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Original Article

Perception of People with Stuttering Regarding their Experiences with Interventions Based on the CALMS Multidimensional Model

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ABSTRACT

This study aimed to know the perception of people with stuttering regarding their experiences with interventions based on the CALMS multidimensional model and its five dimensions; cognitive, affective or emotional, linguistic, motor control of speech, and social. The research was carried out using a qualitative approach, with descriptive analysis and phenomenological methodology, with five male participants between the ages of 19 and 39 years who were diagnosed with persistent developmental stuttering. Each of them participated in a semi-structured individual interview that consisted of open questions categorized in the five dimensions of the CALMS multidimensional model. The Atlas.ti version 7 software was used for the analysis of the information. The results of the interview revealed that the participants perceive the CALMS multidimensional approach as an intervention model that helps them develop their confidence, perform better in their daily lives, and improve their quality of life, even though cycles of negative thoughts and feelings persist within the contexts of their daily life and their general environment. Although the subjects have a positive perception of the speech-language intervention, the personal characteristics of each participant and the impact of their social environment influenced their answers in the cognitive and emotional domains of the survey.

Keywords:
Stuttering; Perception; Treatment; Dimensions; Multidimensional; CALMS

Percepción de personas con tartamudez en cuanto a sus experiencias de tratamiento basado en el modelo multidimensional CALMS

RESUMEN

Conocer la percepción de personas con tartamudez sobre sus experiencias de tratamiento en base al modelo multidimensional CALMS en sus cinco dimensiones; cognitiva, afectiva o emocional, lingüística, control motor del habla y social. Esta investigación se desarrolló con un enfoque cualitativo, análisis descriptivo y abordaje fenomenológico. Participaron cinco sujetos de género masculino de entre 19 a 39 años de edad, diagnosticados con tartamudez del desarrollo persistente. Cada uno de ellos respondió a una entrevista semiestructurada de manera individual, a través de preguntas abiertas categorizadas en las cinco dimensiones del modelo multidimensional CALMS. Para el análisis de la información se utilizó el software Atlas.ti versión 7. Los resultados de la encuesta realizada indicaron que los participantes perciben el abordaje multidimensional como un modelo de intervención que les ayuda a desarrollar su confianza, desempeñarse de mejor manera en su vida cotidiana y mejorar su calidad de vida, aunque aún persistan ciclos de sentimientos y pensamientos negativos dentro de los contextos de su vida diaria y entorno en general. A pesar de que los sujetos perciben de una manera positiva la intervención fonoaudiológica, las características personales de cada participante y el impacto del entorno social influyeron en las respuestas del ámbito cognitivo y emocional basadas en las preguntas de la encuesta.

Palabras clave:
Tartamudez; Percepción; Tratamiento; Dimensiones; Multidimensional, CALMS

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INTRODUCTION

Childhood-Onset Fluency Disorder (stuttering) is defined by the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) of the American Psychiatric Association (APA), as a disturbance in the fluency and patterns of speech. It is characterized by repetitions, prolongations, broken-up words, blocks, circumlocutions, and excessive physical tension. In addition, motor patterns (blinking, tics, tremors, head shaking, breathing movements) may accompany the stuttering (American Psychiatric Association, 2014).

Additional characteristics of this disorder represent involuntary interruptions in the flow of speech, namely: repetition of sounds, syllables, or words; prolongations of sounds, pauses, or airflow blocks (Guitar, 2019). Stuttering has social, emotional, affective, and cognitive consequences for people with this disorder, impacting their quality of life (Guitar, 2019).

The World Health Organization (WHO) presented the eleventh edition of the International Statistical Classification of Diseases (ICD-11), which came into force in January 2022. ICD-11 classifies stuttering as a developmental speech fluency disorder, code 6A01.1, characterizing it as a frequent or pervasive disruption of the normal rhythmic flow of speech, presenting repetitions and prolongations of sounds, syllables, words, and phrases, as well as blocking and word avoidance or substitutions.

The onset of stuttering can generally be found between the ages of 2 and 4 years, coinciding with the development of phonology, morphology, syntax, and vocabulary (Yairi & Ambrose, 2013), and tends to persist into adulthood (Susanibar et al., 2016). Moreover, this condition is more frequent in men than in women, with a ratio of approximately 4:1 (Yairi & Ambrose, 2005).

Suárez Muñoz et al. (2006) claim that the etiology of stuttering is still unknown, adding that there is no single factor to cause this disorder. They suggest that there is a series of different factors associated with stuttering, such as genetic predisposition, speech motor skills, and linguistic, cognitive, emotional/affective, and environmental factors. Regardless of the cause, it is known that to a large extent stuttering is genetically transmitted, thus relating to structural and functional characteristics of the brain. Furthermore, this condition may impact personality and temperament (Yairi & Seery, 2015).

In order to explain the etiology of stuttering, Guitar (2019) proposes the Model of Constitutional Factors. This model suggests that stuttering is frequently inherited, that is, if one or both parents have a predisposition to stutter, this condition will be transmitted through a genetic mutation, influenced by environmental factors and epigenetics (Yairi & Ambrose, 2013).

Approximately 5% of young children stutter at some point in their development, with 80% recovering spontaneously, without the need for any type of intervention (Yairi & Ambrose, 2005). Stuttering becomes persistent in the remaining 20% of children, with academic, emotional, and social consequences in adulthood (Langevin et al., 2010). Considering the consequences and the lack of spontaneous recovery, early intervention is viewed as the best practice (Yaruss & Reardon-Reeves, 2017).

In addition to the characteristics mentioned above, stuttering involves experiences that impact the quality of life. Yaruss & Quesal (2004) describe this impact, based on the components of the International Classification of Functioning, Disability, and Health (ICF) (World Health Organization [WHO], 2001). Furthermore, it is known that people with stuttering are at increased risk of developing social anxiety, which often begins in adolescence and continues into adulthood (Smith et al., 2014).

Recognizing that this condition not only impacts fluency requires therapeutic approaches that consider the persistence of stuttering and its impact on different areas of life (Hughes et al., 2010), such as social and emotional functioning (Hughes et al., 2010; Le Huche, 2000), communication (Gutiérrez, 2015), self-acceptance (Blood et al., 2003), and mental health (Craig et al., 2009). These areas affect the social participation of the individual and their environment (Yaruss & Quesal, 2004).

Due to the above, it is fundamental to assess and intervene stuttering considering the person's context, which includes quality of life, general well-being, and fundamental social aspects. This perspective emphasizes that stuttering transcends primary or observable behaviors since it also involves negative affective, behavioral, and cognitive reactions from both the speaker and their environment (M. P. Boyle & Fearon, 2017; St. Louis et al., 2017; Yaruss, 2010).

As of 2004, and mainly in the USA, Brazil, and Spain, the CALMS multidimensional model (involving cognitive, affective, linguistic, motor, and social aspects) is used for the treatment of stuttering. This model was created by Charles Healey, Lisa Scott Trautman, and Micheal Susca, and it addresses, both in the evaluation and treatment, the cognitive, affective/emotional, linguistic, motor control of speech, and social dimensions of the fluency disorder. The cognitive dimension considers the thoughts, perceptions, awareness, understanding, and beliefs that the individual has regarding their stuttering (Charles-Healey et al., 2004). The linguistics component is related to language formulation skills, which involve morphological and syntactic complexity, among others. The affective dimension includes feelings, emotions, and attitudes that accompany stuttering (Van Riper, 1982). The motor control of speech dimension relates to factors that influence the frequency, duration, type of disfluency, and concomitant behaviors (Guitar, 2019). Finally, the social dimension includes the person's avoidance to speak in situations where there is interaction with other people.

In addition to the above, this model considers how the dimensions interact with one another, proving that not only the motor aspects of speech should be addressed during the evaluation and treatment (Charles-Healey et al., 2004), but that a multidimensional approach that considers different aspects of the individual's life should be used (Guitar, 2014; Yaruss & Quesal, 2006).

The CALMS model proposes that speech disfluency or interruptions in speech fluency in people with stuttering do not occur in isolation, but are part of a sequence of manifestations influenced by a series of factors. In this way, stuttering is understood as the final product of several interrelated processes (Nogueira, 2015). Moreover, being a comprehensive therapy model, it not only aims to achieve greater control of primary behaviors (blocks, repetitions, and/or prolongations) but also to achieve control over avoidance and anticipation behaviors (Guitar, 2019). Additionally, this model allows making a differential diagnosis of stuttering, because it enables interpreting the development of individual experiences from early childhood to adulthood (Ginhson & Gebara, 2014).

The CALMS model follows what ASHA proposes regarding the assessment and intervention of fluency disorders, which is that the intervention should be multidimensional and individual, addressing primary and secondary behaviors (Ward, 2018; Yairi & Seery, 2015).

Although this model is used in Chile, there is no evidence of its relevance in the process of speech-language therapy for stuttering. Therefore, it becomes necessary to gather information on its impact on the rehabilitation of this condition. Thus, the objective of this study is to know the perception of users with stuttering who have undergone therapy based on this intervention model.

It is noteworthy that this research focuses on the perception of the service users because the assessment of the therapeutic process considers the feelings, attitudes, beliefs, and reactions experienced by people with stuttering (Van Riper, 1982), which may influence the progress of therapy. Therefore, it is fundamental to know the perception that people with stuttering have of the therapeutic approach used during the speech-language therapy process.

METHOD

This research uses a qualitative method with descriptive analysis and a phenomenological approach.

Participants

The participants were adults between the ages of 19 and 39 years, with persistent developmental stuttering. Gender, socioeconomic level, and level of education were not considered for their selection, since these variables are not relevant to the research objective.

The inclusion criteria were the following: a) to be a speaker of Chilean Spanish, b) to present developmental stuttering, diagnosed by a speech-language pathologist specializing in the field, c) to have undergone a year or more of speech-language therapy based on the CALMS multidimensional model, and d) to be available for the interview.

People with other speech disorders were excluded, such as dysarthria, anarthria, and speech sound disorder, among others.

Minimum and maximum sample sizes were not determined, since the subjects were selected through discretionary or judgemental sampling. This means that the sample was selected based on the speech-language pathology diagnosis of each of the participants. Five male subjects were selected based on this sampling method, all of whom were university students.

It is important to mention that the participants gave their informed consent, as required by article 11 of Law No. 20,120 (Approves Regulation of Law No. 20,120 regarding Scientific Research on Human Beings and their Genome, and Prohibits Human Cloning, 2011[trans.]) and the Declaration of Helsinki (World Medical Association, 2013). Moreover, the participants had the liberty to abandon or reject the research without providing reasons for their decision (Approves Regulation of Law No. 19,628 regarding Protection of Private Life, 1999 [trans.]).

Material

An in-depth, semi-structured interview was designed to collect information regarding the intervention process. The interview consisted of two sections:

Section 1: General background information: personal details, family history, and stuttering history (see Table 1).

Section 2: Information on the five dimensions of the CALMS multidimensional model. This section was semi-structured and made up of a flexible number of open-ended questions divided into categories (see Table 2).

The interview was submitted to content validation through expert judgment, performed by 2 speech-language pathologists specializing in stuttering.

Table 1. Background information regarding the participants' personal details, family history, and stuttering history.

Personal Details	Full Name Date of Birth Age Gender Occupation / Educational Level Marital Status
Family History	Medical History History of family members who present or presented stuttering, in case of positive answer mention if they are on the paternal and/or maternal side of the family
Stuttering History	Type of Diagnosis Age of Diagnosis Previous Treatments

Note: This table includes the components that allow collecting background information regarding personal details, family history, and aspects related to the stuttering history of the participants.

Table 2. Questions addressing the five dimensions of the CALMS multidimensional model.

Deductive Categories	Deductive Subcategories	Questions
Cognitive Dimension	Aspects related to thoughts and beliefs	(1) What do you think of your stuttering? (2) After receiving therapy based on the CALMS multidimensional model, Do you think your stuttering has changed? (3) Do you think that your difficulties associated with stuttering have decreased after the therapy sessions? (4) What do you believe people in your environment think about your progress with therapy?
Emotional and/or Affective Dimension	Emotional aspects	(5) What feelings and/or emotions are triggered when you stutter? (6) Currently and considering your therapeutic progress, How do you feel towards the different reactions that other people have when you stutter?
Linguistic Dimension	Linguistic aspects	(7) Which features of language do you struggle most with? Give examples; When you are in situations in which you know you will stutter, What strategies have you learned to use? (8) Have the therapy sessions helped you with strategies you can use to manage the linguistic aspects?
Motor Control of Speech Dimension	Sensory-Motor aspects of Speech	(9) How often do you stutter during the day (moments)? (10) We know that stuttering has cycles. Based on the treatment you received, Do you stutter more or less than before? (11) Do you know what the primary behaviors associated with your stuttering are? Give examples; Which do you have? (12) Regarding the treatment, Have you noticed better control of your primary behaviors?
Social Dimension	Social aspects	(13) In what ways have your social interactions changed after the treatment? (14) Has the frequency of your stuttering during academic subjects and extracurricular activities increased or decreased?

	(15) How is your participation in social activities with other people? In what way has it changed? (16) How has therapy impacted the situations in which you have to expose a topic or express an opinion?

Note: This table includes the questions about perceptions, based on the five dimensions of the CALMS model (cognitive, affective/emotional, linguistic, motor, and social).

Procedure

Previous to the beginning of the interviews, the subjects were informed about the objectives and purposes of the research, clarifying that their participation was completely voluntary and that the information provided by them would only be used for the current research. The interview was conducted individually in an office with adequate space, privacy, and comfort.

The interviews were carried out by the researchers, each of whom assumed a specific role, as detailed below.

Researcher #1 interviewed the participants. Each interview was audio recorded using a Huawei P10 smartphone and had a duration of approximately 15 minutes per participant.

Researcher #2 took a passive role, being in charge of taking notes and recording important events of the research.

The Atlas.ti software, version 7, was used for data analysis. This program allows to segment data into units of meaning, coding data, and building theories (Hernández et al., 2010). A general analysis of the interviews was carried out first, followed by an analysis of each of the subjects' answers.

RESULTS

The results are presented below, organized according to the two sections of the interview.

The most remarkable aspect found in section 1 (personal details and family and stuttering history) was that the majority of the participants indicated having a family member with stuttering. Participant No. 2 reported: "yes (...) a maternal aunt", participant No. 3 mentioned: "a cousin from the maternal side of the family", and participant No. 4 commented: "a cousin from the paternal side of the family".

The data for section 2 is presented by dimension:

Cognitive dimension: the participants reported feeling that their stuttering was a limiting condition, even though they expressed knowing that they had to learn to live with it. For example, participant No. 3 stated: "It limits me, it prevents me from acting more freely", while participant No. 5 said: "I feel that it's something that I have to learn, that I and my environment must learn to live with because it's not something that will go away tomorrow and never come back; that will never happen." Regarding the therapy process, the participants perceive that their difficulties have decreased thanks to the sessions, which have significantly helped them to achieve more comfort in their speech. Interviewee No. 1 mentioned, "before it was much more difficult for me, and with time and by doing the exercises, the techniques have helped me a lot." In addition, some subjects reported that their loved ones perceived improvements from treatment. However, others expressed that stuttering is not an issue that their immediate environment addresses.

Emotional dimension: the participants' answers revealed that they maintain negative feelings about their condition, despite the progress they have made thanks to the intervention. These negative feelings seem to have developed from their reactions to the stuttering. Participant No. 4 referred: "it makes me feel ashamed. Also helpless for not being able to do certain things normally, like talking on the phone, introducing myself on the phone and in person, that kind of thing." Although they agree that their stuttering has decreased and that the intervention has helped them, negative feelings persist, especially when stuttering is triggered, as they feel ashamed, frustrated, and powerless.

Linguistic dimension: the participants reported struggling the most with this dimension. In particular, their difficulties are centered on the phonetic/phonological components of language. The motor aspect of the production of phoneme /ȓ/ is unstable, with a high number of blocks and repetitions. Other consonant phonemes are challenging, but variable among subjects. Participant No. 1 referred: "The sound 'rr' in all its combinations, but less and less with time." Participant No. 4 pointed out: "I have a hard time with words with "tr", uttering words when they begin with "tr", with two consonants, especially when they are at the beginning of words, of what I'm going to say." In addition, they expressed using a series of strategies to be able to communicate.

The participants mentioned that one of the strategies they most use is reducing their speech rate, followed by general relaxation techniques. Participant No. 3 stated: “I try to do it slower and more deliberately, when I don't feel well, I speak super fast, but I kind of try to breathe and take my time, marking the timing a little with my foot. Like that, I do well, and what I have to do is lower my voice a little, and to say something I speak loud.” Participant No. 4 referred “I speak slowly, that is, I say it slowly and on top of that I try to relax this part here (pointing to their TMJ, jaw, and neck) that always feels stiff.”

Motor control of speech dimension: the participants expressed that the frequency of their stuttering has decreased compared to the beginning of therapy and that this frequency depends on the situation or moment of the day. Interviewee No. 1 mentioned: "by having greater control of my stuttering and knowing what strategies to use, my stuttering episodes have decreased." Furthermore, the subjects reported that blocks, syllable repetitions, word repetitions, and phoneme prolongations have decreased. They recognize that therapy is the cause for the reduction of blocks (mainly at the beginning of words) and word repetitions. All of the above implies that they have achieved greater motor control of their speech.

Social dimension: the participants indicated that they interact with their social environment more frequently and that their self-confidence has increased, thanks to the strategies that the multidimensional model has provided them. Nonetheless, and although the frequency of their social interactions has increased, all the participants mentioned still presenting avoidance behaviors. For example, they avoid speaking in situations that make them uncomfortable, be it socially or academically. Participant No. 1 explained: "Yes, because in the end, all the exercises and techniques give me more confidence, then it has helped me a lot with my confidence and when I interact with new people." Participant No. 2 said: "yes, many times,” with the transcript of the written response being as follows: "When I feel a lot of pressure or attention - I avoid going out shopping - I avoid speaking in front of the class". Participant No. 3 expressed: "I have even started going out more, it gives me confidence and the techniques have helped me a lot, there are still times when it's hard for me…like it's hard for me to communicate and then I don't go out, but it’s less, much less, before I could spend a year inside the house without going out”. Participant No. 5 indicated: “Before therapy, I spoke less, with fewer people, only what was necessary to communicate, ‘hello, how are you?’, and I didn't care if they understood me or not, but now, that fluency is more regular.”

The subjects reported that the frequency of their stuttering has also been reduced during academic activities. Thus, in situations in which they have to expose a topic or express their opinion, the strategies provided by the model have been effective, helping them to function better. This has had a positive impact on their global academic performance. Participant No. 3 mentioned: "There has been a lot of progress, more than anything with self-confidence, that is the most important thing, I think." Participant No. 4 informed: “what I was saying is I should speak slowly and people should not speak so fast.” Lastly, the different social contexts in which people with stuttering must operate determine the variability in the frequency of their stuttering. The participants expressed that, in social contexts where they feel greater comfort, primary behaviors emerge less (blocks, repetitions, and/or prolongations). In contrast, in less comfortable social environments, the participants reported feeling that they lose control of their speech, although the sensation is less intense than before beginning sessions with a speech-language pathologist.

DISCUSSION

The information obtained from the interviews reveals that there is some genetic predisposition to stuttering, since the participants refer to having relatives, with different degrees of kinship, who also present this condition. The extracted data are consistent with the identification of genes associated with stuttering, such as GNPTAB, GNPTG, NAGPA, and AP4E1, which would imply a genetic basis for stuttering. This is supported by the fact that approximately 70% of individuals who stutter have a family history of this disorder (Guitar, 2019). It is necessary to consider this precedent when working with people with stuttering.

Regarding the impact of stuttering on temperament and quality of life, the interviews show that these areas are negatively affected. In general, the participants of this study are characterized by appearing shy and hermetic. The foregoing is observed in the avoidance behaviors they present in situations in which they have to speak, express opinions, expose ideas, participate in class, and especially when meeting new people. The experiences of the interviewees coincide with what Rafuse (1994) affirms, which is that a person who stutters is shy and calm and that they isolate themselves in certain situations. Furthermore, other researchers conclude that stuttering appears to be associated with an increased risk of developing personality disorders (Iverach et al., 2009).

There is evidence that women who present stuttering show higher self-esteem than men with the same condition. This suggests that there are significant differences, related to gender, in the perception of stuttering in adults (Silverman & Zimmer, 1979). Therefore, future research should focus on studying the possible relationship between gender and the self-esteem of people with stuttering.

Concerning the impact that stuttering has on the quality of life, the participants expressed experiencing mostly negative thoughts about their stuttering, emphasizing that the condition affects their daily life. In this regard, the study by Craig et al., 2009, establishes that stuttering can have an impact on several aspects of a person's life, and hinder their social, occupational, and educational experiences. This condition is known to involve negative affective, behavioral, and cognitive reactions (both from the speaker and their environment), which leads to significant constraints on the person's ability to participate in daily activities, negatively impacting their quality of life (Yaruss & Quesal, 2004).

Both the literature and the findings of this research show the level of impact that stuttering has on quality of life and people's temperament. Therefore, it is necessary to choose comprehensive therapeutic approaches that include the different dimensions mentioned above. The intervention should be carried out by speech-language pathologists specializing in stuttering, and psychologists. In this regard, a combination of the multidimensional model and cognitive therapy shows positive results in people with stuttering. It is even suggested that the speech-language pathology approach should be planned simultaneously with cognitive-behavioral therapy, which would bring positive results (Lindsay & Langevin, 2017). The multidimensional perspective requires comprehensive training and the development of interdisciplinary teams that include psychologists and/or other mental health professionals. Notwithstanding the above, determining the most appropriate intervention should always be based on each individual’s characteristics (Harley, 2018).

Regarding the speech and language intervention using the multidimensional model, the participants report that they are able to use strategies to control their stuttering during communication. Furthermore, they state having achieved easier and more comfortable speech, since both the frequency and duration of blocks and prolongations have decreased. They also mention experiencing better control over their speech. Although they acknowledge significant progress, they agree that their performance depends on the different situations they face daily.

Adequate communication, as previously stated by the interviewees, depends on the different situations in which they participate. In this regard, it is known that different environments (people with whom they interact and the topics that are discussed) influence the variability of the primary and secondary behaviors of people with stuttering (Constantino et al., 2016). Context may come to be so relevant as to affect both the frequency and the severity of the stuttering, with the latter increasing particularly in situations that are more stressful for the individual (Yaruss & Quesal, 2006). Therefore, it is essential that the initial assessment considers the variability of the stutter in relation to different contexts, to more accurately describe the behaviors and experiences of people with stuttering (Tichenor & Yaruss, 2021). The most frequent environment for the participants of this study is the university, where they interact with greater frequency and comfort, experiencing better control of their primary and secondary behaviors.

On the other hand, it has been shown that society does not have adequate knowledge about stuttering (Hearne et al., 2008). Educating people about fluency disorders would make it possible to dismantle beliefs and, in turn, modify the negative reactions towards people with this condition. Moreover, it would allow reducing the stigma and stereotypes around stuttering. Providing information on possible causes, as well as on primary and secondary behaviors associated with stuttering, among other aspects. However, this information should be provided carefully and supported by evidence (Boyle, 2016). This is relevant since, as already mentioned, social environments play an important role in the manner stuttering is experienced (behaviors), how it develops, and its effect on people's lives (Yaruss & Quesal, 2004).

St. Louis (2011) proposes a public opinion survey on the human attributes of stuttering called POSHA-S, which allows collecting information on the beliefs and reactions that society has towards stuttering. The information gathered through this survey contributes to increasing the knowledge about stuttering and desensitizing the community, which in turn creates and promotes comfortable environments for people with this condition (Maguire et al., 2020).

Finally, according to Herder et al. (2006), although therapeutic intervention shows positive effects, additional studies are required to demonstrate the influence of different variables on the performance of people with stuttering. Some of the variables that should be considered are age, gender, socio-cultural status, and intervention times. It is important to remember that these variables are not included in this research, therefore, it is necessary to develop further research where they are considered.

CONCLUSIONS

The participants of this study, who present persistent developmental stuttering, indicate that therapy using the CALMS multidimensional model has enabled them to make progress. This is because they have transferred and internalized strategies based on the cognitive, social, linguistic, motor, and emotional dimensions of the model. Therefore, they have achieved greater confidence in their communication, which allows them to operate comfortably and effectively in most of their daily contexts, thus improving their quality of life.

Although the users perceive speech-language therapy through a positive lens, cycles of negative feelings and thoughts persist, which influences the personal characteristics of each participant and the impact of their social environment. It is noteworthy that the most frequent context in which the participants interact is their university, since the majority are university students, as stated in the methodology section.

Future research with university students should include the opinions and knowledge of subjects without fluency disorders about stuttering. Some topics that should be addressed are concepts, causes, prevalence, and treatment. This will contribute to a desensitization of the communities in which people with stuttering interact daily.

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