Predictors of communication attitude in preschool-age children who stutter

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A B S T R A C T

Purpose: Although preschool-age children who stutter report more negative attitudes toward communication than their typically fluent peers, few investigations have explored factors that may contribute to the differences observed in communication attitude. The purpose of the present study was to explore whether behavioral characteristics of stuttering severity (frequency, duration, physical concomitants) and time since onset of stuttering predict communication attitude in preschool-age children.

Method: Fifty-nine preschool-aged children who stutter completed two speaking samples and the *KiddyCAT*, a self-report assessment of communication attitude. Speech samples were analyzed for stuttering frequency (measured by percentage of stuttered syllables), duration, and presence of physical concomitants. Linear regression models were used to assess if these behavioral measures of stuttering and time since onset of stuttering predicted self-reported communication attitude.

Results: Results indicate stuttering behavioral measures and time since onset do not predict *KiddyCAT* scores of preschool-age children who stutter.

Conclusions: Preliminary data suggest children who have presented with stuttering for a longer period of time are no more likely to report a negative communication attitude than children who have a shorter time since onset. Additionally, in contrast to school-age children who stutter, but similar to adults and adolescents who stutter, communication attitude is not linearly related to stuttering severity in preschool-age children.

1. Introduction

Childhood stuttering is a complex, multifactorial neurodevelopmental communication disorder for which there are affective, behavioral, and cognitive consequences (Ambrose et al., 2015; Smith & Weber, 2017; Yairi & Ambrose, 2005; Yairi & Ambrose, 2013). Children who stutter as young as two years of age demonstrate an awareness of stuttering as well as negative reactions or attitudes toward speaking as evidenced by parent report, observable behaviors, or self-report (Bloodstein & Bernstein Ratner, 2008; Boey et al., 2009; Ezrati-Vinacour et al., 2001; Vanryckeghem & Brutten, 2007; Vanryckeghem et al., 2005; Yairi, 1983). Parents report their young children who stutter make negative comments about their speech (e.g., "I can't talk well"), stop speaking during a stuttering moment, and/or express frustration nonverbally such as through sighing (Boey et al., 2009, pp. 338-339). Boys as young as five years old who stutter describe "good talkers" as those who do not stutter and are less likely to self-identify as "good talkers" than

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age-matched boys who do not stutter (Bajaj et al., 2005).

Preschool- and kindergarten-age children who stutter report significantly more negative communication attitudes than children who do not stutter, with older children who stutter presenting with greater differences compared to their typically fluent peers (Vanryckeghem et al., 2005). Though there are significant group differences in communication attitude between children who do and do not stutter, not all individual children who stutter report negative communication attitudes. It has yet to be determined which young children who stutter may be more likely to report a negative communication attitude. Investigation of possible predictors of communication attitude is critical to advancing our theoretical understanding of and clinical practice for young children who stutter near the onset of the disorder (Guttormsen et al., 2015; Smith & Weber, 2017; Yaruss, Coleman, & Hammer, 2006).

Although much of the available evidence for preschool stuttering intervention focuses on increasing speech fluency (Bergþórsdóttir & Ingham, 2017; de Sonneville-Koedoot et al., 2015; Franken et al., 2005), speech-language pathologists are recommended to incorporate reduction of both negative thoughts and feelings about stuttering and avoidance of stuttering in their treatment (Byrd et al., 2021; Conture, 2001; Logan & Yaruss, 1999; Manning & DiLollo, 2017). Though we do not yet know how communication attitude may contribute to stuttering at its onset and early development, research demonstrates early intervention for young children who stutter may facilitate positive communication attitudes, increase resilience against the social preference for fluent speech, and improve perception of peer relationships (Byrd & Donaher, 2018; Byrd et al., 2018; Byrd et al., 2016; Byrd et al. 2021; Ezrati-Vinacour et al., 2001).

In addition to preschool-age children, school-age children, adolescents, and adults with persistent stuttering also report negative communication attitudes and a significant overall impact of stuttering on their communication and quality of life (e.g., Guttormsen et al., 2015; Yaruss & Quesal, 2006). For adults and adolescents, stuttering severity (i.e., frequency, duration, and presence of physical concomitants) is not linearly related to communication attitude or overall impact of stuttering (Beilby et al., 2012; Constantino et al., 2016; Manning & Beck, 2013). Specifically, for some adults and adolescents, severity of stuttering is low, but impact is high; whereas for others severity is high and impact is low. In contrast, research with school-age children suggests there may be a relationship between stuttering severity and communication attitude or overall impact of stuttering, such that those children who present with greater stuttering severity are more likely to also report more negative communication attitudes (Beilby et al., 2012; Guttormsen et al., 2015; Kawai et al., 2012; Vanryckeghem & Brutten, 1996; Vanryckeghem et al., 2001).

Taken together, these studies suggest greater stuttering severity, as defined by greater frequency, duration, and presence of physical concomitants, predicts greater overall impact of stuttering on quality of life and more negative communication attitudes in school-age children. Importantly, Kawai et al. (2012) reported children as young as five years held negative communication attitudes and that these attitudes increased after first grade. These results may be due, in part, to the increase in communication demands, complexity of peer relationships, and onset of bullying/teasing during the school-age years (Beilby et al., 2012; Daniels et al., 2012; Davis et al., 2002).

To date, to our knowledge, it has not been established *when* stuttering severity may begin to predict negative communication attitude in children who stutter, and if this relationship originates earlier in childhood. Establishing predictors of negative communication attitude in young children may facilitate early identification and intervention to facilitate and maintain positive attitudes toward communication for young children who stutter, particularly as they enter the school-age years with an increased risk of bullying and teasing.

1.1. Predictors of communication attitude in preschool-age children who stutter

Similar to school-age children, preschoolers are at risk for adverse effects of their stuttering when saying their name, introducing themselves to peers and adults, and conversing or playing with family members and peers. Unlike school-age children, however, it has yet to be determined if stuttering severity and communication attitude are related, such that children with greater stuttering severity also report more negative communication attitudes. In a recent meta-analysis, Guttormsen et al. (2015) noted few studies had investigated the association between stuttering severity and communication attitude in children who stutter. And, of the three studies referenced in their meta-analysis for providing evidence for this relationship (Kawai et al., 2012; Vanryckeghem & Brutten, 1996; Vanryckeghem et al., 2001), none sampled preschool-age children. Therefore, an investigation of stuttering severity and communication attitude in young children who stutter is warranted to assess if greater severity predicts more negative communication attitudes.

Two studies have explored aspects of communication attitude, perceived competence, age, time since onset, and stuttering frequency in preschool-age children. Hertsberg and Zebrowski (2016) investigated perceived competence and social acceptance for young children ages four and five years who do and do not stutter. Fourteen children who stutter and fourteen children who do not stutter completed the *Pictorial Scale of Perceived Competence and Social Acceptance for Young Children* (*PSPCSA*; Harter & Pike, 1984) and their mothers completed the *Children's Behavioral Questionnaire – Short Form* (*CBQ-SD*; Putnam & Rothbart, 2006). Though the participants across the two talker groups did not perform differently on measures of perceived general competence or perceived social acceptance, stuttering frequency significantly predicted perceived social acceptance. Children with higher stuttering frequency, as opposed to children with lower stuttering frequency, reported decreased perceived social acceptance. These findings suggest stuttering frequency may play a role in a child's self-perception as it relates to interpersonal communication at a young age.

Groner et al. (2016) were the first to explore age, time since onset, and stuttering frequency as they relate to communication attitude. They recruited 46 preschool-age children who stutter and 66 preschool-age children who do not stutter and assessed the following in their primary analysis: age, clinical measures of stuttering frequency (number of stuttering-like repetitions and prolongations), self-report of communication attitude (*KiddyCAT*), parent reported measures of stuttering behavior (*TOCS Speech Fluency Rating Scale*) and consequences of stuttering (*TOCS Disfluency-Related Consequences Rating Scale*), and speech and language ability

(*GFTA-2*, *PPVT-III*, *EVT*, and *TELD-3*). Interestingly, results suggested communication attitude was significantly negatively correlated with age for each talker group, such that children who do and do not stutter reported more positive communication attitudes with increased age. This finding did not match their original hypothesis, and the authors conducted a supplementary analysis with a subset of their sample of children who stutter (*n* = 38) using time since onset data. Children who presented with stuttering for a longer duration (i.e., children with greater time since onset of stuttering) reported more positive communication attitudes than children with a more recent onset of stuttering. Because descriptive statistics were not provided regarding time since onset for this subset of children, it is difficult apply this finding to both theoretical accounts of communication attitude in young children and clinical practice.

In contrast to age and time since onset, Groner et al. (2016) found evidence both for and against the influence of stuttering frequency on communication attitude. There was no relationship between total number of combined repetitions and prolongations observed by a speech-language pathologist during one play conversation and *KiddyCAT* scores for children who stutter. When analyzed independently, *KiddyCAT* scores were positively correlated with the total number of prolongations but not with the total number of repetitions.

Alternatively, parent perception of greater stuttering behaviors (*TOCS Speech Fluency Rating Scale*) was related to more negative communication attitude (*KiddyCAT*) for both talker groups. Notably, parent perception was inclusive of not only stuttering frequency but also the length of stuttering moments, observation of stuttering across communication contexts, and variability of stuttering over time. Overall, there is conflicting evidence from this sample as to how stuttering behaviors may uniquely contribute to the communication attitude of a preschool-age child who stutters. Because the number of prolongations and parent perception of stuttering behavior were associated with *KiddyCAT* scores, it is possible that characteristics of stuttering severity other than frequency alone (e.g., duration of stuttering behaviors) are related to a young child's communication attitude.

The findings reported by Groner et al. (2016) provide valuable insight into the factors that may or may not influence self-reported communication attitude in preschool-age children who stutter. Notably, age, time since onset, total number of prolongations, and parent perception of stuttering behavior were all related to child *KiddyCAT* scores. Groner et al. also reported that speech, language, and vocabulary ability; parent perception of stuttering consequences; and total number of stuttering-like disfluencies (repetitions and prolongations combined) determined by a speech-language pathologist were not significantly related to *KiddyCAT* scores. Additional research is needed to advance our understanding of negative communication attitude in young children near the onset of stuttering in order to inform clinical practice.

1.2. Purpose and rationale for the present study

To date, preliminary research does not suggest stuttering severity or other characteristics of stuttering (e.g., time since onset) influence communication attitude in preschool-age children who stutter (Groner et al., 2016). If young children present with significant negative communication attitudes and mild stuttering severity, these children may still benefit from early intervention to target the cognitive and affective components of stuttering. And, if greater time since onset of stuttering predicts more negative communication attitudes, clinicians may use this information to guide their intervention and parent education of this population. Thus, the purpose of the present study was to expand our understanding of communication attitude in preschool-age children by investigating possible predictors (i.e., stuttering severity, time since onset) with theoretical and clinical implications. Specifically, we sought to explore the influence of time since onset and stuttering severity as measured by stuttering frequency, duration, and physical concomitants on communication attitude by answering the following questions:

1. Do clinical ratings of stuttering behavior (frequency, duration, and physical concomitants) predict self-reported communication attitude in preschool-age children who stutter?
2. Does time since onset of stuttering predict self-reported communication attitude in preschool-age children who stutter?

2. Method

2.1. Participants

Approval for the completion of this study was obtained through the authors' university Institutional Review Board. Participants were recruited during their initial clinical evaluation at [blinded for peer review] as part of a larger intervention study.

Written, informed parent consent and child assent were obtained for each participant. Fifty-nine children who stutter (45 boys, 14 girls) between the ages of 2.5 and 6.92 years (mean age 4.84 years) were recruited to participate. Each child was determined to present with a childhood onset fluency disorder in the absence of additional speech, language, hearing, or learning deficits by a certified speech-language pathologist. Criteria used in determining a diagnosis of stuttering included a) greater than 3 % observed stuttering-like disfluencies per total syllables spoken across two speaking samples (Ambrose & Yairi, 1999), b) parent report of stuttering, and, c) impact of stuttering on communication determined through self-report, parent report, or standardized scales.

Parents of each participant completed a case history form related to the participant's birth, developmental, and family history. Of particular relevance to the present study, parents answered questions related to family history of stuttering and other communication disorders, the onset of their child's stuttering, and questions related to their child's awareness of or reactions to stuttering. Specific to stuttering onset, parents were asked to report their child's age in months and years (e.g., three years, six months) or the month in which they first observed stuttering (e.g., March 2015). Twenty-six participants (44.07 %) had a reported family history of stuttering. Parents reported first observing signs of stuttering when their child was between the ages of twelve months and six years, zero months (mean

age of onset = 3.13 years). Additionally, at the time of enrollment, twenty-seven parents (49.15 %) reported their child appeared aware of their stuttering. None of the children in the sample participated in a prior stuttering evaluation or treatment for stuttering. Participants, therefore, represent a sample of young children near the onset of stuttering who have not been influenced by any intervention. Table 1 summarizes additional participant descriptive and demographic information.

2.2. Data collection

Parents completed a case history form online via Qualtrics, an online survey software. A certified speech-language pathologist or research assistant trained and directly supervised by a certified speech-language pathologist (the examiner) administered each measure during the participant's initial speech-language evaluation. In addition to the primary clinical measures described below, each participant presented with adequate oral motor structures and functions for speech production as evidenced by an oral motor exam. All participants passed a pure tone hearing screening at 1000, 2000, and 4000 Hz bilaterally at 20 dB HL. All measures for the present study were recorded in a quiet room in person using a Cannon Vivia HFM500 HD camera mounted on a Manfrotto tripod (34 of 59 participants) or remotely using Zoom video recording software on an iMac desktop computer (25 of 59 participants).

2.2.1. Speech samples and analysis

Each child participant completed two speaking samples of 150–300 words each elicited by the examiner. Sample types included a conversation and a picture description. Conversations were elicited by asking open-ended questions and making comments about a shared, familiar context (e.g., dinosaur toys in the evaluation room). Picture descriptions were elicited by asking participants to describe the picture plates in the *Stuttering Severity Instrument – 4*th *Edition (SSI-4;* Riley, 2009*)*. These speech samples were analyzed from video-recordings and were used in administering and scoring the *SSI-4*.

The *SSI-4* is comprised of three sections: stuttering frequency, duration, and presence of physical concomitants. The two speech samples described above were analyzed following the *SSI-4* administration procedures for frequency of stuttering moments per total syllables spoken, the average length of the three longest stuttering moments in seconds, and the presence of physical concomitants (i.e., distracting sounds, facial grimaces, head movements, and movements of the extremities) assessed on a scale from none to severe and painful looking. These task scores were summed to derive a total score per the measure's scoring procedures.

A certified speech-language pathologist with specialization in the area of stuttering reviewed and confirmed the scores to ensure they were accurate (i.e., the speech-language pathologist agreed with the original score or modified the score to ensure it accurately reflected the participant's observable stuttering behaviors).

2.2.2. Disfluency analysis training

Disfluency analysis training was needed in order to calculate the frequency of stuttering moments for the *SSI-4*. Training consisted of a one-hour small group lecture and discussion led by a certified speech-language pathologist with a specialization in stuttering. During this training, research assistants identified different types of stuttering-like disfluencies (e.g., sound-syllable repetitions, whole-word repetitions, audible sound prolongations, inaudible sound prolongations) and typical disfluencies (e.g., phrase repetitions, interjections, and revisions without associated tension or dysrhythmic quality). Additionally, research assistants identified moments of stuttering by the quality of disfluencies, specifically by noting tense and/or dysrhythmic quality. Prior to analyzing data for the present study, a research assistant and speech-language pathology student analyzed at least two training samples demonstrating agreement in identification of stuttering-like disfluencies of at least 80 % with a certified speech-language pathologist specializing in stuttering. Interrater reliability (interclass correlation coefficient) of stuttering frequency for 20 % of the data for the present study was $r = 87.9$ %. This is consistent for interrater reliability of stuttering frequency for both student and clinician ratings (Brundage et al., 2006).

2.2.3. Communication attitude

The *Communication Attitude Test for Preschool and Kindergarten Children Who Stutter (KiddyCAT;* Vanryckeghem & Brutten, 2007*)* is a standardized self-report tool designed to measure speech-associated attitude in children under the age of seven years. The *KiddyCAT* has been shown to demonstrate differences in speech-associated attitudes between young children who do and do not stutter across multiple languages and cultures (Bernardini et al., 2009; Clark et al., 2012; Vanryckeghem & Brutten, 2007; Vanryckeghem et al.,

Table 1
Participant Descriptive Characteristics and Demographics. Means, standard deviations (SD), and ranges for demographic characteristics.

Characteristic	Mean (SD)	Range
Gender (male/female)	45/14	
Age (years)	4.84 (1.15)	2.5–6.9
Age of stuttering onset (years)	3.15 (1.11)	1 – 6
Time since onset (years)	1.56 (1.03)	.08–4.25
Maternal years of education	17.82 (2.41)	12–22
Paternal years of education	16.94 (2.60)	12–22
Family history of stuttering (yes/no)	26/19	

Note: Maternal and paternal years of education and family history of stuttering were available for a subset of the full sample (*n* = 44).

2005; Węsierska & Vanryckeghem, 2015) with adequate test-retest reliability (Vanryckeghem et al., 2015).

Communication attitude was measured following the administration procedures of the *KiddyCAT* (Vanryckeghem & Brutten, 2007). Specifically, participants were told, "I will ask what you think about your talking. If what I say about how you talk is true, you say yes. If what I say is not true, you say no." (Vanryckeghem & Brutten, 2007, p. 17). After responding to two practice items, the examiner read twelve yes/no questions related to speech attitudes aloud (e.g., "Do mom and dad like how you talk?") and recorded the participant's response. The *KiddyCAT* was scored by summing all answers printed in bold (i.e., answers indicative of a negative attitude).

Prior to administering the *KiddyCAT*, all examiners were trained not only in the measure's administration procedures, but also in behavioral signs of inattention and fatigue that may suggest invalid participant responses. This training consistent of a guided review of video of valid and invalid administrations with a certified speech-language pathologist with clinical specialization in stuttering. Examples of valid administrations included those with children providing verbal and/or nonverbal responses after each question while maintaining eye contact, physical proximity, and an interest in the examiner. Examples of invalid administrations included those with children who required more than two repetitions of each item, children who rarely or never directed attention toward the examiner, and children who appeared preoccupied with toys or other manipulatives during the administration. To further verify the reliability of the administration and scoring of the *KiddyCAT*, a certified speech-language pathologist reviewed the video administration and scoring to confirm the measure was scored accurately and that each response included in the analytic sample for the present study was deemed an attentive, reliable response.

2.3. Data analysis

We performed an a priori power calculation using G*Power (Faul et al., 2007), setting our desired power at .80 for our anticipated calculations. In order to detect a small effect size (eta squared .20; Cohen, 1988), with a two-tailed test and alpha of .05, 59 participants were needed for our first research question and 42 participants were needed for our second research question (final N = 59).

All data were input into an Excel spreadsheet and imported into RStudio for statistical analysis (RStudio Team, 2015). These analyses served as a preliminary investigation exploring the extent to which measures of stuttering behavior predict self-reported communication attitude.

Our first research question explored if clinical ratings of stuttering behavior (frequency, duration, and physical concomitants) predict self-reported communication attitude in preschool-age children who stutter. We used a linear regression model with *KiddyCAT* score as the outcome variable and three predictors: *SSI-4* frequency, duration, and physical concomitants scores. Our second research question explored if time since onset predicted self-reported communication attitude in preschool-age children who stutter. We used a linear regression model with *KiddyCAT* score as the outcome variable and time since onset of stuttering as the predictor. Time since onset of stuttering was calculated by subtracting the age at which parents first observed stuttering from the child's age at the time of participation.

Each model reported met all assumptions needed for linear regression. We assessed multicollinearity, or the extent to which predictors are correlated with one another, prior to running our regression models to ensure each predictor provided unique information to each model. We additionally assessed the normality of residuals, homoscedasticity, linearity of the model itself, and the presence of outliers or clusters via Cook's distance.

3. Results

3.1. Descriptive results

3.1.1. Speech sample analysis

Participants presented with a variety of stuttering-like and typical disfluencies across speaking samples. For example, within the clinician-child conversation samples, stuttering frequency ranged from 0 to 21.15 % stuttered syllables and the frequency of typical disfluencies ranged from 0 to 17.17 %. As a group, the stuttering-like disfluencies participants most frequently exhibited were sound syllable repetitions (44.64 %), followed by whole word repetitions (35.54 %), audible sound prolongations (12.55 %), inaudible sound prolongations or blocks (4.76 %), and other stuttering-like disfluencies observed as tense and/or dysrhythmic (2.64 %).

Data from two speaking samples were used in scoring the *SSI-4*. Frequency scores ranged from 4 to 16 (mean = 9.24), suggesting

Table 2
Stuttering Severity Instrument – *4th Edition (SSI-4)* and *KiddyCAT* scores.

Measure	minimum	maximum	mean	SD
SSI-4				
Frequency	4	16	9.24	3.85
Duration	2	10	6.17	2.91
Physical concomitants	0	11	–	–
Total	6	31	17.36	6.72
KiddyCAT	0	9	3.59	2.57

Note: Due to the distribution of *SSI-4* physical concomitants scores, a mean (SD) is not reported. This score had a mode of 0 and median of 1.

the participants' average %SS ranged from 1 to 21 %. Duration scores ranged from 2 to 10 (mean = 6.17), suggesting participants' longest moments of stuttering spanned fewer than 0.5 s–4.9 s. Physical concomitants scores ranged from 0 to 11 (mode = 0; median = 1), suggesting participants presented with no physical concomitants, or physical concomitants that were distracting, severe, and/or painful looking. Table 2 summarizes standardized assessment scores, including *SSI-4* subtest and total scores.

3.1.2. Communication attitude

Participant *KiddyCAT* scores ranged from 0 to 9. The mean reported score was 3.59 (SD = 2.57), the median reported score was 3, and the mode was 5. *KiddyCAT* scores did not vary by gender, $t(17.716) = -0.33$, $p = 0.74$. Additionally, *KiddyCAT* scores did not vary by parent-reported child awareness of stuttering, $t(30.125) = 0.64$, $p = 0.53$.

3.1.3. Time since onset of stuttering

Data were missing for six participants. Ten of the remaining 53 participants had been stuttering for six or fewer months (18.86 %), eight participants had been stuttering more than six months but less than one year (15.09 %), nineteen participants had been stuttering for between one and two years (35.85 %), and sixteen participants had been stuttering for more than two years (30.19 %).

3.2. Do clinical ratings of stuttering behavior (frequency, duration, and physical concomitants) predict self-reported communication attitude in young children who stutter?

A linear regression model was used to assess how well clinical ratings of stuttering behavior predicted self-reported communication attitude. The three predictors (*SSI-4* frequency, duration, and physical concomitants scores) did not explain a significant amount of the variability in a preschool-age child's reported communication attitude, $R^2 = 0.076$, $R^2_{adj} = 0.026$, $F(3, 55) = 1.518$, $p = .22$. Results are reported in Table 3. None of the three clinical ratings of stuttering behavior yielded a significant influence on self-reported communication attitude, suggesting that a preschool-age child who stutters does not feel more positively or negatively about their communication based upon the frequency of stuttering moments, duration of stuttering moments, or presence/absence of physical concomitants.

3.3. Does time since onset of stuttering predict self-reported communication attitude in young children who stutter?

A linear regression model was used to assess how well time since onset of stuttering predicted self-reported communication attitude for 52 of the 59 total participants. Six participants were removed from this model due to missing data and inability to calculate time since onset and one participant was removed as a possible outlier with a time since onset of over five years. The model did not explain a significant amount of the variability in a preschool-age child's reported communication attitude, $R^2 = 0.05$, $R^2_{adj} = 0.03$, $F(1, 50) = 2.68$, $p = 0.11$. The results indicate that time since onset of stuttering does not explain a significant amount of variability in self-reported communication attitude, $B = -.58$, $\beta = -.23$, $t(50) = -1.63$, $p = 0.11$ (see Fig. 1).

4. Discussion

In addition to speech fluency and factors related to stuttering persistence (e.g., time since onset), speech-language pathologists are recommended to consider cognitive and affective consequences of stuttering in their intervention for people who stutter. As a result, there is a clinical need to understand how stuttering behaviors influence negative communication attitudes and overall impact of stuttering on quality of life, particularly in children who stutter. Although stuttering severity is not associated with communication attitude or the overall impact of stuttering in adolescents and adults who stutter (Beilby et al., 2012; Constantino et al., 2016; Manning & Beck, 2013), greater stuttering severity is associated with more negative communication attitude and greater overall impact of stuttering in school-age children who stutter (Kawai et al., 2012). The only previous study that was completed with respect to communication attitude and stuttering frequency in preschool children a) provided evidence both for and against a relationship between stuttering frequency and communication attitude, and, b) suggested children with greater time since onset report more positive communication attitudes (Groner et al., 2016). The present study extends these findings to explore whether stuttering severity (i.e., frequency, duration, and presence of physical concomitants) and time since onset predict communication attitude in a new sample of preschool-age children who stutter. Our preliminary data suggest there is not compelling evidence that either factor predicts communication attitude in preschool-age children who stutter.

Table 3
Linear regression model predicting *KiddyCAT* from *Stuttering Severity Instrument – 4th Edition (SSI-4)* subtest scores.

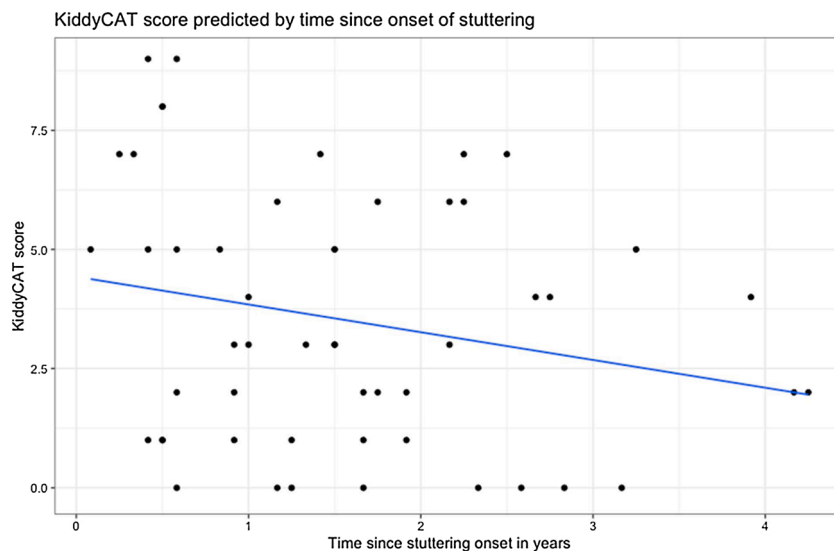|	*b*	*β*	Standard error	*t*-value	*p*-value
SSI-4 Frequency	−0.03	−0.04	0.09	−0.31	.76
SSI-4 Duration	0.22	0.25	0.13	1.68	.10
SSI-4 Physical concomitants	0.09	0.09	0.13	0.65	.52

Fig. 1. Scatterplot visualizing the effect of time since onset on communication attitude (*KiddyCAT*).

4.1. Insufficient evidence that greater stuttering severity predicts negative communication attitude

None of the three characteristics of stuttering severity explored in the present study predicted a preschool-age child's reported communication attitude. Children who presented with greater stuttering frequency, longer stuttering duration, or more apparent physical concomitants were no more likely to report a negative communication attitude than children with more mild stuttering behaviors. Importantly, these results are based on a heterogenous sample of children who stutter, with average stuttering frequency ranging from 1 to 21%SS, duration of stuttering moments from 0.5 to 10 seconds, and secondary behaviors ranging from none to severe or painful looking. Additionally, communication attitude data for the present study were consistent with the normative data for the *KiddyCAT* reported by Vanryckeghem et al. (2007, 2005), which included a mean of 4.36 (SD = 2.78), median of 5, and mode of 5 for a sample of 45 preschool-age children who stutter. In the present study, the average *KiddyCAT* score was 3.59 (SD = 2.57) and the mode was 5 for a sample of 59 children.

In contrast to the present study, Groner et al. (2016) did not provide extensive descriptive statistics on the type, duration, and secondary behaviors of stuttering-like disfluencies in their sample of preschool-age children who stutter. However, the authors did report an average of 22 repetitions and 5 prolongations per 300-word speaking sample (i.e., approximately 80 % of the stuttering-like disfluencies reported were repetitions and 20 % were prolongations). This is remarkably similar to the average distribution of stuttering-like disfluencies in the present study's conversation sample, with whole word and syllable repetitions accounting for 80.18 % of stuttering moments and inaudible and audible prolongations accounting for 17.31 %. Groner and colleagues also reported similar *KiddyCAT* scores to the present study, with a reported mean of 3.63 and standard deviation of 2.45.

Given the similar descriptive statistics across the two studies, it is not surprising that neither study provided strong evidence for an association or influence of stuttering frequency on communication attitude. Though Groner et al. (2016) reported the total number of prolongations was positively correlated with *KiddyCAT* scores, the total number of stuttering moments (repetitions and prolongations) was not associated with communication attitude. Our extension to include more than one speaking sample and measures of stuttering duration and presence of physical concomitants allowed us to investigate if stuttering severity better described the relationship between stuttering and communication attitude. This methodological decision was supported by research reporting a significant association between stuttering severity and communication attitude in school-age children who stutter as young as five years (Beilby et al., 2012; Kawai et al., 2012; Vanryckeghem & Brutten, 1996; Vanryckeghem et al., 2001). Nevertheless, the results of the present study coupled with the findings of Groner et al. suggest there is neither an association between total stuttering-like disfluencies and communication attitude in preschool-age children who stutter nor a linear relationship between stuttering severity and communication attitude, which is congruent with what has been reported in adolescents and adults who stutter (Beilby et al., 2012; Constantino et al., 2016; Manning & Beck, 2013).

Taken together, the results of the present study and that of Groner et al. (2016) provide useful recommendations for speech-language pathologists working with preschool-age children who may stutter. First, because stuttering severity does not predict communication attitude, clinicians should incorporate an assessment of communication attitude in their evaluation of preschool-age children who may stutter, as some children with low stuttering severity may still report significant negative attitudes toward communication. Although a large portion of the intervention evidence for preschool-age children who stutter highlights outcomes in speech fluency (de Sonneville-Koedoot et al., 2015; Sidavi & Fabus, 2010; Yaruss et al., 2006), clinicians should also consider negative communication attitude as a target for intervention, particularly for children with low stuttering severity but significant negative communication attitude. Facilitating and maintaining a positive communication attitude in early childhood may further support

children as they enter elementary school, when they are noted to report increasingly more negative communication attitudes and experience increased risk of bullying and teasing (Berchiatti et al., 2020; Daniels et al., 2012; Kawai et al., 2012).

Clinicians should also feel empowered to counsel parents about the nature of the relationship between stuttering severity and communication attitude. Parents of young children who stutter often ask how they can facilitate their child's speech fluency, and some parents note visible frustration or negative reactions to individual moments of stuttering. For parents who ask about increasing speech fluency, clinicians may explain that greater speech fluency does not equate to positive communication attitude. Additionally, parents may ask how their child's stuttering behaviors and attitudes compare to those of other children who stutter. The distribution of stuttering-like disfluencies in the present sample (e.g., 80 % whole word or syllable repetitions) is consistent with children who ultimately persist or recover from stuttering (Ambrose & Yairi, 1999; Throneburg & Yairi, 2001). Though we cannot infer if the specific participants in the present sample will ultimately recover or persist in their stuttering from this data, positive or negative communication attitude does not appear to be linked with any specific presentation of stuttering frequency, duration, or presence of physical concomitants.

4.2. Time since onset does not predict communication attitude in preschool-age children

To date, only one additional study has assessed the association between time since onset and communication attitude in preschool-age children who stutter. Using a small sample of children who stutter ($n = 38$), Groner et al. (2016) proposed communication attitude in preschool-age children who stutter becomes more positive with increased age and greater time since onset of stuttering. This finding, however, is limited because it is not reported if children participating in this study were exposed to any treatment effect at the time of data collection. Additionally, Groner and colleagues did not provide any descriptive statistics to determine the minimum, maximum, average, or distribution of time since onset data, making it difficult to generalize these findings to other preschool-age children who stutter.

The present study's preliminary findings contrast with this previous research. Specifically, within our sample, children who presented with stuttering for longer duration were no more or less likely to report negative communication attitudes than children with a more recent onset of stuttering. Notably, our sample represented children with time since onset ranging from one month to four years and who had not previously participated in any speech and language evaluation or treatment.

Parents of children who stutter often ask if their child will grow out of their stuttering, or if their child's stuttering will persist later into childhood, adolescence, and adulthood. Yairi and Ambrose (2013) reported time since onset of greater than 6–12 months as a risk factor that may be associated with persistent stuttering. Of the 45 participants for whom we had time since onset data, 28 (62 %) presented with stuttering for greater than twelve months. Additionally, 41 of the 53 children included in our full sample (77 %) were boys, another characteristic that may be associated with persistent stuttering (Craig, Hancock, Tran, Craig, & Peters, 2002; Yairi & Ambrose, 2013). In our sample, neither time since onset nor gender contributed to more negative communication attitudes. These descriptive data do not allow us to determine if any of the preschool-age children in the present sample will persist in their stuttering, and therefore we cannot infer if our data generalize to both preschool-age children who do and do not recover from stuttering. Still, speech-language pathologists may use this information in their efforts to counsel parents and clients. Specifically, our preliminary data suggest children who have presented with stuttering for greater than six months are no more likely to present with negative communication attitude than children who have presented with stuttering for less time. Similarly, children with a recent onset of stuttering are no more likely to present with a positive communication attitude than children who have presented with stuttering for more time.

Time since onset is also relevant to speech-language pathologists working with preschool-age children who stutter when considering when to start intervention. Most (70–80 %) preschool-age children who begin to stutter will recover (Yairi & Ambrose, 2013); therefore, some clinicians may defer treatment up to one year rather than referring for early intervention (Lewis, Packman, Onslow, Simpson, & Jones, 2008). Currently, we do not yet know how communication attitude may contribute to the onset and development of stuttering; however, there is evidence to support early intervention for young children who stutter in order to facilitate positive communication attitudes, increase resilience against the social preference for fluent speech, and improve perception of peer relationships (Byrd & Donaher, 2018; Byrd et al., 2018; Byrd et al., 2016; Ezrati-Vinacour et al., 2001). For these reasons, we recommend speech-language pathologists monitor both stuttering frequency and communication attitude separately or recommend early intervention regardless.

4.3. Limitations and future directions

This preliminary investigation provides necessary insight into the relationship between communication attitude and possible predictors (i.e., stuttering severity and time since onset) in preschool-age children who stutter (Guttormsen et al., 2015). By extending the efforts of Groner et al. (2016), we provide the first analysis of stuttering frequency, duration, and presence of physical concomitants as possible predictors of communication attitude in a relatively large sample of preschool-age children who stutter. Nevertheless, our study is not without limitations.

First, although our sample size ($N = 59$) is the larger than many of the existing published studies investigating communication attitude in preschool-age children who stutter, it remains too small to support more complex statistical models investigating predictors of communication attitude. Our results support previous literature suggesting stuttering severity is not linearly related to communication attitude or overall impact of stuttering in older speakers (Beilby et al., 2012; Constantino et al., 2016; Manning & Beck, 2013); however, it is possible stuttering severity indirectly influences a child's communication. For example, parents are reliable in

identifying specific stuttering moments (Einarsdóttir & Ingham, 2009). Parent perception of their child's stuttering behavior may better predict communication attitude and may be influenced by stuttering severity or time since onset (Boey et al., 2009). Groner et al. (2016) reported parent perception of stuttering behavior (*TOCS Speech Fluency Rating Scale*), rather than stuttering frequency, was associated with child reported communication attitude (*KiddyCAT*). Parent perception of stuttering behavior may be influenced by multiple factors, such as their child's stuttering severity or behaviors over time, their child's reaction to stuttering moments, or their own attitudes or reactions to stuttering. Additionally, research with adults suggests that speakers' experiences and communication goals (Tichenor & Yaruss, 2019a, 2019b, 2020) or stuttering variability or spontaneity (Constantino et al., 2016; Constantino et al., 2020) better predict communication attitude or overall impact of stuttering compared to stuttering severity. Future research should investigate factors other than stuttering severity that may influence communication attitude in preschool-age children who stutter and should recruit larger cohorts of children who stutter to allow for more complex statistical analyses.

Second, our study is limited by the use of cross-sectional data — we measured stuttering severity and communication attitude data at only one time point. This is consistent with prior literature, and, fortunately, there is evidence the *KiddyCAT* has adequate test-retest reliability (Vanryckeghem et al., 2015). Nevertheless, stuttering is variable and the severity of stuttering in one time point may not capture the relationship between stuttering severity and communication attitude in preschool-age children who stutter over time. Future investigations should consider data collection at multiple time points, to determine if variability in stuttering frequency better predicts communication attitude.

5. Conclusion

The present preliminary investigation suggests neither stuttering severity nor time since onset predict communication attitude reported by preschool-age children who stutter. Participants with high stuttering severity or who had presented with stuttering for longer duration were no more likely to report a negative communication attitude than participants with mild stuttering severity or a shorter time since onset. Thus, similar to adults and adolescents who stutter, but in contrast to school-age children who stutter, communication attitude is not linearly related to stuttering severity in preschool-age children. Speech-language pathologists should therefore consider communication attitude independently from the type, quality, and frequency of stuttering-like disfluencies and time since onset of stuttering in their clinical decision making for preschool-age children who stutter.

Author statement

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