

Selection of screening items for stuttering: a preliminary study

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Objective: This study aimed to develop screening items that can identify stuttering, even by those who are not familiar with stuttering (e.g., kindergarten teachers, nursery school teachers, and itinerant counselors).

Methods: A total of 13 items to assess symptoms of disfluency with additional examples were created. There were 4 nursery school teachers (NTs) and 1 speech-hearing-language therapist (ST) who observed 52 children (age range, 3–6 years-old) and checked the 13 items, classifying each child as: "Stuttering," "No stuttering," "May be stuttering," or "Don't know if it's stuttering, but I'm worried."

Results: There were 3 children identified to have a tendency to stutter. Comparing items marked by the NTs and the ST, the 13 original items were merged into 3 items: "Multiple repetitions on the first sound or part of a word," "First sound prolongation," and "Difficulty with saying first sounds of words and requiring physical effort to speak, despite having something to say." For children rated as having ≥ 2 items, using this scale we could identify children who stutter with a sensitivity of 100% and specificity of 98%.

Key words: stuttering, screening, checklist, preschool children

Introduction

Stuttering, *alalia syllabaris*, the most common fluency disorder, is an interruption in the flow of speaking characterized by repetitions of sounds and syllables, sound prolongations, blocks, and may be accompanied by physical tension, negative reactions, secondary behaviors, and avoidance of sounds, words, or speaking situations.¹ Moreover, stuttering has been found to have an incidence rate of 5%–8%.^{2–8} The symptoms of stuttering are variable, and 70%–80% of the affected children have been found to recover naturally.^{7–9} Even when parents worry about their child's stuttering, pediatricians and preschool teachers tend to downplay the anxiety it causes the parents. Therefore, parents might possibly continue to be anxious if they do not receive any reliable information and/or support. And many parents miss the opportunity to consult with speech-language-hearing therapists (ST) concerning their child's speech disorder. Furthermore, it is generally thought that there is a lower

recovery rate for school-age children than preschool children.^{2,10}

In Japan, there is a health checkup system for children between 3 and 3.5 years old, for which the consultation rate is close to 90%. Additionally, although relatively few, there are currently some regions in Japan in which 5-year-old health checkups are conducted. The 3-year-old health checkups are likely the best time for parents, because it might be as much as 6 months to 1 year after the onset of stuttering when a mother has usually begun to worry about her child's stuttering. Providing appropriate information on stuttering during health checkups for children in this age range can provide guidance and support for parents to help reassure them and about how to help their children.

Furthermore, there is an itinerant consultation system in Japan. In early childhood development, specialists regularly visit preschools to conduct observations and evaluations of children, as well as to provide services for children with disabilities. Additionally, they give advice

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and guidance to preschool teachers when necessary. They also observe children who have been identified as "anxious" by childcare personnel, give advice and guidance when necessary, and refer children to specialized agencies as needed. This itinerant system seems to effectively support children whose stuttering does not disappear by the age of 4 or 5 years old. Based on these health checkups and itinerant consultations, it was deemed necessary to develop a system to perform step-by-step interventions at appropriate times for children who stutter that would likely lower the number of cases that may be missed or overlooked of children who might otherwise benefit from proactive interventions.

To accomplish this, we created screening items that were simple enough to be applied by childcare personnel and itinerant consultants who may not be specialists in stuttering, so that they would accurately be able to assess children who stutter. First, it was mandatory to adequately capture the core symptoms of stuttering to create such screening items. The basic core symptoms of stuttering include the repetition of sounds, syllables, and parts of words, sound prolongation, and blocking.¹¹⁻¹³ Even non-stuttering children (i.e., those within the normal range of disfluency) sometimes repeat whole and parts of uttered words. And it is common for some children to show nonfluctuations similar to stuttering, such as inserting unnecessary fillers, stopping in the middle of an utterance, or revising, which alone is not stuttering.¹² However, even for childcare professionals, with various opportunities to interact with children, there is scant information provided to them in training courses about stuttering. Thus, among childcare professionals, relatively little is known about the symptoms of stuttering.^{14,15} Therefore, we considered what kinds of

speech features, behaviors, and symptoms childcare professionals may determine to be stuttering, along with the definitions of stuttering by the ST in the present study, to create this screening instrument for children who may be suspected of stuttering.

This preliminary survey was conducted as the first step in the development of a set of screening items to be used in combination with other pre-established items to distinguish developmental disorders likely to inflict children from preschool age (e.g., learning disabilities, developmental coordination disorders, and the tic disorder). The objective of this survey was to create screening items that could be used by childcare personnel and itinerant consultants to more effectively and accurately identify children who stutter. The long-term goal therefore is for them to be able to accurately determine children who stutter or who may manifest other speech-related anxiety symptoms in order to provide such children with referrals to qualified professionals whenever deemed necessary.

Materials and Methods

Developing a checklist for stuttering behavior

The symptoms of stuttering and the nonfluency symptoms exhibited by children were listed in expressions that would be easy for the general public to understand, and 13 items of disfluency symptoms with additional examples were created (Table 1). An evaluation was conducted regarding the presence or absence of these 13 items. These items were created based on the classification of disfluencies of the Standard Test for Stuttering including some variation items about the position and number of repetitions.¹² Based on the results of these 13 items,

Table 1. Items used to assess dysfluency

No.	Description	Example in Japanese (in English)
1	Initial syllable repetition only once	bo boku-ga (a I am)
2	Initial syllable repetition many times	bo bo bo boku-ga (a a a I am)
3	Final syllable repetition many times	boku-ga ga ga ga (I am am am)
4	Part of word repetition only once	oka okaasan-ga (mom mommy)
5	Part of word repetition many times	oka oka okaasan-ga (mom mom mommy)
6	Whole word repetition many times	boku-ga boku-ga boku-ga (I am I am I am)
7	Prolongation	booooooooooku-ga (I- - - - -)
8	Using interjections many times	e-to, ano- (well, uh- - -)
9	The first word does not come out	• • • boku-ga (- - - - I am)
10	Speaking with facial grimace	
11	Speaking with body movement	
12	Speaking with force and energy	
13	Stop talking in the middle of a sentence or word	

items were selected and integrated to a smaller number of new screening items so that they could be implemented more easily.

Participants

Data were gathered from 52 children (26 girls, 26 boys; aged 3–6 years: 14, 3-year-olds; 15, 4-year-olds; 13, 5-year-olds; and 10, 6-year-olds). The evaluators were 4 nursery school teachers (NTs) and 1 ST. Each of the 4 NTs were in charge of their own class and therefore knew each child in their class very well. Three NTs had less than 5 years of childcare experience, and the other NT had 20 years of experience. None of the NTs had however learned anything about stuttering in their own initial training courses. They stated that they knew relatively little about stuttering except that it meant to repeat words or sounds of words. On the other hand, the ST in the present study had more than 30 years of experience dealing with children who stutter.

Procedure

The evaluators checked each child regarding all of these 13 items and Hayashi's Quantification Method II (QMII).¹⁶ NTs evaluated the children during their normal daily school life, and the ST observed and talked with all the children for 3 days during their school activities (e.g., playing, eating lunch, etc.). They not only checked all the items but also classified all the children as, "No stuttering," "Stuttering," "May be stuttering," or "Don't know if it's stuttering, but I'm worried." In addition, except for the children classified as, "No stuttering," the ST conducted the Standard Test for Stuttering with each child in a quiet room in the nursery school. Utterances of at least 100 words were recorded using an PCM-D100 recorder, Sony. Regarding the duration of the symptoms, the NTs reported the period in months that the symptoms were observed in the nursery school.

This research was approved by the Kitasato University School of Allied Health Sciences Ethics Committee (No. 2016-032).

Results

Children who stutter

The NTs classified 45 of 52 children as, "No stuttering," all of whom were also confirmed as, "No stuttering," by the ST. The ST confirmed 3 children who stuttered, and the NTs rated 4 children as, "Stuttering." Among all the children, there was 1 child classified as, "May be stuttering" by an NT who was classified as, "No stuttering" by the ST. The NTs rated 2 children as, "Don't know if it's stuttering, but I'm worried," for whom the ST classified as, "No stuttering." Finally, there was 1 child who was classified as, "Stuttering" by an NT but as, "No stuttering" by the ST (Table 2).

The stuttering and disfluency symptoms

Of 52 children, 45 were classified as, "No stuttering" by the NTs and the ST. For those 45 children, none of the evaluators selected any items of stuttering or disfluency. Table 3 shows how the symptoms of stuttering and disfluency were marked for 7 children (labeled A–G) who were evaluated as, "No stuttering" by the NTs. NTs evaluated 4 children as, "Stuttering." Child A was marked as having, "Initial syllable multiple repetitions" (Item No. 2 in Table 1), "Prolongation" (Item 7), and "Speaking with a facial grimace" (Item 10). Children B and C were both marked as having, "Initial syllable multiple repetitions" (Item 2), "Blocking" (Item 9), and "Speaking with a facial grimace" (Item 10). Child B also had, "Part of word multiple repetitions" (Item 5) marked, and Child C was had, "Stop talking" (Item 13) marked. Child D was marked as having, "Initial syllable multiple repetitions" (Item 2), "Prolongation" (Item 7), "Blocking" (Item 9), and "Speaking with force and energy" (Item 12). The NTs marked 3–5 symptoms, and the ST confirmed 5–10 symptoms. The ST marked Items 1 and 4 (e.g., initial syllable and part of words repeated only once), whereas the NTs did not mark those items. One NT stated that Child C had shown these obvious symptoms for 3 months, starting from 6 months ago, but that they had not manifested for the last 3 months. That

Table 2. Children's speech evaluations (N = 52)

	Children evaluated by nursery school teachers	Children evaluated by a speech therapist
No stuttering	45	49
Stuttering	4	3
May be stuttering	1	0
Don't know if it is stuttering, but I'm worried.	2	0

NT was impressed by that child, remembering his speech difficulties, and therefore evaluated him as, "Stuttering." However, at the time of the ST's observation, none of these symptoms were present in Child C; therefore, the ST evaluated Child C as, "No stuttering." Furthermore, for 3 children (E–G) who were evaluated as, "No stuttering" by the ST, the NTs had marked 1 item only for each of them. Child E was evaluated as, "Part of word multiple repetitions" (Item 5), for whom an NT marked, "May be stuttering." Regarding Children F and G, who were evaluated by an NT as, "Don't know if it's stuttering, but I'm worried," that NT marked, "Interjections" or "The first sound does not come out." Noteworthy, only Child F was found to have nasopharyngeal articulation (Data not shown).

Selection and development of the screening items

Based on the results of these 13 items, we selected the items that the NTs could also recognize in 3 children evaluated as stuttering by the ST. Three simplified grouped items were formed by making more easily understood appropriate sentences from the 13 original items: (Group item 1, Items 2 and 4 combined) multiple repetitions on the first sound or part of a word (e.g., "bo bo bo boku" [means, "a a a I" in English], "o ok oka okaasan" [means, "m mo mom mommy" in English]); (Group item 2, Item 7) first sound prolongation (e.g., "bo-----ku" [means, "a-----I" in English]); (Group item 3, Items 9–12 combined) "difficulty uttering the first sound and requiring a physical effort to speak, despite having something to say, sometimes with a facial grimace." Thus, the results of these 13 items were combined into these 3 groups. To confirm these, we used the QMII^{16,17} to examine the distinguishing ability to identify children who stutter using these 3 groups. Analysis using the QMII were accurate to distinguish the children who stuttered from their non-stuttering peers (correlation ratio $\eta = 0.778$, correct classification rate = 98.1%).^{16,17} While Group item 2 strongly contributed to the distinguishing ability of the screening items (-2.783), Group items 1 and 3 had a mild distinguishing ability (-0.885). Thus, we could successfully identify the children if they were positive for 2 or more of 3 group items, which yielded the high sensitivity and specificity of 100% and 98.0%, respectively (Figure 1).

Furthermore, it is important to note that some of the children's stuttering was severe but had a short duration, as in the case of Child C. Therefore, referencing the group items 1–3, we added a special category, "Symptoms continue for longer than 1 year even if fluctuation was observed," (Data not shown due to the

possibility of it being a temporary condition).

Discussion

These NTs had no experience learning about stuttering during their initial childcare training; therefore, at the beginning of the present study, it was difficult to explain what symptoms may manifest as stuttering. By showing the items to be examined, the core symptoms of stuttering, "repetition," "prolongation," and "blocking" could be accurately evaluated. When 2 or more symptoms presented with tension symptoms, it was evaluated as stuttering. The ST confirmed "Repeated once" of all children evaluated as stuttering, but none of the NTs marked "Repeated once." It was considered that they did not worry so much about only one repetition, so they did not notice it in the children's daily conversations, or they did not consider "only one repetition" to indicate stuttering. In point of truth, it is appropriate to consider multiple repetitions as stuttering; however, one repetition

Table 3. Comparison of the 13 items evaluated by nursery school teachers (NTs) and a speech-hearing-language therapist (ST)

Child (age: years/months)		
Gender		
Duration of symptoms in nursery school (months)		
Evaluator		
No.	Items	Evaluation
1	Initial syllable repetition only once	
2	Initial syllable repetition many times	
3	Final syllable repetition many times	
4	Part of word repetition only once	
5	Part of word repetition many times	
6	Whole word repetition many times	
7	Prolongation	
8	Using interjections many times	
9	The first word does not come out	
10	Speaking with facial grimace	
11	Speaking with body movement	
12	Speaking with force and energy	
13	Stop talking in the middle of a sentence or word	
Total		

*NT1–3 indicates a different evaluator.

S, Stuttering; NS, No Stuttering; MS, May be stuttering; DS, Don't know if it is stuttering, but I'm worried.

Screening items for stuttering

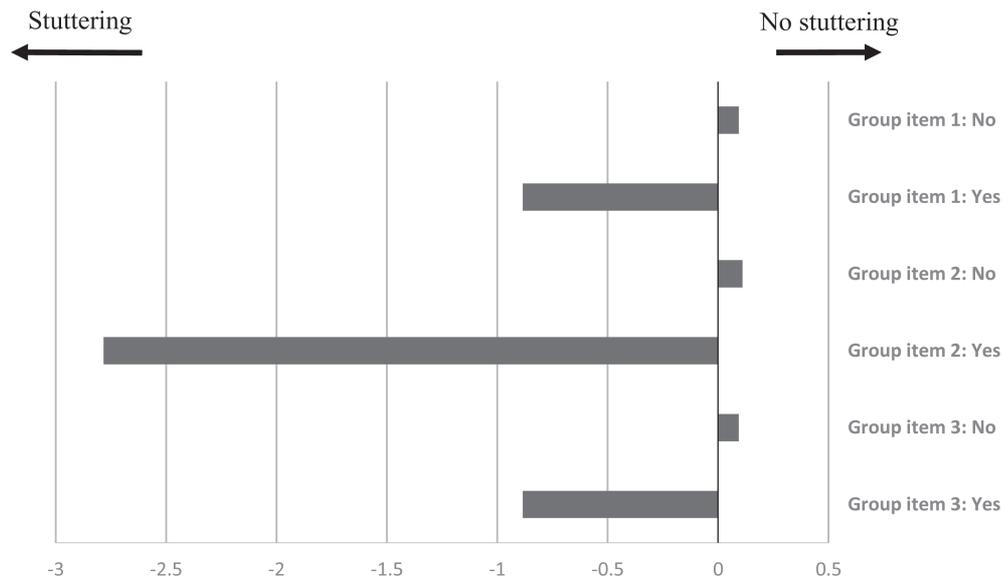


Figure 1. Weighted scores determined by Quantification Method II

Negative values indicate the contribution to the distinguishing of children who stutter.

Group item 1: Multiple repetitions on the first sound or part of a word

Group item 2: First sound prolongation

Group item 3: Difficulty uttering the first sound of words and requiring physical effort to speak, despite having something to say, sometimes with a facial grimace

A (3/08)		B (4/00)		C (4/11)		D (4/04)		E (5/06)		F (3/09)		G (3/07)	
Female		Male		Female									
20		>12		3		18		12		12		12	
NT1	ST	NT2	ST	NT2	ST	NT2	ST	NT3	ST	NT1	ST	NT1	ST
S	S	S	S	S	NS	S	S	MS	NS	DS	NS	DS	NS
	*		*				*						
*	*	*	*	*		*	*						
	*								*				
	*	*	*	*	*		*			*			
*	*	*	*	*		*	*			*			
	*	*	*	*	*		*				*		*
*	*	*	*	*		*	*						*
			*				*						
				*									
3	7	4	10	5	0	5	5	1	0	1	0	1	0

is also seen in children who do not stutter, so that it may not be considered as stuttering.

The expression, "The first word does not come out" was difficult to determine whether or not it was due to the child being poor at word recall, a thinking difficulty, or mutism; therefore, it was necessary to change the expression. "Difficulty with uttering first words and requiring physical effort to speak, despite having something to say, sometimes with a facial grimace" although a bit long, was determined to help avoid evaluating children as stuttering who are not actually stuttering. For the purposes of the present study, it was thought that by carefully selecting three simple expressions as items that could adequately reveal core symptoms, that it would be easier and more accurate to use those for the actual screening. In addition, stuttering repeatedly fluctuates and changes in its manifestations; therefore, it is necessary to check whether or not the symptoms are only manifested for a short period of time.

Limitations and Conclusions

This preliminary study aimed to develop items that could accurately identify children who stutter at the ages of 5 or 6 years old. Children at around the age 5 years old or older often become aware of any differences in their own speech as compared with that of their mother, father, siblings, or friends. On the other hand, if professionals (e.g., NTs and/or STs) notice multiple items regarding children's speech that may be deviant from the norm, they can pay extra careful attention to those children and may be able to address these concerns and suggest professional treatment before the children enter elementary school. One limitation of this study was the small sample size. Further evaluations of larger populations using this screening scale with various cases including more cases of actual stuttering are warranted to clarify the validity of this present study. It will also be necessary to identify more issues using such screening items to better determine a child's speech difficulties including disfluency and stuttering.

Nursery school and kindergarten teachers are key persons who are with a child for extended periods of time, can listen to their utterances in various situations, are aware of any of the child's speech difficulties, and can take the appropriate action to help them. The screening items in the present study will enable teachers to distinguish children who stutter and thereby provide opportunities to give them the necessary support they need. In the course of this study, it became surprisingly evident that most nursery school and kindergarten teachers know relatively little regarding how to support

children with speech difficulties and especially those who stutter. Awareness of the kinds of support necessary for children who stutter and how to give them that support remain important issues for future studies.

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Conflicts of Interest: None

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