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Title: Variability of Stuttering: Behavior and Impact

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Abstract

Purpose: It has long been known that stuttering behaviors vary across time and situation (Constantino et al., 2016; Shulman, 1955; Yaruss, 1997a). Preliminary evidence suggests that this variability negatively affects people who stutter (Tichenor & Yaruss, 2018) and that stuttering behaviors are more variable than adverse impact associated with stuttering (Constantino et al., 2016). More information is needed to determine how variability affects people who stutter and what the clinical and research implications of variability may be.

Method: 204 adults who stutter participated in a mixed methods study exploring (1) how variability of stuttering affects people who stutter in comparison to other aspects of the condition, and (2) which aspects of the overall experience of stuttering are variable.

Results: Analyses indicated that variability is very commonly experienced by people who stutter and that it is among the most frustrating aspects of the condition. Qualitative analyses revealed that variability is experienced in all aspects of the stuttering condition, including the observable behavior (as well as other affective, behavioral, and cognitive reactions) and the adverse impact of stuttering. Notable individual differences were found in terms of which specific aspects of the condition were more variable for different respondents. Overall, analyses revealed that the variability of different aspects of stuttering can be viewed in a hierarchy from most variable to least variable: *More-External* aspects (e.g., frequency, duration), *More-Internal* aspects (e.g., covert behaviors, physical tension), and *Cognitive-Affective* experiences (e.g., negative thoughts, feelings, and self-image).

Discussion: These findings suggest that the variability is a common and burdensome aspect of the experience of stuttering and underscore the importance of considering variability in stuttering behavior, reactions, and impact, in research, assessment, and treatment for adults who stutter.

It has long been known that stuttering behaviors vary across time and situation and that people who stutter exhibit different amounts or degrees of stuttering depending upon factors such as the setting they are in, whom they are talking to, and what they are talking about (Constantino et al., 2016; R. J. Ingham, 1975; Shulman, 1955; Yaruss, 1997a). In one early investigation, Shulman (1955) sought to capture the variability of observed stuttering behaviors by asking participants to read aloud in different speaking situations with different audiences across a period of two weeks. Though participants in the study tended to stutter less on subsequent readings of the same passage, their frequency of stuttering increased in some speaking environments and decreased in others, suggesting a high degree of variability across situations and over time. Yaruss (1997a) found that the frequency of both *more typical* (see Yaruss, 1997a, also called *non-stuttered*) and *less typical (stuttered)* disfluencies produced by preschool children varied greatly across five tasks that are commonly used in the assessment of stuttering (picture description, story-telling, play, speaking while under pressure, and conversation with a parent). Differences in the frequency of stuttering behaviors between tasks was significantly greater than the differences in the frequency of stuttering within tasks, indicating that speaking task is an important factor influencing the amount of stuttering behaviors that a child exhibits. More recently, Constantino et al. (2016) measured the frequency, duration, and severity of stuttering behaviors, as well as adverse impact related to the condition (see Tichenor & Yaruss, 2019b; Yaruss & Quesal, 2004, for discussion of adverse impact) experienced by six adults who stutter over 5 separate days spread across two weeks. The frequency of stuttering behavior showed great variation over time, with some participants changing observable severity classifications (e.g., mild or severe) from one point in time to another. Adverse impact, as measured by the *Overall*

Assessment of the Speaker's Experience of Stuttering (OASES; Yaruss & Quesal, 2006, 2016) was found to be less variable over the two-week study period.

Variability has been discussed as an aspect of the condition that complicates assessment and treatment (Conture, 1990; Logan & Haj-Tas, 2007; Sawyer & Yairi, 2006; Starkweather, 1987; Van Riper, 1982), and it is widely acknowledged that in-clinic speech measures may not be indicative of speech behaviors in the real world (R. J. Ingham, 1975, 1980). Van Riper (1982) stated,

When estimating severity in the initial diagnosis or when ascertaining progress at different times during the course of therapy, it is important not to confine the speech samples... the amount of stuttering [behavior] varies markedly in different speaking situations... [and] may not be representative of [their] real difficulty in communication. (p. 227)

Some researchers and clinicians have attempted to account for situational variability of stuttering behavior by advocating for the use of multiple speech samples, both in the clinical setting and in other environments (Costello & Ingham, 1984). Several authors also have advocated for the use of multiple samples in different environments *and* at different points in time in an attempt to capture a more representative indication of a person's speech in the real-world (Conture, 2001; Gordon & Luper, 1992; Gregory & Hill, 1999; J. C. Ingham & Riley, 1998; O'Brian, Packman, & Onslow, 2004; Yaruss, 1997b). Clinically, the *Stuttering Severity Instrument* – 4th Edition (SSI-4; Riley, 2009) suggests that clinicians collect a spontaneous speech sample consisting of 150-500 syllables, as well as a reading sample where appropriate. Speech samples of 100 to 300 syllables have been frequently used in research (e.g., Conture, 2001), though longer samples may provide more representative indications of a person's

stuttering in a particular situation and at a particular point in time (see Sawyer & Yairi, 2006, for review). Some have advocated for recording longer speech samples (e.g., 1200 syllables), with data suggesting that the frequency of stuttering behaviors increases as speech sample size increases (Sawyer & Yairi, 2006). These recommendations attempt to account for the inherent variability in the observable characteristics of stuttering, both within and between situations. Still, relatively little research has directly examined variability itself, and few studies have examined whether other aspects of the stuttering condition, such as negative emotional/cognitive reactions to stuttering or the overall impact of stuttering on a person's life, vary in a similar way. Despite the common acknowledgment that stuttering is variable and that this variability impacts assessment or treatment, much less is known about whether or how much other aspects of the stuttering condition vary and how any such variability might affect people who stutter.

Preliminary evidence suggests that people who stutter consider variability to be frustrating and limiting. Tichenor and Yaruss (2018) explored the experiences of 13 adults who stutter in order to determine how people who stutter conceptualize moments of stuttering. The authors found that people who stutter view variability of stuttering behavior over time and across situations as a key aspect of their experience of stuttering. In addition to experiencing variability in the stuttering behavior itself, some participants also reported variability in other aspects of the condition, including the presence of physical tension or struggle and the occurrence of negative thoughts and feelings. Having so many aspects of the condition vary has been cited as one of the factors that makes stuttering so difficult for people to adapt to. For example, Participant 5 stated:

Actually, I think my stutter has changed a lot throughout all the years. I've picked up habits and gotten rid of habits, picked up different ones, and gotten rid of them again...

the variability still annoys me so much. (Tichenor & Yaruss, 2018, p. 1186, emphasis added)

If variability is contributing to the adverse impact of stuttering people who stutter experience, then more information is needed to provide insights about how clinicians can help to diminish that adverse impact. A better understanding of the occurrence and impact of variability will therefore support improvements in both assessment (e.g., for more accurately describing the experience of individuals who stutter) and treatment (e.g., for helping people cope effectively with the effects of variability). A better understanding variability will also support improvements in the categorization and description of participants in stuttering research. One study has shown that variability in observable stuttering behavior does not change classification status for children who are judged to be stuttering based on a specific criterion for the production of stutter-like speech behaviors (Johnson et al., 2009). Still, it is not yet known whether other aspects of variability might influence clinical or research classifications or outcomes.

Decades of work have mentioned the value of considering variability in research, assessment, and treatment of stuttering (Costello & Ingham, 1984; Gordon & Luper, 1992; J. C. Ingham & Riley, 1998; O'Brian, Packman, Onslow, et al., 2004; Sawyer & Yairi, 2006). At present, however, it is not actually known how common variability is for the population of people who stutter as a whole. It is also not known whether or how the experience of variability changes over time, and whether or how variability might cause limitations for people who stutter. Preliminary evidence such as that cited above from Tichenor & Yaruss (2018) suggest that variability is, in and of itself, a frustrating aspect of the condition, but it is not known how this frustration compares to other aspects of the overall stuttering condition. This lack of information about the overall degree and impact of variability hampers accurate assessment of stuttering, for

it is unknown if even long speech samples in different situations can capture the real-world variability people who stutter experience on a daily basis. The general lack of knowledge about variability also hampers appropriate intervention, for clinicians do not yet know whether or how to address variability within the context of treatment. More information is needed to determine which aspects of the stuttering condition are more or less variable. Such data will increase the ability of researchers and clinicians to determine whether findings from scientific or clinical assessments are applicable to different people's experiences of stuttering. The purpose of this study, therefore, was to explore the variability of stuttering through a mixed-methods investigation in which adults who stutter were asked about: (a) how variability affects their lives in comparison to other aspects of the condition, and (b) which aspects of their overall experience of stuttering are variable.

METHOD

Participants and Procedures

This study involved an online survey distributed widely to adults who stutter. The survey, described below, included a series of Likert and open-ended questions aimed at exploring how variability affects people's lives and which aspect(s) of stuttering are variable. A total of 218 people opened the link to the survey. Fourteen people were excluded from final data analysis for completing no meaningful portions of the survey (i.e., completing nothing past the consent form). The total number of participants who provided meaningful data that was analyzed in this study was 204. Demographic data, including age at the time of the survey, age of stuttering onset, history of participation in self-help/support and speech therapy, and ethnicity are presented in Table 1. Demographic data were missing for some participants because these questions were asked at the end of the survey, and participants discontinued the study before completing the

final set of questions. Most participants indicated a history of treatment (74.5%), but only 40.2% reported a history of self-help/support participation. Most participants were from the United States of America, self-identified as White, and were college graduates.

Recruitment procedures were similar to recent survey studies published from the Spartan Stuttering Laboratory at Michigan State University (Tichenor & Yaruss, 2019a, 2019b, 2020a, 2020b). Specifically, participants were recruited using a mix of convenience sampling and snowball sampling, in which recruitment cascades from one or more outlets or respondents to others (see Goodman, 1961). Research registries from previous studies, social media outlets, personal contacts of the authors, word-of-mouth, and national and international stuttering associations were used to recruit respondents. These various outlets were asked to share the survey with as many adults who stutter as possible to encourage a broad sampling of participants from different backgrounds and with different experiences. Because recruitment was conducted in these varied ways, response rates cannot be calculated, because it is impossible to determine how many potential participants were contacted.

The survey was conducted via the Internet using Qualtrics (Qualtrics, 2020). All respondents were adults age 18 or older (*Mean age* = 40.96, *SD* = 16.52), who self-reported to be people who stutter and who completed an informed consent prior to receiving and completing the survey. The study was deemed to be exempt from institutional review by the Michigan State University Human Subjects Research Protection Office under statute 45 CFR 46.101(b) 2 of the Federal Policy for the Protection of Human Subjects.

The Survey

The purposes of this study were to explore how the variability of stuttering affects people's lives as compared to other aspects of the condition, and to determine which aspects of

stuttering vary. The first purpose involved both quantitative and qualitative measures, while the second involved quantitative measures only. To begin, a set of items were developed to broadly describe various aspects of the stuttering experience that are known from prior research to adversely affect people who stutter. These included cognitive/affective reactions, behaviors, and real-world impact (Craig et al., 2009; Tichenor & Yaruss, 2019b; Yaruss & Quesal, 2004). The authors drew upon their prior experience with survey and questionnaire development (e.g., Tichenor & Yaruss, 2019a; Yaruss & Quesal, 2006) to guide a series of pilot studies in which various questions addressing different aspects of the experience of stuttering were reviewed by small focus groups of people who stutter. The list of items was refined in an iterative fashion based on feedback from these focus groups before the broader data collection effort was undertaken. In total, the piloting process involved feedback from approximately 25 people who stutter.

Based on this larger list of items, three specific questions related to variability were purposefully added by the authors to examine how frustration related to variability compares to frustration related to other aspects of stuttering. The first item intentionally did not operationalize variability (*how variable is stuttering?*), and two other items intentionally did operationalize variability in terms of variability across *time* (*I stutter more at some times and less at others*) and variability across *situation* (*I stutter more in some situations and less in other situations*). The responses for these questions were the same as the other frustration-related questions in Figure 1 (i.e., not frustrating to a large amount of frustrating). Participants were asked to rate how frustrating they found each of these aspects before proceeding to specific questions about variability. This was done to determine how frustration or concern about variability itself

compares to frustration or concern about other well-documented aspects of the stuttering condition. The full list of items can be found in Figure 1.

Next, participants answered a single question, with a binary yes-no outcome, about whether they experienced variability of stuttering (*do you experience variability related to stuttering?*). Participants who indicated that they did experience variability related to stuttering then completed a set of multi-component open-ended questions to ascertain their experiences related to variability. Examples of these questions included: “*Please describe your experience of variability in relation to stuttering?*” “*What does variability mean to you?*” and “*What aspects of stuttering are variable and which are not?*”

Lastly, all participants who indicated experience of variability (as measured via the binary question described above) were asked specific follow-up questions about variability to determine the degree of variability for each of the various aspects of their experience of stuttering. These items were reviewed and refined via a similar pilot process as described above. The overall goal was to create items that would capture an accurate representation of the experiences of people who stutter with respect to variability across a range of different aspects of the stuttering condition (Tichenor & Yaruss, 2019b; Yaruss & Quesal, 2004). These items can be found in Figure 2 and Table 2.

Data Analysis

Data recorded in Qualtrics were exported to and analyzed in R-studio (RStudio, 2020), a companion program to R (R Core Team, 2020). Various R packages were used for data manipulation, analysis, and visualization (Huang, 2016; Ludecke, 2020; Revelle, 2019; Wickham, 2016). All data were manually checked for data entry or coding errors. Since items were created to capture multidimensional constructs of the stuttering condition (e.g., overt

features, thoughts, feelings) exploratory factor analysis was completed to determine the underlying structure of the constructs. Confirmatory factor analysis was not conducted in order to reduce the likelihood that new structures would be overlooked. The factors were assumed to correlate with one another because prior research has shown that various aspects of the stuttering condition are conceptually related to one another (Smith & Weber, 2017; Tichenor & Yaruss, 2019b; Yaruss & Quesal, 2006). The correlations among the three factors (described below in the results section) ranged from $-.23$ to $.24$. Though none of the correlations exceeded the $.32$ cutoff recommended by Tabachnick & Fidell (2019) for oblique rotations, the factor correlations were far enough from zero that an oblique (promax) rotation was used in the factor analysis (Russell, 2002). The promax rotation was selected because it, “first conducts an orthogonal varimax rotation and then allows correlations between the factors in an attempt to improve the fit to simple structure” (Russell, 2002, p. 1638). In order to estimate the number of factors, eigenvalues were estimated and plotted via scree plot. The estimated eigenvalues were plotted via parallel analysis. Lower and higher factor loadings were explored for interpretability with scree plots as a guide.

The analysis of the participants’ responses to the open-ended questions was conducted via the process of phenomenology, a method of qualitative analysis that allows researchers to describe the shared meaning of a lived experience of a phenomenon (Creswell, 2013). Several recent studies used phenomenology to explore various aspects of stuttering, such as anticipation (Jackson et al., 2015), what comprises an effective therapeutic alliance (Plexico et al., 2010), and how moments of stuttering are experienced (Tichenor & Yaruss, 2018). Because variability related to stuttering is a shared experience of people who stutter (i.e., one that many people who

stutter experience), a phenomenological approach was selected for analyzing the shared experience of variability in this study.

Common principles of phenomenology and qualitative analyses were used for data analysis (Boyatzis, 1998; Charmaz, 2004; Creswell, 2013; Myers & Newman, 2007). Specifically, the first author (a person who stutters) began by preparing a narrative description of his own experiences related to the variability of stuttering in order to acknowledge and set aside his own views. This record was reviewed during the analysis to ensure that data were not being inadvertently analyzed in a way that too narrowly matched the investigators own views related to variability. This is viewed as an important step in qualitative research, because it helps to reduce unintentional bias and the tendency for researchers to interpret participant responses in terms of their own experiences and views (see Creswell, 2013, for discussion). To accomplish this, textual data from the open-ended question described above were then downloaded as plain-text files and imported into RQDA (Huang, 2016), a qualitative analysis package developed for the R statistical computing package (R Core Team, 2020). The first author then read each statement for a broad understanding of the participants' responses. Through subsequent readings and re-readings, significant statements were coded according to words or phrases that captured their meanings. These significant statements were grouped and re-grouped as needed, in an iterative fashion, as meaning and structure in the qualitative data were more clearly seen (Braun & Clarke, 2006). These groupings were eventually formed into the themes discussed below. A culminating *essential structure* of the phenomenon was then created from the themes and quotes to illustrate a composite description of the phenomenon. This essential structure reflects, "the essence of the experience and represents the culminating aspect of the phenomenological study" (Creswell, 2013, p. 194).

Credibility

The themes reported below come from all qualitative data collected. Consistent with past qualitative stuttering research using large samples of data (e.g., Tichenor & Yaruss, 2019b) and qualitative standard practice (Fusch & Ness, 2015), no saturation analysis was conducted on the qualitative data. The consistency of themes, the large sample size, and the varied backgrounds of participants support the credibility of the results. Consistent with established reliability procedures in qualitative research (Syed & Nelson, 2015), the second author then completed a reliability analysis on the themes by coding 20% of the data independent of the first author. The structure and content of the themes coded by the second author matched those identified by the first author almost exactly, and minor disagreements were resolved via consensus.

Results

This study was a mixed-methods investigation seeking to explore how variability affects people who stutter in comparison to how other aspects of stuttering; and two, to learn more about which aspects of stuttering are experienced as variable. The first purpose involved both quantitative and qualitative methods, while the second was purely quantitative. Results for each analysis are presented separately.

Quantitative Data

How does Variability Affect People who Stutter?

Analyses revealed that the most frustrating aspect of stuttering for these respondents was the fact that they experience a sensation of feeling stuck when speaking (see Tichenor & Yaruss, 2019b, for discussion of how common this sensation is). In the present study, 81.7% of participants indicated that they experience a large or medium amount of frustration due to the fact that they stutter. Of the remaining 20 items representing different aspects of the experience

of stuttering, items related to variability were rated as the next most frustrating. Specifically, 72.8% of participants indicated that they experience a large or medium amount of frustration because they stutter more at some *times* and less at other times, and 72.6% of participants indicated that they experience a large or medium amount of frustration because they stutter more in some *situations* than in others. Fully 68.2% of participants reported that they experience a large or medium amount of frustration directly related to the variability of stuttering. These data indicate that variability is among the most frustrating aspects of stuttering experienced by adults who stutter. The aspects of stuttering reported as *least* frustrating were related to limitations stuttering may cause in daily life. Specifically, 43.7% of participants reported that they experience a large or medium amount of frustration related to how “how much stuttering limits me in daily life.” And, 36.1% of participants reported that they experience a large or medium amount of frustration with choosing to text rather than make a phone call. Figure 1 presents the degree of frustration experienced by participants across different aspects of the condition.

How Common is the Experience of Variability?

Participants were asked “Do you experience variability with stuttering?” Of the 202 participants who answered that question, 196 (97%) indicated that they do experience variability. Thus, variability of stuttering was reported to be pervasive among this large sample of adults who stutter.

Which Aspect(s) of Stuttering are Variable?

A three-factor structure was identified for the variability items. For ease of interpretation, these three factors are referred to as *More-External* (e.g., frequency and duration), *More-Internal* (e.g., physical tension and covert behaviors), and *Cognitive-Affective* (e.g., negative thoughts and feelings about oneself). The structure of the items revealed some items with low factor loadings.

Items of factor loadings of less than .3 were considered not to significantly measure the construct (Hair et al., 1998) and were removed from the factors (Field, 2003). Items were also investigated to prevent cross-loading on factors. Items that did not load significantly higher on one factor were excluded from both factors (Matsunaga, 2010). Cronbach's alpha was then calculated on each factor to establish internal consistency (Cronbach, 1951). Table 2 shows the factor loadings, factors, and internal consistency coefficients. The internal consistency coefficients were acceptable for the first and third factors (Cortina, 1993). The average inter-item correlation between items comprising factor 2 was .27, indicating an acceptable mean inter-item correlation (Briggs & Cheek, 1986, define acceptable factor loadings as having mean inter-item correlations between .2 and .4). Responses to the items that loaded on the three factors are graphically represented in Figure 2.

The most variable aspects were the *frequency* and *severity* of stuttering: 74.9% of respondents indicated that *frequency* was often or always variable, and 72.3% of respondents indicated that *severity* was often or always variable. The least variable aspects were *how stuttering makes me think about myself* and *the negative thoughts and feelings regarding stuttering*. These least-variable aspects were reported to be not at all variable or only slightly variable by 65.4% and 62.7% of participants, respectively. The distributions in responses visualized in Figure 2 parallel the *More-External*, *More-Internal*, and *Cognitive-Affective* factors listed in Table 2, so items are grouped via those factors for ease of interpretation. Overall, the most variable experiences were the *More-External* ones, including frequency, duration, severity, and perceived speaking effort. The *More-Internal* items, including physical tension and covert behaviors, were in the middle of the continuum; slightly variable and often variable were the most-reported Likert responses for these items. The two *Cognitive-Affective* items, i.e., *how*

stuttering makes me think about myself and the negative thoughts and feelings regarding stuttering, were least variable. Overall, the data support past literature suggesting that adults who stutter commonly experience variability and that the more external features of stuttering are more variable than the more internal features (see Constantino et al., 2016).

Qualitative Analyses

Analysis of the participants' responses to the open-ended questions in the survey revealed 418 significant statements across the responses of the 204 participants. These significant statements were combined into meaning units by similarity, culminating in an initial set of 29 broad categories describing participants' experience of variability. These initial categories were further reviewed and combined, in an iterative fashion based on commonality, to form themes. A list of themes is shown in Table 3, and detailed descriptions of themes are described below. The quotes presented in the text represent examples of the statements that describe themes. They are presented to illustrate the meaning of the themes for this large sample of people who stutter. Some of the quotes presented here represent more than one theme. This corresponds to the multifaceted ways in which participants described *variability* in relation to stuttering. Not every instance of a theme is included here for brevity; rather, the quotes are used to "bring in the voice of the participants" and to provide examples of the themes (Creswell, 2013, p. 219). Note that participant numbers were assigned before some participants were excluded from analysis.

All Aspects of Stuttering Vary

Participants described how all aspects of stuttering are variable across both time and place. While no single participant indicated that they experienced variability in every aspect of stuttering, participants as a group indicated that they experience variability in the frequency,

duration, types of behaviors, their reactions to stuttering, and the impact of stuttering on their lives.

P(3): Who doesn't experience variability in stuttering? To me, variability IS stuttering. Everything about stuttering varies.

P(77): ...Aspects of stuttering that are variable to me are fear of stuttering, amount, and duration of stuttering.

P(59): ...At times I can speak fluently without any trouble, then at other times there is a particular sound or word that I can't force out of my mouth or I struggle to begin speaking at all.

P(39): My stuttering is variable in its severity...

P(83): Variability also means that there are times when I struggle on certain words...for long periods of time and suddenly I am fine with those words but struggle with different words that I previously had no difficulty with.

P(141): I view variability in stuttering as the differences in tension, how big my blocks are, and the types of stutters I experience. There will be days when my blocks are very small and I can easily get out of them, and other days when I seem to struggle on every word. I will stutter every day, so that is not a variable part of stuttering but the intensity and type of stutters are.

Variability Across Time

Variability across time was discussed as a central component to variability. Importantly, participants described both short-term fluctuations (e.g., minutes, hours, and days) as well as longer-term fluctuations (e.g., weeks, months, seasons, years).

P(16): Variable in terms of time of day, actual day, week, or month. Frequency of disfluency is variable; could be fluent for days then a return to dysfluency for weeks/months...

P(22): ...Fluency in general, is highly variable in my experience. I can speak fluently for 2 weeks, and then have a 2 month period where I can hardly say my child's name...

P(30): Variability is when stuttering goes through spells of good and bad times. I can often find myself snowballing into a pattern of time when I stutter more, then have good spells when I do not stutter for days or weeks!

P(120): ... Some days/week/months/years I'll hardly stutter, and sometimes I stutter a couple times in every sentence.

P(145): ... When I was young, the period when I spoke fluently [or] when I couldn't speak a single word was very short (like a week with stuttering and two or three days without stuttering). But, when I grew up, this period was very long (like 3 or 4 months with stuttering and a one or two months without stuttering).

Variability Across Situations

Variability across situations or places was also discussed as a central component to variability. The situations and locations discussed were individualized; no single situation or location was discussed as more variable by all participants. In fact, the same location was sometimes mentioned as being more stable by one person but more variable by another (e.g., speaking on a telephone).

P(20): ... I stutter more frequently in some circumstances and less frequently at others. It depends on the situation,... who I'm speaking to, how much pressure there is (e.g., competing to talk, talking over each other, etc.) or how polite the listener/audience is.

P(32): I never stutter when talking to myself, stutter a little bit when talking to my friends, and stutter a lot when in school or around a bunch of people.

P(33): ..The variability of stuttering in contexts also happens to me—sometimes when I speak to a room full of strangers, the ones that I work with vs. the ones that I don't changes my speaking experience (more stuttering with people that I am associated with in some way even if I don't know them).

P(45): Stuttering is very situational for me and depends on context, conversational partners...If I can practice a presentation or speech I have to give I will stutter significantly less than if I have to speak in front of people off the cuff. The severity of stuttering is dependent on the context of the speech-moment.

P(154): [Stuttering] becomes less when you are more friendly with someone...especially on the telephone... Sometimes I stutter only a few times in a whole conversation but on other occasions I try to prolong the sentences and substitute words to avoid stuttering.

P(53): I experience severe stuttering when I talk in public. I stutter a bit if I talk to my family. [I have a] mild stutter when I talk to people outside, i.e., in public transportation. I also stutter a lot if I talk to phone of telephone, to a teller, or to customer support making for an inquiry or something.

Individuality

In addition to the *Variability Across Time* and *Variability Across Situation* themes, participants also discussed their idiosyncratic relationship with various aspects of speaking and communicating that make their experience of stuttering more or less variable. The term *individuality* was chosen as a way of describing these specific relationships to stuttering and its variability. For example, participants reported that certain words, phrases, sounds, or syllables, are experienced as more or less variable in a way that is meaningful to them, both personally and individually. This person-centered meaning was described as a central experience of variability related to stuttering.

P(36): Sometimes I only stutter on "s" words, but other times it seems like it could be anything...There are certain "s" consonants that I will always stutter on, so that is not variable...But other times, I can say some "s" words fine and speak mostly fluently...

P(67): To me, variability means how my fluency and problem letters change over time...For me, the letters sets seem to cycle monthly...for example, some problems letters similar to "th" will be hard for a month only to go away and have the "b" letter family have issues.

P(72): Some words are always troubling, while others it's occasional.

P(114): I experience variability in the flow of speech during conversation. Sometimes my explanations get stuck on words that I did not have trouble with at other times...There is sometimes variability in the location of where I stutter in a word. Mostly it's on the first sound or syllable of words, but sometimes, unexpectedly, it will be in the middle of a words

P(190): Over the course of time certain sounds or parts of words are more likely to be a disfluency point than others, but that also changes...I have had years where a "s" sound would be more generally more disfluent than others, but that changes. I have also had stretches of time where "f" sounds have a higher rate of disfluency. But this changes and has no discernable beginning or end...

The Effects of Adverse Impact on Variability

Adverse impact (e.g., the negative thoughts, feelings, behaviors, and associated real-world limitations) was reported to be a cause of increased amounts of variability related to

stuttering. Variability was described as increasing or decreasing as a function of the how much adverse impact the speakers experience on a moment-by-moment basis.

P(127): When I am tired, stressed, or pressured to talk, my stuttering is much worse.

P(129): ... in more relaxed situations, stuttering is less frequent; in situations where I am excited, stressed, or tired, stuttering is more frequent.

P(142): From what I can gather, the variability has a lot to do with how I am managing my internal state of being...when I'm feeling highly self-conscious I tend to be less focused on being present and more impacted by outside stimuli... [I] end up devoting my resources to maintain a sense of calm, which to a degree impacts my ability to just communicate freely. I find that when I'm thinking about my speech I tend to be more susceptible to a higher frequency and duration of moments of stuttering...The more openness that I have, the less focused I am on anticipating and trying to prevent stuttering and I just slip into modification tools with ease if a moment of stuttering surfaces.

The Essential Structure of Variability

Based on the results presented above, an essential structure of the experience of variability from the perspectives of participants was developed:

Behaviors, thoughts, and feelings related to stuttering and their associated real-world limitations are experienced by adults who stutter to vary across time and situation. As a group, adults who stutter experience variability in all aspects of the stuttering condition. Individuality distinguishes adults who stutter from one another in terms of which aspects are experienced as more or less variable. Greater levels of adverse impact of these features can cause increased amounts of variability to be experienced in other areas. This compounding nature of variability and adverse impact is a central component of the stuttering condition.

This essential structure, which was derived from analysis of the qualitative data, can be combined with the results of the quantitative analysis, which showed that some aspects of stuttering vary more, while other aspects of stuttering vary less. Together, these findings provide a comprehensive picture of: (a) how people who stutter experience variability and (b) the ways that this variability affects them in their daily lives.

Discussion

This study explored variability related to stuttering in order to determine how variability affects people who stutter in comparison to other aspects of stuttering; and two, to determine which aspects of stuttering are experienced as variable. The vast majority of adults who stutter in this study (97%) reported that they experience variability related to stuttering. Moreover, variability was the second most frustrating aspect of the condition for these respondents. The only aspect of stuttering that was rated as more frustrating was the fact that people who stutter feel stuck in their speech (i.e., that they stutter). These findings highlight the clinical and theoretical importance of variability in relation to stuttering. Though many clinicians and researchers have long highlighted variability as a hindrance to accurate measurement of stuttering (Conture, 1990; Costello & Ingham, 1984; Gordon & Luper, 1992; J. C. Ingham & Riley, 1998; O'Brian, Packman, & Onslow, 2004; Sawyer & Yairi, 2006; Starkweather, 1987; Van Riper, 1982; Yaruss, 1997a), the present findings highlight that variability itself is pervasive and that it negatively impacts the lives of adults who stutter. This underscores the importance of considering variability in evaluation, assessment, and treatment and suggest that variability may have been overlooked and under-considered in prior treatment and research endeavors.

Data from this study also expand upon past research suggesting that Participants in this study reported that *More-External* features of stuttering (e.g., frequency and duration of speech disfluencies) are more variable than *More-Internal* features (e.g., physical tension and covert behaviors). More internalized and covert behaviors (e.g., the amount of physical tension experienced with stuttering or when not stuttering, and avoiding sounds, words, or situations) were reported as more variable than cognitive-affective experiences (e.g., sense of self and negative thoughts). These findings indicate that internalized reactions or covert behaviors (Constantino et al., 2017; Douglass & Quarrington, 1952; Murphy et al., 2007; Tichenor et al.,

2017; Tichenor & Yaruss, 2019a) should be assessed and addressed at various timepoints and in different situations, just as overt behaviors should be (Costello & Ingham, 1984). By not assessing covert features in this manner, a clinician may misunderstand a person's underlying experience of stuttering, underestimate the impact of stuttering on the speaker's life and, potentially, though unintentionally, limit progress in therapy.

The qualitative data from this study further support the idea that variability should be a central consideration in diagnosing and treating the stuttering condition. The ways in which participants highlighted their individual experiences of variability are reminiscent of the ways in which people who stutter, more broadly, experience stuttering. Tichenor and Yaruss (2019b) described the *phenotype* of a person's individual experience of the stuttering condition and differentiated that phenotype from the many other ways that other people who stutter may experience their own stuttering. Thus, people who stutter experience individuality in their affective, behavioral, and cognitive personal reactions, as well as in the ways that those reactions result in real-world impact. Similarly, although there were commonalities across this large group of participants, individual participants in this study reported that they experience variability in their own unique ways. The aspects of stuttering that vary differed from person-to-person, indicating that clinicians should not overgeneralize their assumptions about the experience of stuttering or its variability. Still, quantitative data in this study suggest that some aspects of the stuttering condition are experienced to be more variable (*More-External Features*) and less variable (*Cognitive-Affective Aspects*) across the large sample of adults who stutter in this study. Variability itself may occur as the summative effect of underlying etiology, primary impairments, personal factors, limitations, and external factors (Tichenor & Yaruss, 2019b; Yaruss & Quesal, 2004), and its manifestation in the life of an individual person who stutters is

person-specific. Thus, clinicians should assess the experience of variability related to stuttering *individually* within each subject to guide treatment.

Not incorporating variability as one guide to treatment may increase the adverse impact (negative personal factors and increased real-world limitations) a person who stutters experiences. Specific quotes from participants highlight such a possibility. For example, P(142) stated

Variability has a lot to do with how I am managing my internalized state of being...when I'm feeling highly self-conscious, I tend to be less focused on being present and more impacted by outside stimuli... [I] end up devoting my resources to maintain a sense of calm, which to a degree impacts my ability to just communicate freely. I find that when I'm thinking about my speech, I tend to be more susceptible to a higher frequency and duration of moments of stuttering.

Comments such as these highlight the clinical implications of the current findings, in that variability itself is contributing to the adverse impact people who stutter experience. Specifically, recent research has highlighted the impact of undiffused thoughts and emotions. Tichenor and Yaruss (2020b) found that adults who stutter who engage in high degrees of repetitive negative thinking (RNT) are more likely to have greater levels of adverse impact related to stuttering than adults who stutter who engage in RNT less frequently. Consistent with this finding, Constantino et al. (2020) found that individuals who are more spontaneous with communication experience significantly less adverse impact related to stuttering. Current findings suggest that therapies that encourage increased spontaneity and decreased repetitive negative thinking may help to decrease variability, perhaps by helping people learn to cope with variability and thereby minimize the impact of variability on people's lives. Fortunately, many current approaches to stuttering

treatment seek to help speakers understand their thoughts associated with stuttering and to defuse their emotional reactions from those thoughts (Beilby et al., 2012, 2013; Blood, 1995; Boyle, 2011; Cheasman, 2013; Emerick, 1988; Gupta et al., 2016; Harley, 2018; Helgadóttir et al., 2014; Kelman & Wheeler, 2015; Kuster et al., 2013; Menzies et al., 2008, 2009; Plexico & Sandage, 2011; Van Riper, 1973). Importantly, such therapeutic approaches have been shown to decrease some of the adverse impact related to stuttering (Menzies et al., 2008). A clinician who uses such holistic treatment approaches may thereby increase a person's resilience and decrease the likelihood that they will be negatively impacted by variability.

Future Directions and Limitations

This study explored the experiences of variability related to stuttering in adults who stutter. Although the large sample size and detailed qualitative analyses convey confidence in the findings, there are still limitations that must be considered when these results are applied to future research and clinical endeavors. For example, preliminary research has shown that people who stutter who live in different countries or cultures may experience the adverse impact related to stuttering differently (e.g., that there are differences in public perceptions of stuttering across cultures, see St. Louis et al., 2016, for review). Such differences in personal and public perceptions may influence how people experience stuttering in general. Given that variability places a significant burden on people who stutter, it may be fruitful to study whether this burden might be affected by societal perceptions in addition to self-perceptions. Furthermore, the third factor of *Cognitive/Affective aspects* of stuttering was comprised of only 2 items. Though this is the absolute minimum for exploratory factor analyses (Worthington & Whittaker, 2006), and the reliability of this factor was acceptable ($\alpha = .76$), future research should replicate this finding with more items to increase confidence in the factor and the findings more broadly.

Future qualitative work in this area should also explore the experiences of variability as they develop over time. Given that the data from this study come from adults, care should be taken when applying these findings to children. It is possible that children and adolescents who stutter may experience differing degrees of variability or that different aspects of their experience of stuttering might vary in different ways. Exploring these possible differences may add valuable understanding to the development of variability and its impact over time.

Quantitative data from this study suggest that *More-Internal* aspects of stuttering (e.g., frequency, struggle, duration, etc.) are experienced as variable, though not to the same degree as *More-External* features (e.g., tension, avoidance, reactions of others). Past researchers have suggested using speech samples over multiple time points or in multiple environments as a way to capture a measure of the person's *true* stuttering that is indicative of the person's speech in the real-world (Costello & Ingham, 1984; Gordon & Luper, 1992; J. C. Ingham & Riley, 1998; O'Brian, Packman, & Onslow, 2004; Sawyer & Yairi, 2006; Yaruss, 1997a). A critical and open question remains of how much or how many speech samples are enough to capture a person's experience of stuttering— or even whether there is such a construct as a single, “true” stuttering, if the experience is inherently variable. Future research should more directly address this with *in situ*, with day-long, week-long, or month-long speech samples collected in numerous real-world situations and with different conversation partners as a person lives their life. Relatedly, future work should expand the items in this study to other aspects of the overall experience of stuttering (e.g., acceptance or communicative effectiveness) to ascertain whether these aspects of the stuttering condition are also experienced as being variable.

Summary

This study demonstrates that variability related to stuttering is one of the most frustrating aspects of living with the condition and that variability of all aspects of stuttering is common for people who stutter. The qualitative data further highlight the importance and nature of variability as it relates to both clinical work and research with people who stutter. Accounting for variability in a way that is consistent with the experiences of people who stutter may therefore lead to more accurate assessment, more effective treatments, and greater generalizability of research findings.

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