

Use of monolingual English guidelines to assess stuttering in bilingual speakers: A
systematic review

Courtney T. Byrd, PhD., CCC-SLP^a, Danielle Werle, ABD, CCC-SLP^a, Geoffrey
Coalson, PhD., CCC-SLP^b, Kurt Eggers, PhD^{c,d}.

*^aCommunication Sciences and Disorders, University of Texas at Austin, Austin, United States;
University Station A1100, Austin, TX 78759, USA*

*^bDept. of Communication Sciences and Disorders, Louisiana State University, 68 Hatcher Hall,
Field House Drive, Baton Rouge, LA, 70803*

*^cDept. of Speech-Language Therapy and Audiology, Thomas More University College, Belgium
Molenstraat 8 2018 Antwerp, Belgium*

*^dDept. of Psychology and Speech-Language Pathology, University of Turku, Finland
20500 Turku, Finland*

Abstract

Speech-language pathologists can identify stuttering in multiple languages, even if they do not speak the language. However, due to differences in language development, multilingual speakers have been documented with higher levels of typical disfluencies in their speech than monolingual speakers. These higher levels of disfluency put multilingual speakers at greater risk for misdiagnosis as individuals who stutter, due to poor understanding of the nature of the manifestation of stuttering in two or more languages and reliance on monolingual-English diagnostic criteria. The purpose of the present systematic review is to explore how stuttering is identified in multilingual speakers who are described as participants who stutter, and whether monolingual English-speaking guidelines were the most commonly used reference for determining the presence of stuttering.

Key Words: Stuttering, Multilingualism, Bilingualism, Diagnosis, Assessment, Review

Introduction

Speech-language pathologists commonly report challenges evaluating children who speak more than one language (e.g., Boerma & Blom, 2017; Grimm & Schulz, 2014; Hemsley, Holm, & Dodd, 2014). The variation in speech-language development that is inherent to multilingualism is often misinterpreted as a disorder (e.g., Bedore & Peña, 2008; Paradis, Genesee, & Crago, 2011). It has also been reported that children who lack native-like proficiency in both their first and second languages are at significantly higher risk for false positive identification as having a language impairment (Kohnert, 2010). Recent research suggests this risk of misdiagnosing typically developing multilingual children as disordered may extend to developmental stuttering (Byrd, Watson, Bedore, & Mullis, 2015a).

Assessing typical and atypical speech disfluencies

Preliminary data demonstrate clinicians have significant difficulty discriminating typical from atypical speech disfluency in children who speak both Spanish and English (Byrd et al., 2015a). Recent findings also suggest that speech-language pathologists inaccurately perceive speaking more than one language as a risk factor for the onset and/or persistence of stuttering (Byrd, Haque, & Johnson, 2016). This misidentification and misperception may be related to the minimal criteria used to determine multilingualism in speakers who stutter (Eggers, 2010; Coalson, Peña, & Byrd, 2013; Werle, Byrd, & Coalson, 2019) and, more pertinent to this study, the inappropriate criteria used to determine stuttering in speakers who are multilingual. Given that the typically fluent multilingual child produces frequencies of disfluencies that is higher than that reported for monolingual children who stutter, the standard practice of diagnosing stuttering based on criteria derived from monolingual English speakers may result in an overrepresentation of stuttering within the multilingual population.

Assessment of speech disfluencies provides valuable insight into the linguistic and motoric effort required for spoken communication in multilingual speakers. Expressions such as “word fluency” and “second language fluency” tasks reflect this concept. Breakdowns in speech fluency are more likely when children attempt to produce utterances that are longer and/or more grammatically complex than their emerging linguistic capacity (Zackheim & Conture, 2003). Whether the multilingual speaker has limited and/or high proficiency in both languages, their linguistic knowledge is not limited to one language; rather, it is spread across the two or more languages they speak (Bedore & Pena, 2008). Thus, it is not surprising that multilingual children experience elevated levels of disfluency as, unlike monolingual children, they have to navigate more than one language system (Bedore, Fiestas, Peña, & Nagy, 2006; Byrd, Bedore, & Ramos, 2015b; Byrd, 2018).

Identifying stuttering in multilingual speakers

Multiple studies confirm that speech-language pathologists can use monolingual English guidelines to accurately assess stuttering in non-English monolingual speakers (e.g., Dutch: Boey, Wuyts, Van de Heyning, De Bodt, & Heylen, 2007; French: Leclercq, Suaire, & Moyse, 2017; German: Natke, Sandrieser, Pietrowsky, & Kalveram, 2006; cf. Watson, Byrd, & Carlo 2011). Further research indicates that clinicians can identify stuttering severity in speakers of more than one language with high levels of accuracy, even when they are unfamiliar with the languages the speakers’ are producing (Bosshardt, Packman, Blomgren, & Kretschmann, 2016; Cosyns, Einarsdottir, & Van Borsel, 2015; Hoffman, Wilson, Copley, Hewatt, & Lim, 2014; Lee, Robb, Ormond, & Blomgren, 2014). Discriminating whether disfluencies are typical or atypical in multilingual speakers who do stutter versus those who do not may prove to be more

challenging than previously thought, particularly if the speech-language pathologist is using the monolingual English-speaking guidelines to guide their diagnostic decision. .

For example, in Byrd et al. (2015a), 14 bilingual Spanish-English speech-language pathologists were asked to diagnose two Spanish-English bilingual children based on retell narratives in both languages. One of the bilingual children who provided the sample was confirmed by their clinician, teacher, and parents to be a child who stutters, while the other was confirmed by the same parties to be a typically fluent child. Although 10 of the 14 clinicians correctly identified the child who stutters, 12 of the 14 falsely identified the typically fluent bilingual child as a child who stutters. These data demonstrate that bilingual Spanish-English children may be vulnerable to misdiagnosis of developmental stuttering, even by experienced Spanish-English bilingual clinicians who have been practicing for more than 20 years.

The bilingual speech-language pathologists in Byrd et al. (2015a) attributed their false positive identification of stuttering in the typically fluent multilingual child to the child's frequent production of sound, syllable and monosyllabic word repetitions. Repetitions of sounds, syllables and monosyllabic words are one of four classic types of disfluencies that are considered to be "stuttering-like" according to the monolingual English guidelines proposed by Ambrose and Yairi (1999). These disfluencies are also included in the most widely-used measure to diagnose stuttering, the Stuttering Severity Instrument (SSI; Riley, 1972; 1980; 1994; 2009), the norms of which were also based on monolingual English speakers who stutter. According to Ambrose and Yairi's criteria, as well as the SSI, an average of three repetitions per 100 syllables is sufficient to be indicative of stuttering in children. When they were questioned as to what influenced their decision to identify the typically fluent bilingual Spanish English speaking child as a child who stutters, the bilingual speech-language pathologists in the study

by Byrd and colleagues reported that their reliance on these monolingual English guidelines as they were analyzing these speech samples contributed to their (mis)identification.

There are additional preliminary data that further confirm the apparent risk for false positive identification of stuttering in multilinguals may be compromised by an overlap in the speech behaviors considered typical and those that are considered to be stuttering in mono- versus multilingual (Byrd, 2015b; Eggers, van Eerdenbrugh & Byrd, 2019; Gkalitsiou, Byrd, Bedore & Taliancich-Klinger, 2017; Taliancich-Klinger, Byrd & Bedore, 2013). For example, Byrd et al. (2015b) explored the types and frequencies of speech disfluencies that are produced by typically fluent bilingual Spanish-English children ($N = 18$; 5 to 6 years old). Two Spanish and English narratives – story tell and re-tell – were provided by each child. Irrespective of language dominance, 14 of the 18 bilingual children exhibited a mean percent of “stuttering-like disfluencies” that exceeded 3 percent per 100 syllables. In fact, if the 3 percent guideline had been employed, the majority of these bilingual children would have been classified as children who stutter despite no child, parent, teacher or clinician concern regarding their fluency.

Misidentification of typically fluent Spanish-English bilingual children as children who stutter were recently replicated by Eggers et al. (2019) in Yiddish-Dutch speakers. Eggers and colleagues investigated the frequency and types of stuttering-like disfluencies in 59 typically developing bilingual Yiddish-Dutch speaking children. Participants (12 boys and 47 girls) were divided in two age categories: 6- to 7-year olds and 9- to 10-year olds. All children were Yiddish-dominant bilinguals with sufficient intelligibility in both languages. A conversational sample of at least 300 syllables was collected in each language. Similar to Byrd (2015b), the total amount of stuttering-like disfluencies produced was higher than the standard 3% stuttering-like disfluencies in both languages. The authors concluded that *typically fluent* bilingual Yiddish-

Dutch speaking children produce the types of disfluencies considered to be stuttering at a markedly higher frequency than what is considered to be indicative of stuttering in monolingual English children. However, these children, unlike their peers who stutter, do not have any parent, teacher, or self concern that they may be stuttering. Additionally, the disfluencies they produce are produced in an effortless manner with no excessive tension. However, if a clinician were to rely only and/or primarily on the monolingual English-speaking guidelines, these typically fluent bilingual children would be at risk for being classified as stuttering.

Taken together, these data suggest that the use of monolingual English guidelines for assessment of stuttering in multilingual speakers may yield false positive identification of stuttering in bilingual speakers who are, in fact, typically fluent, and that this risk is not limited to specific language dyads. In light of these data, it is critical to review past research related to stuttering in bilinguals to determine how many of these studies used the monolingual English-speaking guidelines for participant inclusion. Previous studies that have used these guidelines may need to be re-assessed with the understanding that the bilingual participants may have been mis-identified as stuttering, when in fact they were typically fluent bilingual speakers who were producing disfluencies that were the result of navigating two languages.

Purpose of the present study

In summary, preliminary data demonstrate the use of monolingual English-speaking guidelines with bilingual speakers could lead to false positive identification (e.g., Byrd 2015a). Research has also demonstrated that the vast majority of investigations of bilinguals in the stuttering literature have been limited in the manner in which bilingualism is defined (for review, see Coalson et al., 2013; Werle et al., 2019). However, to date, it is not clear whether these studies of the manifestation of stuttering has also been compromised by the manner in which

stuttering has been identified in the participants who were included. The purpose of the present study is to explore how stuttering is identified in bilingual speakers who are described as participants who stutter, and whether monolingual English-speaking guidelines were the most commonly used reference for determining the presence of stuttering.

Methods

A systematic review was conducted to identify the number of studies using multilingual participants who stutter. Descriptions provided for classification as a person who stutters, or inclusion criteria with respect to stuttering for multilingual participants were identified and examined to explore the reliance on monolingual frequency guidelines. Methodological procedures for database searches, terms, inclusionary and exclusionary criteria, as well as the review procedure replicated those used by Coalson et al. (2013) and Werle et al. (2019).

Search procedure and inclusionary criteria

Two online databases were searched to identify qualifying studies: (1) EBSCO (see Coalson et al., 2013; Werle et al. 2019) for full list of databases included in EBSCO) as well as Google Scholar. Literature was searched from 1900 through December 2018. Search terms included combinations of *bilingual*, *bilingualism*, *multilingual*, *multilingualism*, *stuttering*, *stutter*, *stammer*, and *stammering*. Unique combinations of each variation of multilingualism and stuttering resulted in 16 different search terms.

For each document identified as relevant through the initial review procedure (described below), abstracts and methods were reviewed by the second author and a research assistant. Studies were included in the final review if the following inclusionary criteria were met: (1) multilingual participants who stutter were examined, (2) original data was reported, and (3) full text was published or translated into English. Articles were excluded from the final analysis if (1)

not reviewed in peer-reviewed journal (e.g., theses, conference proceedings or posters), (2) participants who stutter did not speak two or more languages, (3) stuttering was acquired, not developmental, in nature, meaning that the speaker had sudden adult onset of stuttering as the result of a traumatic neurological event (4) the manuscript lacked original data, or (5) full text was not available in English.

Review Procedure

The 16 search terms across the two databases resulted in 5,365 unique entries. The titles and abstracts of these items were reviewed by the second author and a research assistant for relevance according to inclusionary and exclusionary criteria. Of these, 369 were included for more detailed review of methods. One hundred sixty-two of this subset were unpublished theses or conference proceedings. One hundred fourteen contained participants who, per researcher report, were multilingual participants who did not stutter, or monolingual participants who stuttered. Ten papers were not available in English. Thirty-two papers did not report original data. Two studies included stuttering described as neurogenic rather than developmental in nature, and one study could not be accessed via online databases or inter-library loan.

Additionally, six papers (Jayaram, 1982; 1983; 1984; 1989; Kornisch, Robb, & Jones, 2017a; Kornisch, Robb, & Jones, 2017b) utilized the same cohort of participants in multiple studies. Given that they were the same participants across the studies, we only included Jayaram (1983) and Kornisch et al. (2017a), as the participants were described in the greatest detail in these two studies. . Studies included in this review are marked with an asterisk (*) in the references (see Appendix A for all studies included).

Diagnostic Criteria

Description of participant characteristics used to determine that the multilingual participant was a person who stutter was reviewed. Diagnostic criteria were limited to these sections, and all subsequent descriptions of stuttering manifestation were excluded from the analysis. Every unique descriptor of diagnostic criteria was recorded. Each description was then categorized by its relationship to monolingual frequency guidelines of 3% stuttering-like disfluencies per 100 syllables. This was done to assess diagnostic criteria that stemmed from, though did not explicitly state, monolingual guidelines.

Results

Number of publications

Results of the analysis will first be presented for all studies identified in the review ($N = 44$), followed by studies specifically focusing on children ($N = 23$). In total, 44 independent studies with multilingual participants who stutter were published between 1900 and December 2018. Twenty-nine of these investigations were descriptive in nature - either describing the manifestation of stuttering in multilingual participants who stutter, or describing characteristics of multilingual participants who stutter. Eleven studies focused on the treatment of multilingual people who stutter, and four studies reported the prevalence of stuttering in multilingual populations.

Consistency of diagnostic criteria

Across the 44 studies, 18 unique descriptors of diagnostic criteria were employed. The frequency of each of the 18 unique descriptors with definitions are listed in Table 1. Of note, the descriptor “DSM IV Criteria” refers to researchers utilizing the definition offered in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders which is widely used by clinicians, policy makers, and the legal system to categorize and define specific conditions

(American Psychiatric Association, 2000). The most frequently used diagnostic criteria was teacher or family report, used in 15 of the 44 studies (34%), which was reported with higher frequency than the following three descriptors: the presence of a previous diagnosis of stuttering (13 of 44 studies, 30%), use of the SSI (9 of 44 studies, 20%), and researcher judgment (8 of 44 studies, 18%) (For complete detail of which descriptors each study utilized, see Appendix A).

Table 1. Unique descriptions of diagnostic criteria and their frequency of use across studies including multilingual participants who stutter through December 2018.

Descriptor	Definition	Use
1. Teacher / Family Referral	Teacher or family member referred participant for presence of stuttering.	15/44 (34%)
2. Previous Diagnosis	Author stated participants were previously diagnosed with fluency disorder.	13/44 (30%)
3. SSI	A published version of the <i>Stuttering Severity Instrument</i> was employed.	9/44 (21%)
4. Researcher Judgment	Diagnostic criteria not stated, or author determined talker group.	8/44 (18%)
5. Monolingual Frequency – 1 language	Frequency of stuttering-like disfluencies were analyzed for one language. Participant considered to be a person who stutters if their stuttering frequency met guidelines set forth by researchers.	7/44 (16%)
6. Previous Treatment	Participant received previous treatment for stuttering.	6/44 (14%)
7. Length of Time Stuttering	Length of time participant stuttered, as reported by participant, SLP, and or teacher/family.	5/44 (11%)
8. Self-Report: Diagnosis	Participant self-report of presence of stuttering.	4/44 (9%)
9. Self-Report: Severity	Participant self-report of stuttering severity.	4/44 (9%)
10. SLP Re-Evaluation	SLP confirmed presence of stuttering for specific investigation (compared to reliance on previous diagnosis).	3/44 (7%)
11. Monolingual Frequency – 2 languages	Frequency of stuttering-like disfluencies were analyzed for two languages. Participant considered participant to be a person who stutters if frequency guidelines set forth by researchers in each language.	3/44 (7%)

12. Judgment in Two Languages	Qualitative judgment for presence of stuttering by author, SLP, or teacher/family was made in two languages.	3/44 (7%)
13. DSM IV Criteria	Diagnosis according to DSM IV must include “one or more” frequent occurrences of SLDs by type, quality, or interference with academic achievement.	2/44 (5%)
14. Qualitative Disfluency Count	Disfluency counts of speech samples analyzed for disfluency type, frequency, and production quality.	2/44 (5%)
15. “Survey” in two languages	No further author description.	1/44 (2%)
16. “Standard Clinical Assessment Tasks”	No further author description.	1/44 (2%)
17. Iowa Scale for Rating the Severity of Stuttering	Composite scale across several variables with a range of 0-7	1/44 (2%)
18. Severity Rating – SLP	Nine-point severity scale to assess stuttering severity, as rated by an SLP.	1/44 (2%)

Use of diagnostic descriptors were not consistent across studies, particularly with respect to those that relied on monolingual guidelines. Of the 10 studies that diagnosed stuttering based upon frequency in one or both languages (descriptors 5 and 11 in Table 1), six (60%) reported the specific frequency cutoff for stuttering diagnosis. Of these six, only two utilized the 3% stuttered syllables criterion, while the other four utilized a less stringent requirement of 2% of stuttered syllables.

To assess internal consistency, we examined how many different descriptors researchers used to confirm stuttering in bilingual participants in each study. This analysis was completed to elucidate whether researchers utilized a combination of primary and secondary sources to confirm stuttering, or if they relied on a single source, and if so, what source did most researcher consistently rely upon. In terms of consistency within each of the 44 studies, the number of different descriptors utilized in a single study ranged from one to five (median = 2). Sixteen of the 44 studies (36%) classified stuttering with only one descriptor. These single descriptors

consisted of a version of the SSI ($n = 5$), previous stuttering diagnosis ($n = 2$), teacher or family report ($n = 2$), self-reported diagnosis ($n = 2$), a “survey” in two languages ($n = 1$), and researcher judgment ($n = 2$)(Appendix A). Thus, five of the six criteria that were used in isolation were either derived from monolingual diagnostic criteria or were unclear in how stuttering was diagnosed. The 34 remaining studies utilized at least two criteria to diagnose stuttering in multilingual participants.

Use of monolingual guidelines for multilingual participants

To compare how frequently monolingual guidelines were applied for multilingual participants, the 18 unique descriptors were grouped into the following four categories: (1) descriptors that include monolingual guidelines, (2) alternative descriptors that do not rely on monolingual guidelines (e.g., qualitative disfluency counts, teacher or family judgment, self-report), (3) vague, unclear descriptors (with respect to reliance on monolingual guidelines) (e.g., “standard clinical assessment tasks”), or (4) a combination of use of monolingual guidelines and unclear descriptors. As displayed in Table 2, five descriptors relied on monolingual guidelines, eight descriptors did not, and five were unclear.

Table 2. Frequency of diagnostic descriptors that relied on English-monolingual guidelines across studies including multilingual participants who stutter through December 2018.

<i>Category</i>	Descriptors	Overall		Children	
		Use	Exclusive Use	Use	Exclusive Use
<i>Monolingual Criteria</i>	1. Previous Diagnosis	25/44	12/44	12/23	6/23
	2. SSI	(57%)	(27%)	(52%)	(26%)
	3. Monolingual Frequency – One Language				
	4. Monolingual Frequency – Two Languages				
	5. DSM-IV				

<i>Alternative Criteria other than Monolingual Guidelines</i>	1. Self-Report: Diagnosis 2. Teacher/Family Referral 3. Iowa Scale for Rating the Severity of Stuttering 4. Self-Report: Severity 5. Qualitative Disfluency Counts 6. Length of Time Stuttering 7. Previous Treatment 8. Severity Rating by SLP	26/44 (59%)	7/44 (16%)	15/23 (65%)	6/23 (26%)
<i>Unclear or Vague Criteria</i>	1. SLP Re-Evaluation 2. “Survey” in Two Languages 3. “Standard Clinical Assessment Tasks” 4. Researcher Judgement 5. Judgement in Two Languages	17/44 (39%)	4/44 (9%)	7/23 (30%)	2/23 (9%)
<i>Combination</i>	1. Reliance on Monolingual and Unclear/Vague Criteria	18/44 (41%)		8/23 (35%)	

Note. Values reflect the number of studies that included one or more of the descriptors listed within each category. Studies that used multiple descriptors within the same category (e.g., monolingual frequency and SSI) were tallied once within each category to avoid inflated representation across categories.

Twenty-five of the 44 studies (57%) reviewed included at least one diagnostic descriptor that relied on monolingual guidelines. Of these, 12 studies (27%) exclusively used monolingual guidelines to describe monolingual participants who stutter. Twenty-six of the studies (59%) included at least one alternative descriptor that did *not* rely on monolingual frequency guidelines, such as qualitative disfluency counts, or self-reports of stuttering severity. Seven of these studies (16%) exclusively used these alternative diagnostic descriptors. These results suggest that the

majority of studies relied on the monolingual guidelines to make their decisions regarding whether or not the participant was a speaker who stutters, but they also included alternative guidelines, rather than limiting their decision to use of the monolingual guidelines alone. However, results also revealed that for those studies that employed only one criterion, for the majority the one criterion was the monolingual guidelines.

The remaining studies relied on less specific criteria. Seventeen studies (39%) included at least one descriptor that was vague or unclear in terms of use of monolingual guidelines. Four studies (9%) exclusively utilized vague descriptors such that accuracy of diagnosis of stuttering cannot be determined. Most striking, 18 studies (41%) either exclusively relied on monolingual frequency guidelines, used ambiguous descriptors, or both to classify multilingual participants who stutter. In sum, nearly half of all studies reviewed utilized either inappropriate and potentially inaccurate criteria to diagnose stuttering, which calls into question the validity of the results of these studies.

Based on the unique challenges inherent to diagnosis of stuttering in children versus adults, an additional analysis was completed to investigate whether studies that focused on children may employ more comprehensive or stringent diagnostic guidelines. As depicted in Table 2, patterns of diagnostic criteria within the 23 studies that focused exclusively on children differ with respect to diagnosis of stuttering across all 44 studies (Appendix A). While the proportion of studies that include diagnostic criteria that rely on monolingual guidelines is similar to the overall pattern, studies investigating stuttering in children more frequently and more exclusively used alternative diagnostic criteria. This suggests that when faced with the task of differentially labeling normal disfluencies that arise from the development of multiple

languages rather than the presence of developmental stuttering, researchers may be aware that monolingual guidelines alone are not sufficient, and much more nuanced assessment is required.

Discussion

Crosslinguistic and bilingual research suggest that the frequency and types of speech disfluencies observed over the course of development vary with the specific languages spoken and proficiency in each language (Byrd, 2018). An increased number of speech disfluencies may reflect linguistic uncertainty with respect to their linguistic input and output in multiple languages. That is, they may be more or less disfluent in one language than the other depending how well they are able to both understand and produce each of those languages. Interestingly, research shows increased disfluencies when proficiency is high and when proficiency is low, suggesting that increased knowledge of the language may yield more decisions that can be made when formulating speech, and limited knowledge can also contribute to increased uncertainty that can compromise the speaker's speech fluency. Results from this review indicate that nearly half of the studies (41%) relied on monolingual English criteria to describe or qualify research participants as persons who stutter. Of the 44 studies, 18 (41%) either relied exclusively on monolingual diagnostic criteria ($n = 12$), used unclear, vague diagnostic criteria ($n = 4$), or both ($n = 2$). Over-reliance on monolingual criteria to diagnose stuttering in multilingual speakers suggests a fundamental lack of understanding about how stuttering manifests in linguistically diverse populations, and increases the likelihood of over-identification.

The language sample of a monolingual English speaker cannot be considered equivalent to the English output of a bilingual speaker (Pena & Bedore, 2008). Bilinguals who speak a variety of languages have been shown to produce significantly more disfluencies as compared to monolinguals (e.g., Byrd, 2015b; Eggers et al., 2019; Fiestas, Bedore, Peña, & Nagy, 2005;

Poulisse, 1999; Wiese, 1984). The use of monolingual English guidelines in stuttering research cannot adequately accommodate for the distinct differences in speech disfluency inherent to bilingualism. In lieu of valid bilingual or multilingual criteria to diagnose stuttering, the use of alternative criteria other than monolingual guidelines to classify group status may be the next best option. As seen in Table 2, 59% ($n = 26$) of the 44 studies included at least one alternative descriptor, and only 16% ($n = 7$) relied *exclusively* on these alternative criteria. While the studies that focused on children maintained the pattern from the broader cohort of a significant portion relying exclusively on monolingual guidelines (26%), child studies more consistently reported use of alternative criteria. Of the child studies, 65% (15/23) included at least one alternative descriptor that did not rely on monolingual criteria, and exclusive use of alternative descriptors was more common (26%) than observed for the combined adult and child studies (16%). Although we view this pattern as encouraging, and perhaps preferable to classifying participants based on the known limitations of monolingual stuttering criteria, we cannot be certain that these alternative descriptors were sensitive or sufficient to accurately classify multilingual speakers without further investigations.

Of the eight alternative descriptors identified, three included diagnostic factors other than stuttering frequency – length of time stuttering, previous treatment for stuttering, and qualitative disfluency counts. Given the propensity for false positive diagnoses and spontaneous recovery, metrics such as length of time stuttering and whether the participant previously received speech-language treatment for stuttering may not be reliable measures to confirm a diagnosis of stuttering in multilingual speakers, especially if used in isolation. Qualitative disfluency counts, on the other hand, may capture the unique quality of stuttered speech previously found to differentiate stuttered speech in multilinguals, specifically, tension and rhythmicity (Byrdet al.,

2015b). Other factors such as self-reported severity of stuttering may serve as a more reliable indicator of diagnosis, particularly for older participants. That is, multilingual participants with a lifelong history of stuttering are less likely to incorrectly identify themselves as a person who stutters than an unfamiliar listener or examiner relying on monolingual guidelines.

If, in fact, participants were included in these studies based on a reliance on the monolingual English-speaking guidelines, and a lack of understanding of the typical disfluent speech of bilinguals, then the data published thus far may be further compromised than originally thought. Both Coalson and colleagues (2013) as well as Werle and colleagues (2019) have demonstrated that participant description as it relates to bilingualism is significantly lacking in breadth and depth in the existing literature, making it nearly impossible for readers to determine the potential influence of their history, proficiency, and use of their respective languages. The present study demonstrates that, in addition to inadequate description to determine language status (mono- versus multilingual), researchers also rely on inadequate or inappropriate description to determine whether the speaker is typically fluent or is a speaker who stutters. The additive effect of inadequate description of language-status *and* talker-status compromise the available literature much more so than either factor in isolation, and further restrict our ability to describe speech behavior in this unique clinical population.

Furthermore, as Byrd (2018) has previously argued, without having any point of reference for what is considered to be *typical* speech disfluencies in the bilingual population and how those typical speech disfluencies compare to what has been documented in the monolingual literature, it is difficult, if not impossible, to determine what is *atypical*. Preliminary data suggest what overlaps across monolingual English-speaking children who stutter and bilingual speakers who stutter is not the quantity, but the quality of the disfluencies produced (Byrd

2015b, Eggers et al. 2019). Specifically, the tension and the timing of the disfluent speech productions are markedly different in speakers who stutter as compared to speakers who do not, regardless of the languages they speak. Based on Byrd's (2018) recommendations, and the pervasive misuse of monolingual frequency-based criteria in the existing research identified in the present study, additional research will be needed to adequately describe disfluencies produced by bilingual speakers of various language dyads.

Conclusion

Review of the research indicates a non-trivial percentage of studies that include bilingual participants who stutter have relied on monolingual English guidelines when identifying stuttering in speakers of more than one language. Based on previous data, it is likely that some of the participants identified as persons who stutter may have been typically fluent, but produced more disfluencies than monolingual English speakers because of the challenges of navigating more than one language. Future research should explore the disfluencies of multilingual speakers who do and do not stutter as they differ from each other and from monolingual English speakers to improve diagnostic validity of stuttering in speakers of more than one language. To mislabel a typically fluent /multi-lingual child as child who stutters limits our understanding of speech and language development in bilingual populations and misappropriates limited clinical resources.

References

- *Al-Yaari, S., Al Hammadi, F., Alyami, S., & Almaflehi, N. (2013). Overcoming stuttering using delayed auditory feedback (DAF): A case study. *International Journal of English Language Education*, 1(2), 91-118.
- Ambrose, N. G., & Yairi, E. (1999). Normative disfluency data for early childhood stuttering. *Journal of Speech, Language, and Hearing Research*, 42(4), 895-909.
- American Psychological Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., Text Revision). Washington DC: Author.
- *Andrews, C., O'Brian, S., Harrison, E., Onslow, M., Packman, A., & Menzies, R. (2012). Syllable-timed speech treatment for school-age children who stutter: A phase I trial. *Language, Speech, and Hearing Services in Schools*, 43(3), 359-369.
- *Andrews, C., O'Brian, S., Onslow, M., Packman, A., Menzies, R., & Lowe, R. (2016). Phase II trial of a syllable-timed speech treatment for school-age children who stutter. *Journal of Fluency Disorders*, 48, 44-55.
- *Ardila, A., Ramos, E., & Barrocas, R. (2011). Patterns of stuttering in a Spanish/English bilingual: A case report. *Clinical Linguistics & Phonetics*, 25(1), 23-36.
- *Bakhtiar, M., & Packman, A. (2009). Intervention with the Lidcombe Program for a bilingual school-age child who stutters in Iran. *Folia Phoniatrica et Logopaedica*, 61(5), 300-304.
- Bedore, L. M., & Peña, E. D. (2008). Assessment of bilingual children for identification of language impairment: Current findings and implications for practice. *International Journal of Bilingual Education and Bilingualism*, 11(1), 1-29.

Bedore, L. M., Fiestas, C. E., Peña, E. D., & Nagy, V. J. (2006). Cross-language comparisons of maze use in spanish and english in functionally monolingual and bilingual children.

Bilingualism: Language and Cognition, 9(3), 233-247.

<https://doi.org/10.1017/S1366728906002604>.

*Bernstein Ratner, N., & Benitez, M. (1985). Linguistic analysis of a bilingual stutterer. *Journal of Fluency Disorders*, 10, 211-219.

Boerma, T., & Blom, E. (2017). Assessment of bilingual children: What if testing both languages is not possible? *Journal of Communication Disorders*, 66, 65–76. DOI:

10.1016/j.jcomdis.2017.04.001

Boey, R. A., Wuyts, F. L., Van de Heyning, P. H., De Bodt, M. S., & Heylen, L. (2007).

Characteristics of stuttering-like disfluencies in Dutch-speaking children. *Journal of Fluency Disorders*, 32(4), 310–329. DOI: [10.1016/j.jfludis.2007.07.003](https://doi.org/10.1016/j.jfludis.2007.07.003)

Bosshardt, H.-G., Packman, A., Blomgren, M. & Kretschmann, J. (2016). Measuring stuttering in preschool-aged children across different languages: An international study. *Folia*

Phoniatrica et Logopaedica, 67(5), 221-230. DOI : [10.1159/000440720](https://doi.org/10.1159/000440720)

*Brown, L., Wilson, L., Packman, A., Halaki, M., Onslow, M., & Menzies, R. (2016). An investigation of the effects of a speech-restructuring treatment for stuttering on the distribution of intervals of phonation. *Journal of Fluency Disorders*, 50, 13-22.

Byrd, C.T. (2018). Assessing bilingual children: Are their disfluencies indicative of stuttering or the byproduct of navigating two languages? *Seminars in Speech and Language*, 39(4), 324-332.

- Byrd, C. T., Bedore, L. M., & Ramos, D. (2015). The disfluent speech of bilingual Spanish–English children: Considerations for differential diagnosis of stuttering. *Language, Speech, and Hearing Services in Schools, 46*(1), 30-43.
- Byrd, C. T., Haque, A. N., & Johnson, K. (2016). Speech-language pathologists' perception of bilingualism as a risk factor for stuttering. *Journal of Communication Disorders, Deaf Studies, and Hearing Aids, 4*, 158.
- Byrd, C. T., Watson, J., Bedore, L. M., & Mullis, A. (2015). Identification of stuttering in bilingual Spanish-English-speaking children. *Contemporary Issues in Communication Science and Disorders, 42*, 72-87.
- *Carias, S., & Ingram, D. (2006). Language and disfluency: Four case studies on Spanish-English bilingual children. *Journal of Multilingual Communication Disorders, 4*(2), 149-157.
- Coalson, G. A., Peña, E. D., & Byrd, C. T. (2013). Description of multilingual participants who stutter. *Journal of Fluency Disorders, 38*(2), 141-156.
- Cosyns, M., Einarsdottir, J., & Van Borsel, J. (2015). Factors involved in the identification of stuttering severity in a foreign language. *Clinical Linguistics & Phonetics, 29*(12), 909-921. DOI: [10.3109/02699206.2015.1062560](https://doi.org/10.3109/02699206.2015.1062560).
- *Dale, P. (1977). Factors related to dysfluent speech in bilingual Cuban-American adolescents. *Journal of Fluency Disorders, 2*(4), 311-313.
- *Druce, T., Debney, S., & Byrt, T. (1997). Evaluation of an intensive treatment program for stuttering in young children. *Journal of Fluency Disorders, 22*(3), 169-186.

- Eggers, K. (2010, August). *What is normal dysfluency and why measure it: Belgium*. Seminar presented at the Convention of the International Association of Logopedics and Phoniatrics, Athens.
- Eggers, K., van Eerdenbrugh, S., & Byrd, C. T. (under review). Speech disfluencies in bilingual Yiddish-Dutch speaking children.
- Fiestas, C. E., Bedore, L. M., Peña, E. D., & Nagy, V. J. (2005). Use of mazes in the narrative language samples of bilingual and monolingual 4- to 7-year old children. In ISB4: Proceedings of 4th International Symposium on Bilingualism (pp. 730-740). Somerville, MA: Cascadilla Press.
- *Firozjaei, A. K. (2013). Prevalence of stuttering in bilingual and monolingual primary schools. *International Research Journal of Applied and Basic Sciences*, 4(6), 1328-1331.
- *Gkalitsiou, Byrd, Bedore, & Taliancich-Klinger. (2017). Stuttering on function words in bilingual children who stutter: A preliminary study. *Clinical Linguistics & Phonetics*, 31(10), 791-805.
- *Gough, P. M., Connally, E. L., Howell, P., Ward, D., Chesters, J., & Watkins, K. E. (2017). Planum temporale asymmetry in people who stutter. *Journal of Fluency Disorders*, 55, 94-105.
- Grimm, A. & Schulz, P. (2014). Specific language impairment and early second language acquisition: The risk of over- and underdiagnosis. *Child Indicators Research*, 7(4), 821-841.
- Hemsley, G., Holm, A., & Dodd, B. (2014) Identifying language difference versus disorder in bilingual children, *Speech, Language and Hearing*, 17:2, 101-115. DOI: 10.1179/2050572813Y.0000000027.

- *Hernández-Jaramillo, J., & Gómez, K. V. (2015). Patterns of stuttering comparing two languages: A case report. *Revista Ciencias de la Salud*, 13(3), 493-504.
- Hoffman, L., Wilson, L., Copley, A., Hewatt, S., & Lim, V. (2014). The reliability of a severity rating scale to measure stuttering in an unfamiliar language. *International Journal of Speech-Language Pathology*, 16(3), 317-326. DOI: [10.3109/17549507.2014.898097](https://doi.org/10.3109/17549507.2014.898097).
- *Howell, P., Davis, S., & Williams, R. (2009). The effects of bilingualism on stuttering during late childhood. *Archives of Disease in Childhood*, 94(1), 42-46.
- *Jankelowitz, D. L., & Bortz, M. A. (1996). The interaction of bilingualism and stuttering in an adult. *Journal of Communication Disorders*, 29(3), 223-234.
- *Jayaram, M. (1977). Linguistic analysis of stuttering patterns of bilingual stutterers. *Foreign Language Section, Indian Institute of Science, Bangalore*, 363 – 370.
- *Jayaram, M. (1982). Relationship of stuttering to word information value in a phonemic clause. *The Journal of The All India Institute of Speech and Hearing*, 13, 1-6.
- *Karniol, R. (1992). Stuttering out of bilingualism. *First Language*, 12, 255-283.
- Kohnert, K. (2010). Bilingual children with primary language impairment: Issues, evidence and implications for clinical actions. *Journal of Communication Disorders*, 43(6), 456-473.
- *Kornisch, M., Robb, M. P., & Jones, R. D. (2017a). Estimates of functional cerebral hemispheric differences in monolingual and bilingual people who stutter: Dual-task paradigm. *Clinical Linguistics & Phonetics*, 31(6), 409-423.
- Kornisch, M., Robb, M. P., & Jones, R. D. (2017b). Estimates of functional cerebral hemispheric differences in monolingual and bilingual people who stutter: Dual-task paradigm. *Clinical linguistics & phonetics*, 31(6), 409-423.

- *Koushik, S., Shenker, R., & Onslow, M. (2009). Follow-up of 6–10-year-old stuttering children after Lidcombe Program treatment: A Phase I trial. *Journal of Fluency Disorders*, 34(4), 279-290.
- *Lattermann, C., Shenker, R. C., & Thordardottir, E. (2005). Progression of language complexity during treatment with the Lidcombe Program for early stuttering intervention. *American Journal of Speech-Language Pathology*.
- Leclercq, A.-L., Suaire, P., & Moyse, A. (2017). Beyond stuttering: Speech disfluencies in normally fluent French-speaking children at age 4. *Clinical Linguistics & Phonetics*, 32(2), 166-179. <https://doi.org/10.1080/02699206.2017.1344878>
- Lee, A. S., Robb, M. P., Ormond, T., & Blomgren, M. (2014). The role of language familiarity in bilingual stuttering assessment. *Clinical Linguistics & Phonetics*, 28(10), 723-740. <https://doi.org/10.3109/02699206.2014.892154>.
- *Lim, V. P., Lincoln, M., Chan, Y. H., & Onslow, M. (2008). Stuttering in English–Mandarin bilingual speakers: The influence of language dominance on stuttering severity. *Journal of Speech, Language, and Hearing Research*, 51(6), 1522-1537.
- *Lim, V. P., Lincoln, M., Onslow, M., & Chan, Y. H. (2015). English-only treatment of bilingual speakers who stutter: Generalization of treatment effects from English to Mandarin. *International Journal of Speech-Language Pathology*, 17(5), 431-440.
- Loban, W. (1976). Language development: Kindergarten through grade twelve. Urbana, IL: National Council of Teachers of English.
- *Malek, A., Amiri, S., Hekmati, I., Pirzadeh, J., & Gholizadeh, H. (2013). A comparative study on diadochokinetic skill of dyslexic, stuttering, and normal children. *ISRN pediatrics*.

- *Mamdoh, H., & Gomaa, M. A. (2015). Assessment of severity of stuttering in native versus foreign language in secondary (late) bilingual children. *Indian Journal of Otolaryngology and Head & Neck Surgery*, 67(2), 132-134.
- *Maruthy, S., Raj, N., Geetha, M. P., & Priya, C. S. (2015). Disfluency characteristics of Kannada–English bilingual adults who stutter. *Journal of Communication Disorders*, 56, 19-28.
- *Mohammadi, H., Bakhtiar, M., Rezaei, M., & Sadeghi, K. (2012). Stuttering behavior in Kurdish-Persian bilingual speakers. *Procedia-Social and Behavioral Sciences*, 32, 283-287.
- *Mohammadi, H., Khazaie, H., Rezaei, M., & Joghataei, M. T. (2016). Late recovery from stuttering: The role of hand dominance, fine motor and inhibition control. *Iranian Journal of Psychiatry*, 11(1), 51.
- *Mohamadi, H., Nilipour, R., & Yadegari, F. (2008). Stuttering Prevalence among Kurdish-Farsi Students Effects of the Two Languages Similarities. *Iranian Rehabilitation Journal*, 6(1), 83-88.
- *Morrish, T., Nesbitt, A., le Roux, M., Zsilavec, U., & van der Linde, J. (2016). Sounds affecting the moments of stuttering in multilingualism: A case study. *Communication Disorders Quarterly*, 38(3), 154-160.
- Natke, U., Sandrieser, P., Pietrowsky, R., & Kalveram, K. (2006). Disfluency data of German preschool children who stutter and comparison children. *Journal of Fluency Disorders*, 31(3), 165–176. <https://doi.org/10.1016/j.jfludis.2006.04.002>.
- *Nwokah, E. E. (1988). The imbalance of stuttering behavior in bilingual speakers. *Journal of Fluency Disorders*, 13(5), 357-373.

- *Osipovskaya, M. P., Sharifzyanova, K. S., & Zamaletdinova, Z. I. (2016). The particularities of the monologue speech type manifestations in stuttering schoolchildren with Tatar-Russian bilingualism compared to the normality. *International Journal of Environmental and Science Education*, 11(7), 1571-1577.
- Paradis, J., Nicoladis, E., Crago, M., & Genesee, F. (2011). Bilingual children's acquisition of the past tense: A usage-based approach. *Journal of Child Language*, 38(3), 554-578.
- Poulisse, N. (1997). Language production in bilinguals. In A. M. B. de Groot & J. F. Kroll (Eds.), *Tutorials in bilingualism: Psycholinguistic perspectives* (pp. 201-224). Mahwah, NJ: Lawrence Erlbaum Publishers.
- *Raza, M. H., Gertz, E. M., Mundorff, J., Lukong, J., Kuster, J., Schäffer, A. A., & Drayna, D. (2013). Linkage analysis of a large African family segregating stuttering suggests polygenic inheritance. *Human Genetics*, 132(4), 385-396.
- Riley, G. D. (1972). A stuttering severity instrument for children and adults. *Journal of Speech and Hearing Disorders*, 37, 314-332.
- Riley, G. D. (1980). *Stuttering severity instrument for children and adults* (revised ed.). Tigard, OR: C. C. Publications.
- Riley, G. D. (1994). *Stuttering severity instrument for children and adults* (3rd ed.). Austin, TX Pro-Ed.
- Riley, G. D. (2009). *Stuttering severity instrument for children and adults* (4th ed.). Austin, TX Pro-Ed.
- *Roberts, P. M. (2002). Disfluency patterns in four bilingual adults who stutter. *Journal of Speech-Language Pathology and Audiology*, 26(1), 5-19.

- *Schäfer, M., & Robb, M. P. (2012). Stuttering characteristics of German–English bilingual speakers. *Clinical Linguistics & Phonetics*, 26(7), 597-612.
- *Stern, E. (1948). A preliminary study of bilingualism and stuttering in four Johannesburg schools. *Journal of Logopaedics*, 1, 15-25.
- *Taliancich-Klinger, C. L., Byrd, C. T., & Bedore, L. M. (2013). The disfluent speech of a Spanish–English bilingual child who stutters. *Clinical Linguistics & Phonetics*, 27(12), 888-904.
- *Travis, L. E., Johnson, W., & Shover, J. (1937). The relation of bilingualism to stuttering: A survey of the East Chicago, Indiana, schools. *Journal of Speech and Hearing Disorders*, 2, 185–189.
- *Tsai, P.T., & Ratner, N.B. (2016). Involvement of the central cognitive mechanism in word production in adults who stutter. *Journal of Speech, Language, and Hearing Research*, 59, 1269-1282.
- Werle, D., Byrd, C. T., & Coalson, G. (2019). Description of multilingual participants who stutter: An update 2011-2018. *Communication Disorders Quarterly*, 1525740119870772.
- *Vong, E., Wilson, L., & Lincoln, M. (2016). The Lidcombe Program of early stuttering intervention for Malaysian families: Four case studies. *Journal of Fluency Disorders*, 49, 29-39.
- Wiese, R. (1984). Language production in foreign and native languages: Same or different. In H. W. Dechert, D. Möhle, & M. Raupach (eds.), *Second language productions* (pp. 11-25). Tübingen: Gunter Narr.
- *Whillier, A., Hommel, S., Neef, N. E., von Gudenberg, A. W., Paulus, W., & Sommer, M. (2018). Adults who stutter lack the specialised pre-speech facilitation found in non-

stutterers. *PloS one*, 13(10), e0202634.

*Woods, D. W., & Wright, L. W. (1998). Dismantling simplified regulated breathing: A case of a bilingual stutterer. *Journal of Behavioral Therapy and Experimental Psychiatry*, 29, 179–186.

Zackheim, C. T., & Conture, E. G. (2003). Childhood stuttering and speech disfluencies in relation to children's mean length of utterance: A preliminary study. *Journal of Fluency Disorders*, 28, 115-142.

*Zaretsky, E., Lang, B., Euler, H., Robinson, F., & Neumann, K. (2017). Pre-schoolers who stutter score lower in verbal skills than their non-stuttering peers. *The Buckingham Journal of Language and Linguistics*, 10, 96-115.