[a]	

Kruskal-Wallis test; *p-value ≤ 0.05; [a]Nemenyi test
Subtitle: SD = standard deviation

Table 4. Association analysis between stuttering severity index and sex, age, and percentage of speech discontinuity

Variables	Stuttering severity index			p-value
	Mild N (%)	Moderate N (%)	Severe N (%)	
Sex				
Males	22 (44.9)	0 (0.0)	4 (80.0)	0.132[1]
Females	27 (55.1)	2 (100.0)	1 (20.0)	
Total	49 (100.0)	2 (100.0)	5 (100.0)	
Age				
Mean±SD	29.63±9.50	32.50±6.36	22.40±4.98	0.066[2]
Median	27.00	32.50	21.00	
Percentage of speech discontinuity (%)				
Mean±SD	18.43±9.41	45.65±25.24	40.90±11.91	0.001[2]*
Median	16.00[a]	45.65[a]	36.50	

[1]Pearson's chi-square test; [2]Kruskal-Wallis test; *p-value ≤ 0.05; [a]Nemenyi test
Subtitle: N = number of participants; % = percentage

DISCUSSION

This study investigated how individuals perceive the severity of their stuttering, whether this perception is associated with the severity obtained through a standardized instrument (SSI-4)[14], and the association between the SSI-4 and the percentage of speech discontinuity.

Stuttering is prevalent in males, with a ratio of four men for every woman[12]. However, females predominated in the study sample, differing from previous research, which points to a prevalence of the disorder in males[12]. The sample makeup may be related to the type of selection adopted, which was based on volunteering – i.e., a non-probabilistic selection by convenience.

The difference between the sample makeup and the epidemiological prevalence of men can be explained by factors related to recruitment and service-seeking behavior. The literature on the use of health services shows that women tend to seek health care more frequently than men, which may indicate greater female participation in this study and public outreach initiatives[17,18].

Furthermore, participants were recruited through outreach on social media, channels for which recent population data

highlight greater female participation and reach in the Brazilian context[19]. This asymmetry in platforms may, therefore, have favored women's participation in the study. Thus, the observed female predominance constitutes a plausible selection bias, resulting from the recruitment strategy and real patterns of help-seeking, and not necessarily an error in the severity or fluency measures applied to the participants.

The analysis showed that most participants (69.6%) considered their stuttering to be moderate. Although participants who self-reported a mild stuttering were classified as such by the SSI-4, those who reported it as moderate or severe overestimated the severity of their stuttering compared to the severity found in the SSI-4 – i.e., the self-report, in most cases, indicated a greater severity than that found in the SSI-4. These data are consistent with a previous study[20], which suggested that individuals who stutter recognize their difficulties in expression, contributing to low self-esteem and the perception of their condition as more severe than that found by the SSI-4.

This finding suggests that individuals who stutter tend to recognize their difficulties in expression broadly and consistently, which can promote feelings of low self-esteem and a more negative subjective perception of their condition. While the SSI-4 only accounts for disfluencies typical of stuttering (such as repetitions, prolongations, and blocks), a person who stutters perceives and records all speech disruptions (including pauses, hesitations, and disfluencies common to fluent speech), which can result in an internal feeling of greater discontinuity in discourse. In this sense, the percentage of speech discontinuity is a measure that the speaker intuitively identifies, even though this variable includes disfluencies that do not constitute stuttering. The sum of these perceptions can intensify the feeling of severity, generating a relevant discrepancy between the self-report and the standardized index used by the clinical evaluator.

The stuttering severity index was not statistically significantly associated with sex or age ($p > 0.05$). In other words, it is not possible to state that differences in stuttering severity are related to the participants' sex or age. Likewise, the associations of the self-reported degree of stuttering severity with sex and age were not statistically significant ($p > 0.05$), suggesting that sex and age were not associated with participants' self-perception. A previous study[21] examined the association between three characteristics (age, sex, and marital status) and the experience of stuttering, as quantified by the Hebrew OASES-A. Participants' responses on the OASES-A were associated with age and marital status, but not with sex. These results are consistent with our study regarding the relationship between severity index and sex, but disagree with it regarding the relationship between severity index and age. This implies that men and women perceive stuttering similarly, regardless of sex. These data also contradict a study[22] that investigated the effect of stuttering on women and men at different stages of life and found that the effect of stuttering was greater for adolescents than for children and young adults and was greater for women than for men[22].

Another factor, the percentage of speech discontinuity, was statistically significantly associated ($p < 0.05$) with self-perception of stuttering severity and with the stuttering severity index. It can be inferred that the higher the self-reported severity of stuttering, the higher the percentage of speech discontinuity – i.e., there is a greater number of disfluencies present, typical of stuttering or not. Moreover, a higher percentage of speech discontinuity is associated with a higher stuttering severity index. Thus, the percentage is more influential in classifying severity than, for instance, other communicative and concomitant physical aspects. A previous study[21] sought to relate the percentage of speech discontinuity and a scale for classifying stuttering severity, used both by the evaluator and for self-assessment by the person who stutters. The authors concluded that the correlation between scores on the percentage of stuttered syllables and the stuttering severity scale from the clinical perspective was greater than the correlation between scores on the percentage of stuttered syllables and the speaker's severity scale. These results were explained by the possibility that the evaluator placed greater emphasis on stuttering moments when assigning a score on the severity scale, while people who stutter tend to consider emotional aspects in their self-assessment, which may contribute to the difference between the speaker's and the evaluator's assessments.

In line with the results of this research, a study[21] highlights the hypothesis that individuals may use different criteria to assess severity, such as emotional impact and individual or social experiences, while the severity index seems to focus on observable characteristics and quantitative aspects of stuttering, such as the time of occurrence of a typical stuttering disfluency.

The present study also verified a statistically significant association between the severity index and the self-reported level of stuttering severity ($p = 0.002$) – i.e., there was a relationship between how participants self-reported the degree of their stuttering and how it was assessed by the speech-language-hearing pathologist.

The descriptive analysis results revealed that all participants who self-reported moderate stuttering (39) were not classified as such. Of these, 37 were classified as mild and two as severe, which may suggest differences in the interpretation of severity criteria between clinicians and people who stutter. This data confirms previous studies[23,24], which showed that individuals classified as very mild by the SSI tend to report their stuttering as moderate[23]. Self-reporting may be influenced by the speaker's individual experience with stuttering, which may have led to discrepancy, especially in the moderate and severe categories. While listeners may consider some people who stutter as fluent, these people may feel very disfluent when evaluating their own speech[25].

As limitations, this study had a small sample of participants classified with moderate and severe stuttering and a larger number classified with mild stuttering, which may have influenced the variability of responses. Therefore, generalizations should be analyzed with caution. Another limitation refers to online data collection, which may have influenced the classification of the degree of stuttering. The evaluation of physical concomitants via videoconference can be limited, depending on the camera positioning. This fact may have led to an underestimation of these aspects, increasing the propensity to classify participants as having mild stuttering.

These limitations reinforce the need for studies with larger samples and a more balanced distribution of sex and the different degrees of stuttering. Hence, future investigations, especially those with longitudinal designs and multivariate models, may

deepen the findings presented here and offer more robust interpretations of the factors involved.

The expansion of the assessment of individuals who stutter stands out as an advance, transcending the exclusive use of formal instruments. Self-reporting provides valuable information on aspects not covered in these protocols, guiding speech-language-hearing pathologists to adopt a biopsychosocial therapeutic approach, which considers the individual in their entirety.

CONCLUSION

The self-reported degree of stuttering was statistically significantly associated with the stuttering severity index and percentage of speech discontinuity. The latter was significantly associated with the severity of stuttering, indicating that it is an important variable in patient assessment and monitoring.

The discrepancy between the evaluator's analysis and the speaker's self-perception of the degree of stuttering severity may indicate the importance of better aligning the criteria used for self-report and assessment, so that the patient and speech-language-hearing pathologist can have the same assessment parameter in therapy.

Furthermore, it is of utmost importance that further studies involving self-reporting of stuttering be carried out, in the pursuit of understanding the individual in their entirety, in a biopsychosocial way.

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