ORİJİNAL ARAŞTIRMA ORIGINAL RESEARCH

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Comprehensive and Intensive Group Therapy for School-Aged Children Who Stutter: A Preliminary Study

Okul Çağı Kekemeliği Olan Çocuklar İçin Kapsamlı ve Yoğunlaştırılmış Grup Terapisi: Ön Çalışma

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ABSTRACT Objective: This was a preliminary study to investigate a comprehensive and intensive group therapy (CIGT) for school-aged children who stutter and examine the differences in cognitive, affective, linguistic, and social components of stuttering as well as speech behavior in Türkiye. **Material and Methods:** Participants were 6 children, 2 girls and 4 boys (age range 8-12 years), who attended ten days of CIGT. Primary outcome measures were the Turkish version of the Cognitive, Affective, Linguistic, Motor, and Social Rating Scale for School Children who Stutter, the percentage of syllables stuttered, and the Turkish version of the 4th edition of the Stuttering Severity Instrument. Secondary outcome measures were parents' ratings of stuttering severity and speech naturalness. Data were gathered 1 month prior to therapy, on the first and last day of the therapy, 1 month following the therapy, and 3 months after the therapy. This study was conducted at the Speech & Language Therapy Department of Hacettepe University in Ankara, Türkiye. **Results:** Group mean reduction of stuttering frequency from the first day to the last day of the therapy was 67%, and from the first day of the therapy to the third month after the therapy was 82%. Parents' ratings of stuttering severity confirmed these results. Participants' cognitive, affective and social scores were reduced to 1. **Conclusion:** Results support that the CIGT can result in an increase in children's common knowledge, understanding, and awareness of stuttering and positive changes in fluent speech production in school-aged children who stutter in Türkiye.

Keywords: School-aged children; comprehensive; intensive; group therapy; stuttering

ÖZET Amaç: Bu araştırma, Türkiye'deki okul çağı kekemeliği olan çocuklar için kapsamlı ve yoğunlaştırılmış grup terapisini (KYGT) araştırmak ve kekemeliğin bilişsel, afektif, dilsel ve sosyal bileşenlerinin yanı sıra konuşma davranışındaki farklılıkları incelemek için yapılmış bir ön çalışmadır. **Gereç ve Yöntemler:** Katılımcılar, 10 günlük KYGT'ye katılan, 2 kız ve 4 erkek (8-12 yaş arası) olmak üzere 6 çocuktur. Birincil sonuç ölçütleri, Kekemeliği Olan Okul Çağı Çocukları için Bilişsel, Affektif, Dilsel, Motor ve Sosyal Değerlendirme Aracının Türkçe versiyonu, kekelenen hece sıklığı ve Kekemelik Şiddet Ölçeği'nin 4. baskısının Türkçe versiyonudur. İkincil sonuç ölçütleri, ebeveynlerin kekemelik şiddeti derecelendirmeleri ve konuşma doğallığı puanlarıdır. Veriler, terapiden 1 ay önce, terapinin ilk ve son gününde, terapiden 1 ay sonra ve terapiden 3 ay sonra toplanmıştır. Bu çalışma, Ankara, Türkiye'de Hacettepe Üniversitesi Dil ve Konuşma Terapisi Bölümünde yürütülmüştür. **Bulgular:** Terapinin ilk gününden son gününe kadar ortalama kekemelik sıklığındaki azalma oranı %67, terapinin ilk gününden terapi sonrası 3. aya kadar %82'dir. Ebeveynlerin kekemelik şiddeti derecelendirmeleri de bu bulguları desteklemektedir. Katılımcıların bilişsel, duyuşsal ve sosyal puanları 1'e düşmüştür. **Sonuç:** Sonuçlar KYGT'nin Türkiye'de okul çağı kekemeliği olan çocukların kekemelik konusundaki ortak bilgi, anlayış ve farkındalıklarında artış ve akıcı konuşma üretiminde olumlu değişikliklerle sonuçlanabileceğini desteklemektedir.

Anahtar Kelimeler: Okul çağı çocuklar; kapsamlı; yoğunlaştırılmış; grup terapisi; kekemelik

Stuttering is a common condition that may have significant social and emotional consequences for school-aged children who stutter (CWS).[1,2] A growing body of literature recognizes that many factors contribute to the onset and maintenance of childhood stuttering, including motor, emotional, cognitive, social, and linguistic dimensions.[3-9] The current study focuses on approaching stuttering therapy in school-aged CWS from a multifactorial perspective, as there is a broad understanding that stuttering is better understood from a multidimensional perspective.[10]

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Data from several studies have suggested that intensive and comprehensive group therapy has been beneficial for school-aged CWS.[7,10-14] Baumeister et al. investigated outcomes of an intensive stuttering therapy which was performed as a 3 or 2 weeks (for children under 12 years) program.[7] The program consisted of direct and indirect interventions that combined fluency shaping and stuttering modification therapy with awareness training and social interaction activities in children and adolescents (age range 9-19 years). The authors reported reduced stuttering frequency after the therapy. Laiho and Klippi examined 14 days (35.5 hr) of intensive therapy using stuttering modification in school-aged CWS (age range 6.8-14.0), and reported reduced stuttering severity and avoidance behavior.[13] Rosenberger et al.[14] evaluated the effectiveness of an intensive stuttering therapy program that integrated stuttering modification with awareness tasks and social support in children and adolescents (age range 9-18 years). The program consisted of 3 weeks of intensive therapy, 1 weekend of follow-up the therapy after 2 months, and another 1 weekend of follow-up the therapy after 9 months. The authors reported increased fluent speech production and reduced anxiety after the therapy. Recently, Byrd et al. and Byrd et al. addressed the affective and cognitive components in a 5-day intensive stuttering therapy for CWS (age range 4-14 years) and reported improvements in communication attitude.[11,12] Previous literature has shown that improved fluent speech production and communication attitude can be achieved with comprehensive and intensive stuttering therapy. Comprehensive and intensive therapy approaches have been valuable to the therapy of school-aged CWS, so it is important to provide further evidence from different languages and cultures for the use of these approaches. To the authors' knowledge, there is no previous study that has investigated the intensive stuttering therapy that addressed the cognitive and affective skills as well as speech behaviors in school-aged CWS in Türkiye. Therefore, investigating a comprehensive and intensive stuttering therapy for school-aged CWS is essential for an increased understanding of beneficial stuttering therapy for school-aged CWS in Türkiye.

In the present study, a comprehensive and intensive group therapy (CIGT) for school-aged CWS was investigated. The Cognitive, Affective, Linguistic, Motor, and Social (CALMS) assessment was used to see the changes in cognitive, affective, linguistic, and social components after the therapy. The CALMS model provides a framework for a comprehensive assessment of the above-mentioned five components in school-aged CWS.[10,15] This was a preliminary study to investigate the CIGT for school-aged CWS and examine the differences in cognitive, affective, linguistic, and social components of stuttering as well as speech behavior in Türkiye.

MATERIAL AND METHODS

Ethical approval for this study was obtained from the Hacettepe University Ethics Committee (date: October 25, 2016, approval no. GO16/621-15), and the study was registered with ClinicalTrials.gov (trial no. NCT03778632). The research was carried out at Hacettepe University's Department of Language and Speech Therapy. This study was a part of the first author's doctoral dissertation and a larger research project investigating the stuttering therapy in school-aged CWS from a multidimensional perspective in Türkiye. This research was conducted in accordance with the Principles of the Helsinki Declaration.

The participants were 6 children (age range 8-12 years) recruited from applications to the Speech & Language Therapy Unit of Hacettepe University Hospital between May and December 2017. The criteria for inclusion of the children were as follows: (a) Presence of stuttering based on the assessment with the Turkish version of the 4th edition of the Stuttering Severity Instrument (SSI-4-TR); (b) No history of neurological, physiological, intellectual, emotional, academic, or hearing problems based on parental reports; (c) No speech and/or language impairment other than stuttering; (d) No therapy history for stuttering during the previous 6 months; and (e) Being a native Turkish speaker.[16,17] The baseline demographic and stuttering-related characteristics of the children are presented in Table 1. All the children and their parents were provided written informed consent and informed that they were free to withdraw at any time and/or apply for additional therapy sessions.

TABLE 1: Demographic and baseline characteristics.

Children	Age (months)	Sex	Family history	Time since onset (months)	Therapy history
P1	131	B	+	47	-
P2	100	G	-	70	+
P3	126	B	+	72	+
P4	111	B	+	51	-
P5	125	B	-	77	+
P6	127	G	-	43	-

P: Participant; B: Boy; G: Girl.

Assessments were conducted by senior students of speech and language therapy who were trained in the assessment procedure. CALMS-Turkish Version (CALMS-TR), the SSI-4-TR (16) assessments, and parent's ratings of the stuttering severity were completed on 5 time-points: 1 month before (Time 1, T1), the first day (Time 2, T2), last day (Time 3, T3), 1 month after (Time 4, T4), and 3 months after (Time 5, T5) the therapy.[18] All of the in-clinic samples were taken in rooms not related to the therapy and with unfamiliar adult conversation partners.

Cognitive, affective, linguistic, and social scores were evaluated using the CALMS-TR.[18] The cognitive component examines children's ability to detect overt stuttering behaviors in the clinician's and their own speech, their general knowledge of stuttering, and if they have been involved in therapy previously, their understanding of specific stuttering management techniques, with four sub-items. The affective component examines children's feelings, emotions, and attitudes about their stuttering with 3 sub-items. The linguistic component examines the effect of language formulation and discourse complexity on children's stuttering as well as children's speech and language skills with 3 sub-items. The social component examines children's attitudes concerning their participation in social life, the effects of the listener type, and speech situation on the children's stuttering with 4 sub-items. The sub-items were graded on a scale from 1 to 5, and the scores of each component were obtained by calculating the average of the scores for these items. As a result, a score in the range of 1 (low concern) to 5 (great concern) was reached for each component.

The stuttering frequency was calculated from the audio and video recordings of reading and conversational samples of the assessment of SSI-4-TR as the percentage of syllables stuttered with the following formula: %SS=100×(total number of syllables stuttered/total number of syllables).[19] Stuttering severity was assessed via SSI-4-TR that measures stuttering severity in children (age range 6-16 years). The lowest score was 6, which is indicative of very mild stuttering, while scores that were ≥36 indicate very severe stuttering. The speech naturalness scores were graded by 7 independent listeners from offline video recordings randomly and blindly. The lowest score was 1, which was indicative of speech that was perceived as highly natural, and the highest score was 9, which was indicative of speech that was perceived as being highly unnatural. Parents were asked to rate their child's stuttering severity on a severity rating scale with 7 scale divisions (1=normal disfluency, 2=very mild stuttering, 7=very severe stuttering).

Parents attended 2 hr of training 1 month before the therapy. Through the training, parents were provided with general information on stuttering and communication strategies. Brochures were provided to parents, which were prepared by using information from previous publications for parents, and teachers.[20-24] The content of communication strategies in parent training and the information brochure for parents were as follows; 1) active listening skills that focus on paying attention to the content of their child's speech and emotions; 2) following the child's interest in verbal communication and turn-taking during conversations; 3) the importance of body language and tone of voice in communication as well as words; 4) facilitating the pace of life; 5) the impor-

tance of giving feedback on behavior and following rules if any; 6) being open to themselves in their thoughts about stuttering. Parents worked with the speech-language pathologist (SLP) to learn to rate the stuttering severity and were invited to rate their child's stuttering severity daily from the first in-clinic assessment (i.e., T1) to the last (i.e., T5). Parents were provided with a stuttering severity rating scale that had 7 scale divisions (Supplemental Material 1). The training was conducted by the first author, who had 7 years of experience providing stuttering therapy.

The therapy program ran from 09:00 AM to 03:30 PM for 2 weeks (5 days a week). During scheduled 2 tea breaks, 1 in the morning and 1 in the afternoon, and a lunch break (a total of 2 hrs a day), children were monitored and given feedback informally. The first author conducted the therapy, and a senior student of speech and language therapy assisted them. The SLP used active listening skills and verbal rewards on children's behavior throughout the therapy.[25] The verbal rewarding was performed through observation of the child's behavior. For example, "It was very helpful of you to put books on the shelf." This way of rewarding; 1) Describes behavior, 2) confirms the effort, 3) develops it, and 4) teaches self-motivation, self-belief, and self-evaluation. This can also be expressed when the child fails in doing something. The benefits of tailoring a therapy plan for each child based on their perspectives have been well documented.[26] Therefore, the inclusion of children in all processes with their choices and ideas was the key to the therapy to internalize the goals. The daily therapy content can be seen in Supplemental Material 2.

The program was structured to target the following goals:

1. Identification and awareness of (a) speech behaviors, (b) thoughts and feelings associated with stuttering, (c) stuttering, (d) technique, (e) time pressure,

Supplemental Material 1: The Stuttering Severity Rating Scale.

Name:

7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
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Date: Date: Date: Date: Date

(1=Normal disfluency, 2=Very mild stuttering, 7=Very severe stuttering).

Supplemental Material 2: Therapy content.

Day	Activity Category (Goal)	Duration	Tools
1	Warm up	1 hr	Warm up games
	Speech mechanism (I&A)	1.5 hr	Charts; listening and tactile sensations
	Breathing (I&A)	2 hr	Charts; listening and tactile sensations
2	Warm up		Warm up game
	Emotions (I&A)	1 hr	Emotions face charts; storytelling; identification about thoughts, emotions, physical reactions and speech behaviors as well as forming links; sharing experiences
	Stuttering (I&A)	1.5 hr	Discussion on common facts, variabilities, social contexts, and emotions; hierarcies
	Time pressure (I&A; D; T)	1 hr	Storytelling; identification about thoughts, emotions, physical reactions and speech behaviors as well as forming links; sharing experiences; considering other cause and effect explanations; drawing
	Avoidance (I&A; D; T)	1 hr	Storytelling; to embody the burden of avoidance, participants put a weight on a paper bag for each word they avoid producing; identification about thoughts, emotions, physical reactions and speech behaviors as well as forming links; sharing experiences; considering other cause and effect explanations
3	Warm up	2 hr	Warm up game
	Emotions (I&A; D)		Storytelling; drawing; identification about thoughts, emotions, physical reactions and speech behaviors as well as forming links; sharing experiences; considering other cause and effect explanations; finding best fit solutions by brainstorming; roleplaying
	Technique (IFSP)	2.5 hr	Video model; modeling; choral reading;reading aloud; word-level exercises
4	Warm up	30 min	Warm up game
	Time pressure (I&A; D)	1 hr	Sentence production on different speed levels; modeling
	Technique (IFSP)	3 hr	Video model; modeling; reading aloud; utterance-level exercises
5	Warm up	15 min	Warm up game
	Oral-motor coordination (I&A)	45 min	Exaggerated articulation exercises; modeling
	Time pressure (I&A; D)	1.5 hr	Identification about thoughts, emotions, physical reactions and speech behaviors as well as forming links; sharing experiences; considering other cause and effect explanations; roleplaying
	Technique (IFSP)	2 hr	Video model; modeling; reading aloud; sentence-level exercises
6	Warm up		Warm up game
	General overview (I&A)	30 min	Brainstorming on the activities implemented in the previous week
	Technique (IFSP)	2.5 hr	Video model; modeling; reading aloud; storytelling-level exercises
	Formal presentation (IFSP; D; G)	1.5 hr	Prepared presentation about their life, hobbies, etc., in front of their groupmates and family members
7	Warm up		Warm up game
	Formal presentation (IFSP; D; G)	1.5 hr	Prepared presentation about their life, hobbies, etc., in front of their groupmates
	Problem-solving (I&A; D; T; IFSP; G)	1.5 hr	Defining speech-related problems and feelings then brainstorming on possible solutions to finding the best-fit solutions, and roleplaying
	Technique	1.5 hr	Video model; modeling; reading aloud; conversation-level exercises
8	Warm up		Warm up game
	Teasing & bullying (I&A; D)	1.5 hr	Storytelling; identification about thoughts, emotions, physical reactions and speech behaviors as well as forming links; sharing experiences; considering other cause and effect explanations; problem-solving activity
	Technique (IFSP)	3 hr	Video model; modeling; reading aloud; conversation-level exercises; formal presentation in fornt of group mates and a group of unfamiliar adults
9	Warm up	2.5 hr	Warm up game
	Technique (IFSP)		Video model; modeling; reading aloud; conversation-level exercises
	Problem-solving (I&A; D; T; IFSP; G)	2 hr	Defining speech-related problems and feelings then brainstorming on possible solutions to finding the best-fit solutions, and roleplaying
10	Warm up	1 hr	Warm up game
	What I have learned,	1.5 hr	Sharing thougths and feelings; writing a letter for themselves
	How do I feel? (I&A; T; G)		
	Goodbye party	2 hr	

I&A: Identification and awareness; D: Desensitization; IFSP: Increasing fluent speech production; T: Transformation; G: Generalization.

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(f) avoidance as a safety behavior, and (g) bullying and teasing. All the concepts encountered during the therapy, as well as in which situations they occurred, how they emerged, how to cope with them and their mechanism, the learning outcomes, and their use for each child, were identified and shared in guided and nonjudgmental discussions.

2. Desensitization to (a) stuttering and (b) different speaking situations. Hierarchies were used specifically for tasks.

3. Transformation of (a) unhelpful emotions and (b) unhelpful thoughts. These included activities such as considering other cause and effect explanations of events, exploring related thoughts and feelings about the possible other explanations, problem-solving through defining speech-related problems and feelings, then brainstorming on possible solutions, and role-playing.

4. Increasing fluent speech production. The speech restructuring technique's presentation was modeled after the Camperdown Program's principles, which is a stuttering therapy program for adolescents and adults, and the presentation of the technique had not required the use of the defining features of the technique.[27,28] To be specific, the children were not instructed to modify their speech patterns in a specific way. They were invited to define the features of the technique, and their own specific definitions were used for each child throughout the therapy. The speech-restructuring technique was introduced by two age-appropriate reading texts (in Turkish) called Piknik and Alışveriş through video models (https://www.detayyayin.com.tr/sayfa/okt).[29] The reading texts' readability rates were calculated as very easy according to a Turkish readability formula, an adaptation of the Flesch reading ease score.[30,31] The speech restructuring technique in the video model has been created with the combined use of easy starts, light articulatory contacts, connection, and pause techniques. In presenting the technique to children, the technique's defining features were not described, and children were encouraged to identify and individualize the production features that felt comfortable. The children first just watched the video model, and then they read the reading texts aloud with the SLP with the video model. Afterward, the children were invited to describe the features of the technique. The children then did choral readings with the SLP. After the paired readings, the children read the texts individually. Children's readings were recorded and then listened to. Afterward, the children were invited to share the features that they liked about their speech. The length of utterances in speech activities with the technique was gradually increased during days 3-10.

5. Generalization of the therapy targets. Senior students of the Speech & Language Therapy Department volunteered in an activity of solving riddles and puzzles to reach a target.

Video self-modeling, which was also modeled after the Camperdown Program's principles, was recommended for maintenance after the therapy.[32] Video self-modeling is an activity in which a person watches their own video of performing a target behavior which is a stutter-free speech in this study.[32-34] A 2 min video of the stutter-free speech, including reading and spontaneous speech, was recorded for each child. Children were instructed to watch the video once a day for a month, and invited to rate their technique usage frequency daily from the last therapy day to the last assessment day. Children were provided with a rating scale that had 5 scale divisions (1=never, 5=consistently) and asked to continually monitor their physical reactions, thoughts, and feelings in relation to speech behaviors, and motivated to employ problem-solving abilities as they faced daily issues linked to their stuttering (Supplemental Material 3). Their adherence to these instructions was not monitored.

RELIABILITY

All of the speech samples were transcribed and analyzed by the first author. Twenty (67%) of the outcome assessment recordings of different children were randomly selected from all in-clinic 5 timepoints to establish the interjudge agreement. The samples were rated by a second experienced SLP who was not otherwise involved in the study. The Pearson correlation of the 2 SLPs' %SS scores was 0.95 which indicated a high correlation.[35] The mean

difference between the scores was 2.40%SS (range=0.40-5.60%SS).

RESULTS

None of the children dropped out of the study during the therapy or the follow-up period. The comparison between pre and post-therapy assessments indicated reduced cognitive and linguistic scores, stuttering frequency, and stuttering severity in school-aged CWS.

Figure 1 shows the children's cognitive, affective, linguistic, and social scores at 5-time points for each participant. Cognitive and affective scores of P1 reduced to one (indicative of low anxiety) one month after the therapy, and these scores were maintained three months after the therapy; the language score, which was 2 before the therapy, reduced to 1 after the therapy, and this score was maintained 3 months after the therapy. Cognitive and linguistic scores of P2 were reduced to 1 on the last day of the therapy and this score was maintained 3 months after the therapy. Cognitive and affective scores of P3 were reduced to 1 on the last day of the therapy, and this score was maintained 3 months after the therapy. The cognitive score of P5 was reduced to 2 (indicative of low anxiety) on the last day of the therapy and dropped to one one-month after the therapy, and this score was maintained three months after the therapy; the language score, which is 2, did not change. The scores of P4 and P6, whose pre-therapy scores were all one, did not change.

Table 2 shows the %SS data, and Figure 2 shows the medians and interquartile ranges of %SS. Overall, the group showed an average 21% stuttering reduction from 1-month pre-therapy to the first day of the therapy, with a 67% reduction from the first day to the last day of the therapy an 82% reduction from the

Supplemental Material 3: The daily my technique usage frequency.

Date:						
5	5	5	5	5	5	5
4	4	4	4	4	4	4
3	3	3	3	3	3	3
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1	1	1	1	1	1	1

Date:						
5	5	5	5	5	5	5
4	4	4	4	4	4	4
3	3	3	3	3	3	3
2	2	2	2	2	2	2
1	1	1	1	1	1	1

Date:						
5	5	5	5	5	5	5
4	4	4	4	4	4	4
3	3	3	3	3	3	3
2	2	2	2	2	2	2
1	1	1	1	1	1	1

Date:						
5	5	5	5	5	5	5
4	4	4	4	4	4	4
3	3	3	3	3	3	3
2	2	2	2	2	2	2
1	1	1	1	1	1	1

(1=Never, 3=Frequently, 5=Consistently)

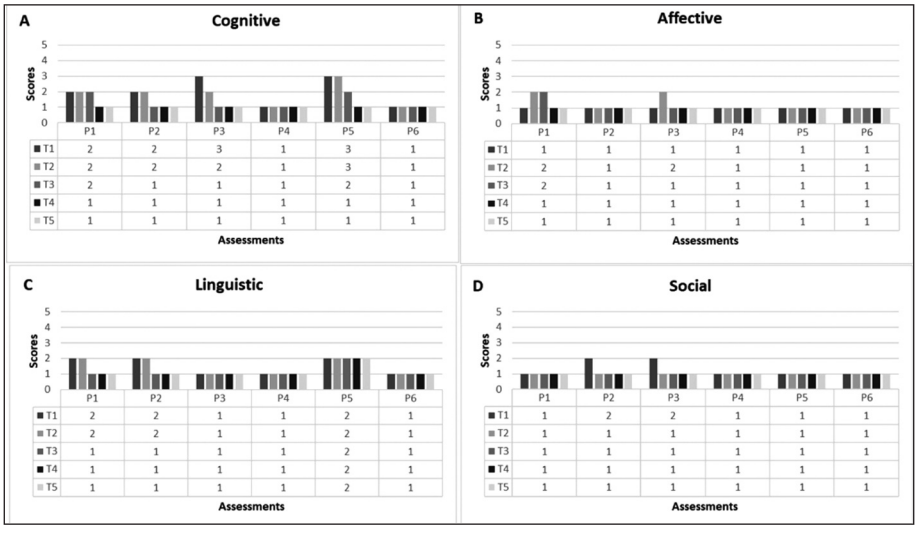


FIGURE 1: Cognitive, affective, linguistic, and social scores. Participants were randomly assigned numbers from 1 to 6. Bars show the assessment scores of each participant; the exact scores from the first to the 5th assessments are also presented below the bars in the figure for each participant. **Panel A:** Cognitive component scores. **Panel B:** Affective component scores. **Panel C:** Linguistic component scores. **Panel D:** Social component scores. P: Participant; T: Time.

TABLE 2: Percentage of syllables stuttered.

Children	Percentage of syllables stuttered				
	T1	T2	T3	T4	T5
P1	9.5	10.1	1.9	0.7	2.3
P2	15.8	8.7	2.45	1.6	3.9
P3	3.5	2.5	0	0	0
P4	3.3	3.2	0	0	0
P5	32.9	28	16.5	20.6	11.1
P6	6.2	4.1	3.5	0.8	0
Mdn	6.8	6.1	1.35	0.35	1.15
IQR	3.45-20.08	3.03-14.58	0.00-5.96	0.00-6.37	0.00-5.67

P: Participant; T: Time; IQR: Interquartile range.

first day of the therapy to 3 months post-therapy, and a 35% reduction from the last day of the therapy to 3 months post-therapy. P3 and P4 maintained their significant stuttering reductions during the 3-month follow-up period, but P1 and P2 failed to maintain the therapy gains during the same period. P3 and P4 showed a 100% reduction of stuttering frequency from the first day to the last day of the therapy, and they maintained their 100% reduction up to 3 months after therapy. Although P1 showed an 81% and P2 showed a 71% reduction of stuttering frequency from the first day to the last day of the therapy, and they

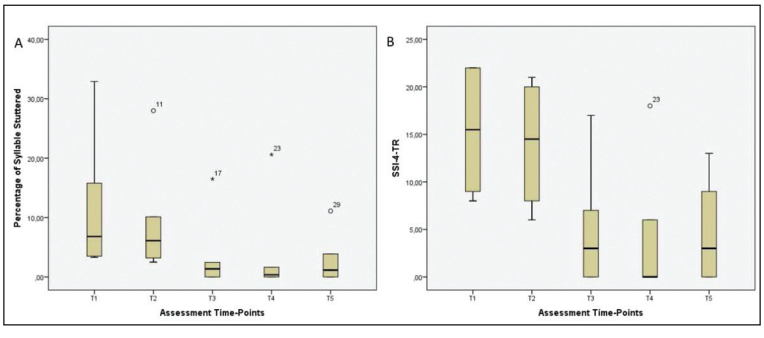


FIGURE 2: MMedians and interquartile ranges of percentage of syllables stuttered and stuttering severity at 5 time-points. **Panel A:** Percentage of syllables stuttered and at 5 time-points. **Panel B:** SSI-4-TR scores at 5 time-points. T: Time; SSI-4-TR: The Turkish version of the 4th edition of the Stuttering Severity Instrument.

only maintained 77% and 55% (respectively) reduction up to 3 months after the therapy. P5 showed a 41% and P6 showed a 14% reduction of stuttering frequency from the first day to the last day of the therapy, and with continued reduction, they showed 60% and 100% (respectively) reduction 3 months after the therapy.

Table 3 shows the SSI-4-TR data, and Figure 2 shows the medians and interquartile ranges of SSI-4-TR. The SSI-4-TR score of P1 was reduced to 6 (indicative of very mild stuttering) and P3, P4, and P6 were within normal limits on the last day of the therapy, and they maintained their scores from the last day of the therapy to 3 months post-therapy. The score of P2 was reduced to 7 (indicative of very mild stuttering) on the last day of the therapy, and their score was within the limits of very mild stuttering 3 months after the therapy. The score of P5 was reduced to 17 (indicative of mild stuttering) on the last day of the therapy, and their score was within the limits of mild stuttering 3 months after the therapy.

Table 4 shows the parents' ratings and comparison findings. These scores indicate a consistent reduction in parents' ratings of stuttering severity for the 5 participants (P1, P2, P3, P4, and P6) across 5 assessments. Parents' ratings of 5 months can be seen in Supplemental Material 4. Table 5 presents median and IQR data of speech naturalness.

TABLE 3: Stuttering severity scores.

Children	SSI-4-TR scores				
	T1	T2	T3	T4	T5
P1	22	21	6	6	6
P2	21	18	7	NL	9
P3	8	6	NL	NL	NL
P4	9	11	NL	NL	NL
P5	22	20	17	18	13
P6	10	8	NL	NL	NL
Mdn	15.5	14.5	3	0.0	3
IQR	8.75-22.00	7.50-20.25	0.00-9.50	0.00-9.00	0.00-10.00

P: Participant; T: Time; IQR: Interquartile range; NL: Within normal limits; SSI-4-TR: The Turkish version of the fourth edition of the Stuttering Severity Instrument.

TABLE 4: Parents' ratings of the stuttering severity.

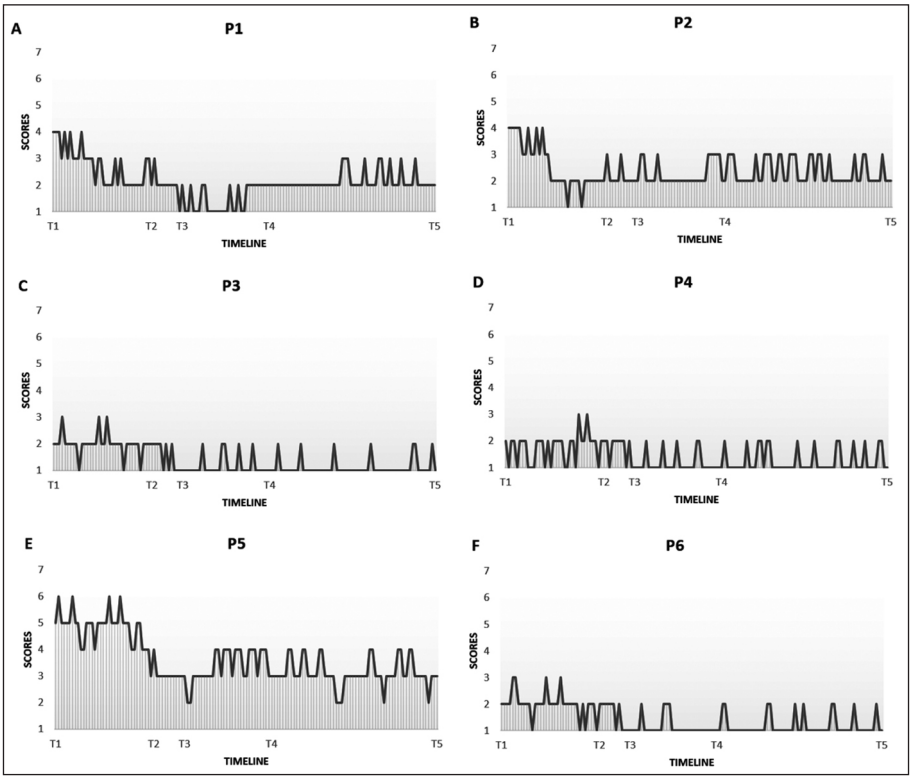
Children	Parents' ratings of the stuttering severity				
	T1	T2	T3	T4	T5
P1	4	3	2	2	2
P2	4	3	2	2	2
P3	2	2	1	1	1
P4	2	2	1	1	1
P5	5	5	3	4	3
P6	2	2	1	1	1
Mdn	3	2.5	1.5	1.5	1.5
IQR	2-4.25	2.5-3.5	1.0-2.25	1.0-2.25	1-2.25

P: Participant; T: Time; IQR: Interquartile range.

DISCUSSION

In this preliminary study, the cognitive, affective, linguistic, and social components of stuttering, and changes in speech behavior following CIGT, were examined. Participants' pre-therapy cognitive, affective, linguistic, and social scores which were higher than one reduced to one (indicative of low concern) immediately after the therapy or 1 month after the therapy and were maintained 3 months post-therapy-except for the linguistic score of P5. Stuttering frequency reduced by 67% across the group from the first day to the last day of the therapy, and from the first day of the therapy to three months, post-therapy was 82%.

None of the participants' cognitive, affective, linguistic, and social scores were higher than 3 at pre-therapy. Participants' scores higher than 1 were reduced to 1 following the therapy and were maintained for 3 months-except for the linguistic score of P5. The decrease in cognitive scores may be interpreted as an increase in children's common knowledge, understanding, and awareness of stuttering. The linguistic component of the CALMS assessment helps to understand the contribution level of the length and complexity of utterances to the frequency and severity of stuttering.[10,15,18] Accordingly, the decrease in language scores may be elucidated by the fluent production of longer utterances after the therapy, as children do not have any concurrent language and speech impairment. The affective and social score findings may be explained by the fact that children entered the



Supplemental Material 4: Parents' daily stuttering severity ratings of their children for 5 months.

Participants were randomly assigned numbers from 1 to 6.

Panel A: Participant 1's parent's ratings. **Panel B:** Participant 2's parent's ratings. **Panel C:** Participant 3's parent's ratings. **Panel D:** Participant 4's parent's ratings. Panel E: Participant 5's parent's ratings. Panel F: Participant 6's parent's ratings.

P: Participant; T: Time; 1=Normal disfluency; 2=Very mild stuttering; 7=Very severe stuttering.

TABLE 5: Speech naturalness ratings.

Children	Speech naturalness									
	T1		T2		T3		T4		T5	
	Median	IQR	Median	IQR	Median	IQR	Median	IQR	Median	IQR
P1	4	3-4	4	4-4	2	2-3	2	2-3	2	2-3
P2	4	3-5	4	3-5	3	2-4	3	2-4	3	2-4
P3	3	3-3	3	3-3	2	1-2	1	1-2	3	2-4
P4	3	3-4	3	3-4	3	3-3	3	2-4	3	3-3
P5	4	3-5	4	3-5	2	2-3	2	2-3	2	2-3
P6	5	5-7	5	5-6	5	4-6	5	4-5	5	4-6

P: Participant; T: Time; IQR: Interquartile range.

program with a positive communication attitude. The affective scores did not increase after the therapy, and this could be interpreted as increased awareness of stuttering did not cause negative emotions, feelings, and attitudes related to stuttering. These results are in line with those of Byrd et al., who also have found that the children's positive feelings about their communication skills were not adversely affected by significantly addressing and discussing the stuttering during the course of their program.[11]

The results indicated reduced stuttering frequency and severity in school-aged CWS after the CIGT. Secondary outcome measures confirmed the

therapy effect. Parents' ratings of stuttering severity were <3 for all participants at 3 months post-therapy, suggesting mild stuttering. Five out of 6 participants achieved speech naturalness scores in the normal range (1-3) after the therapy.[36] These findings corroborate the findings of the previous studies and support that increased fluent speech production can be achieved through comprehensive and intensive therapy approaches for school-aged CWS.[7,11,12] Future research on the children's adherence to recommended video self-modeling and problem-solving activities after the therapy, and thus, their impact on the maintenance of the therapy gains, would help to establish a greater degree of accuracy on this matter.

The findings of this preliminary study must be interpreted with caution because of a few factors. First, it was a preliminary study with few participants. Therefore, the small sample size may not reflect the general school-aged CWS population. Second, participants in this trial had very mild to moderate pre-therapy stuttering severity. As a result, they may have responded differently to this therapy than from school-aged CWS with severe stuttering.

CONCLUSION

The present study set out to investigate a comprehensive and intensive stuttering therapy for school-aged CWS in Türkiye. According to the findings, an increase in children's common knowledge, understanding, and awareness of stuttering, as well as positive changes in fluent speech production in school-aged CWS can be accomplished with the CIGT in Türkiye. Notwithstanding the relatively limited sample, this work offers valuable insights into comprehensive group therapy in a short period of time for school-aged CWS in Türkiye. Therefore, the results of this preliminary study are promising to support further work on comprehensive and intensive approaches in school-aged CWS.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *İlkem Kara;* ***Design:*** *İlkem Kara;* ***Control/Supervision:*** *Maviş Emel Kulak Kayıkcı;* ***Data Collection and/or Processing:*** *İlkem Kara;* ***Analysis and/or Interpretation:*** *İlkem Kara, Meltem Çiğdem Kirazlı, Maviş Emel Kulak Kayıkcı;* ***Literature Review:*** *İlkem Kara, Meltem Çiğdem Kirazlı;* ***Writing the Article:*** *İlkem Kara;* ***Critical Review:*** *Meltem Çiğdem Kirazlı, Maviş Emel Kulak Kayıkcı;* ***References and Fundings: Materials:*** *İlkem Kara, Maviş Emel Kulak Kayıkcı.*

REFERENCES

1. Blood GW, Blood IM, Tramontana GM, Sylvia AJ, Boyle MP, Motzko GR. Self-reported experience of bullying of students who stutter: relations with life satisfaction, life orientation, and self-esteem. Percept Mot Skills. 2011;113(2):353-64. [Crossref] [PubMed]
2. Veerabhadrappa RC, Vanryckeghem M, Maruthy S. Communication attitude of kannada-speaking school-age children who do and do not stutter. Folia Phoniatr Logop. 2021;73(2):126-33. [Crossref] [PubMed]
3. Ambrose NG, Yairi E, Loucks TM, Seery CH, Throneburg R. Relation of motor, linguistic and temperament factors in epidemiologic subtypes of persistent and recovered stuttering: Initial findings. J Fluency Disord. 2015;45:12-26. [Crossref] [PubMed] [PMC]
4. Usler E, Smith A, Weber C. A lag in speech motor coordination during sentence production is associated with stuttering persistence in young children. J Speech Lang Hear Res. 2017;60(1):51-61. [Crossref] [PubMed] [PMC]
5. De Nil LF, Brutten GJ. Speech-associated attitudes of stuttering and non-stuttering children. J Speech Hear Res. 1991;34(1):60-6. [Crossref] [PubMed]
6. Jones RM, Conture EG, Walden TA. Emotional reactivity and regulation associated with fluent and stuttered utterances of preschool-age children who stutter. J Commun Disord. 2014;48:38-51. [Crossref] [PubMed] [PMC]
7. Baumeister H, Caspar F, Herziger F. [Treatment outcome study of the stuttering therapy summer camp 2000 for children and adolescents]. Psychother Psychosom Med Psychol. 2003;53(11):455-63. [Crossref] [PubMed]
8. Hollister J, Van Horne AO, Zebrowski P. The relationship between grammatical development and disfluencies in preschool children who stutter and those who recover. Am J Speech Lang Pathol. 2017;26(1):44-56. [Crossref] [PubMed] [PMC]

9. Watson JB, Byrd CT, Carlo EJ. Effects of length, complexity, and grammatical correctness on stuttering in Spanish-speaking preschool children. Am J Speech Lang Pathol. 2011;20(3):209-20. [Crossref] [PubMed]
10. Healey EC, Scott Trautman LA, Susca M. Clinical applications of a multidimensional model for the assessment and treatment of stuttering. Contemp Issues Commun Sci Disord. 2004;31(Spring):40-8. [Crossref]
11. Byrd CT, Hampton E, McGill M, Gkalitsiou Z. Participation in camp dream Speak Live: affective and cognitive outcomes for children who stutter. J Speech Pathol Ther. 2016;1:116. [Crossref]
12. Byrd CT, Gkalitsiou Z, Werle D, Coalson GA. Exploring the effectiveness of an intensive treatment program for school-age children who stutter, camp dream. Speak. Live.: a follow-up study. Semin Speech Lang. 2018;39(5):458-68. [Crossref] [PubMed]
13. Laiho A, Klippi A. Long- and short-term results of children's and adolescents' therapy courses for stuttering. Int J Lang Commun Disord. 2007;42(3):367-82. [Crossref] [PubMed]
14. Rosenberger S, Schulte K, Metten C. [Intensive stuttering therapie susanne rosenberger-first results of an evaluation study]. Forum Logopadie. 2007;21(2):20-5.
15. Healey EC. The Cognitive, Affective, Linguistic, Motor and Social (CALMS) Assessment for School-Age Children Who Stutter. 1st ed. Lincoln, Nebraska: University of Nebraska; 2012.
16. Mutlu Aİ, Bacık Tırank Ş, Gündüz B. 6 ve 16 yaş okul çocukları arasındaki SSI-4-TR/KEŞİDA-4 dördüncü baskısının Türkçe versiyonunun güvenilirliği ve geçerliliği [Reliability and validity of the Turkish version of the stuttering severity instrument, fourth edition (SSI-4-TR/KEŞİDA-4) between 6 and 16 years old school children]. Izmir Democracy University Health Sciences Journal. 2020;3(2):135-44. [Link]
17. Riley G. Stuttering Severity Instrument for Children and Adults 4th ed. Austin, Tex: Pro-Ed; 2009.
18. Healey EC. CALMS-TR Kekemeliği Olan Okul Çağı Çocuklar İçin Bilişsel, Afektif, Linguistik, Motor ve Sosyal-Türkçe (CALMS-TR) Değerlendirme [The cognitive, affective, linguistic, motor and social (CALMS) assessment for school-age children who stutter]. İlkem Kara, Tuğçe Karahan Tığrak, Maviş Emel Kulak Kayıkcı, translators. Detay Publishing; 2020.
19. Jones M, Onslow M, Packman A, Gebski V. Guidelines for statistical analysis of percentage of syllables stuttered data. J Speech Lang Hear Res. 2006;49(4):867-78. [Crossref] [PubMed]
20. Ainsworth S, Fraser J. If Your Child Stutters: A Guide for Parents. 8th ed. United States: Stuttering Foundation of America; 2012.
21. Cooper EB, Gregory HB, Guitar B, Hill DG, Fraser J, Ramig P, et al. Effective Counseling in Stuttering Therapy. 3rd ed. United States: Stuttering Foundation of America; 2013.
22. Kelman E, Whyte A. Understanding Stammering or Stuttering: A Guide for Parents, Teachers and Other Professionals. 1st ed. London: Jessica Kingsley Pub; 2012.
23. Langevin M, Prasad NG. A stuttering education and bullying awareness and prevention resource: a feasibility study. Lang Speech Hear Serv Sch. 2012;43(3):344-58. [Crossref] [PubMed]
24. Turnbull J. Promoting greater understanding in peers of children who stammer. Emot Behav Difficulties. 2006;11(4):237-47. [Crossref]
25. Faber A, Mazlish E. How to Talk so Kids Will Listen, and Listen so Kids Will Talk. 3rd ed. London: Piccadilly Press; 2012.
26. Rocha M, Yaruss JS, Rato JR. Stuttering impact: a shared perception for parents and children? Folia Phoniatr Logop. 2020;72(6):478-86. [Crossref] [PubMed]
27. O'Brian S, Onslow M, Cream A, Packman A. The Camperdown Program: outcomes of a new prolonged-speech treatment model. J Speech Lang Hear Res. 2003;46(4):933-46. [Crossref] [PubMed]
28. Packman A, Onslow M, van Doorn J. Prolonged speech and modification of stuttering: perceptual, acoustic, and electroglottographic data. J Speech Hear Res. 1994;37(4):724-37. [Crossref] [PubMed]
29. Karasu HP, Girgin Ü, Uzuner Y. Formel Olmayan Okuma Envanteri. 1. Baskı. Ankara: Nobel Akademik Yayıncılık; 2013.
30. Ateşman E. Türkçe'de okunabilirliğin ölçülmesi [Measuring readability in Turkish]. AÜ Tömer Dil Dergisi. 1997;58:171-4. [Link]
31. Kincaid JP, Fishburne Jr RP, Rogers RL, Chissom BS. Derivation of new readability formulas (automated readability index, fog count, and Flesch reading ease formula) for navy enlisted personnel research branch report https://stars.library.ucf.edu/istlibrary/56: Institute for Simulation and Training; 1975. Retrieved 4 August 2018. [Crossref] [PMC]
32. Cream A, O'Brian S, Onslow M, Packman A, Menzies R. Self-modelling as a relapse intervention following speech-restructuring treatment for stuttering. Int J Lang Commun Disord. 2009;44(5):587-99. [Crossref] [PubMed]
33. Cream A, O'Brian S, Jones M, Block S, Harrison E, Lincoln M, et al. Randomized controlled trial of video self-modeling following speech restructuring treatment for stuttering. J Speech Lang Hear Res. 2010;53(4):887-97. [Crossref] [PubMed]
34. Webber MJ, Packman A, Onslow M. Effects of self-modelling on stuttering. Int J Lang Commun Disord. 2004;39(4):509-22. [Crossref] [PubMed]
35. Valente AR, Jesus LM, Hall A, Leahy M. Event- and interval-based measurement of stuttering: a review. Int J Lang Commun Disord. 2015;50(1):14-30. [Crossref] [PubMed]
36. Martin RR, Haroldson SK, Triden KA. Stuttering and speech naturalness. J Speech Hear Disord. 1984;49(1):53-8. [Crossref] [PubMed]