
Is Parent–Child Interaction Therapy Effective in Reducing Stuttering?

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Purpose: To investigate the efficacy of parent–child interaction therapy (PCIT) with young children who stutter.

Method: This is a longitudinal, multiple single-subject study. The participants were 6 children aged 3;3–4;10 [years;months] who had been stuttering for longer than 12 months. Therapy consisted of 6 sessions of clinic-based therapy and 6 weeks of home consolidation. Speech samples were videorecorded during free play with parents at home and analyzed to obtain stuttering data for each child before therapy, during therapy, and up to 12 months posttherapy.

Results: Stuttering frequency data obtained during therapy and posttherapy were compared with the frequency and variability of stuttering in the baseline phase. Four of the 6 children significantly reduced stuttering with both parents by the end of the therapy phase.

Conclusions: PCIT can reduce stuttering in preschool children with 6 sessions of clinic-based therapy and 6 weeks of parent-led, home-based therapy. The study highlights the individual response to therapy. Suggestions for future research directions are made.

KEY WORDS: stuttering, preschool children, parents, treatment outcomes, single-subject design

Approximately 70% of children who experience stuttering will resolve the problem (Kloth, Kraaimaat, Janssen, & Brutton, 1999; Yairi & Ambrose, 1999), leaving around 30% of children experiencing a long-term problem. A key issue for speech and language therapists is deciding which children require therapy. The decision-making process can be informed by a greater understanding about the factors that are associated with increased risk of persistence (Kloth et al., 1999; Rommel, 2000; Yairi & Ambrose, 2005), but it is still not possible to predict, with any accuracy, the prognosis for any individual child (Bernstein Ratner, 1997) either with or without therapy. The decision about the type of treatment to be offered and how effective that treatment might be is not yet definitive.

A number of therapy programs have been developed for children who stutter (CWS), ages 6 years and under. Some of these programs emphasize direct methods of intervention (Meyers & Woodford, 1992; Onslow, Packman, & Harrison, 2003; Ryan, 2001) and may require the child to make specific changes to speech production, such as slowing speech rate or using soft consonant onsets (Meyers & Woodford, 1992), or they may use operant methods to reinforce fluent speech through praise and acknowledgment and seek correction of stuttered speech (Onslow et al., 2003). In general, the programs seek to establish fluency at the single-word level and gradually increase utterance length while maintaining

fluency (Meyers & Woodford, 1992; Ryan, 2001). Other programs advocate the use of indirect methods of management, which require parents to make changes in their interaction style with the aim of facilitating fluency in the child (Guitar, 2006; Rustin, Botterill, & Kelman, 1996; Starkweather & Gottwald, 1990; Wall & Myers, 1995; Yaruss, Coleman, & Hammer, 2006). These programs seek to establish fluency with minimal involvement of the child at first. Even when direct approaches may be required at a later date, many experts consider that the initial use of an indirect approach provides a firm foundation for direct therapy and gives parents long-term essential skills that will support the child's speech (Conture, 2001; Conture & Melnick, 1999; Kelman & Nicholas, 2008; Rustin et al., 1996; Yaruss et al., 2006).

Generally speaking, indirect approaches are based on the theoretical notion that stuttering is a multifactorial disorder (Smith & Kelly, 1997; Starkweather & Gottwald, 1990; Wall & Myers, 1995) with physiological, linguistic, psychological, and environmental factors influencing the onset, impact, and prognosis of stuttering (Rustin, et al., 1996). For each child there will be an individual combination of factors that contribute to his or her vulnerability to stuttering (Rustin et al., 1996; Starkweather & Gottwald, 1990; Wall & Myers, 1995). The onset of the disorder may be influenced by neurological functioning (Sommer, Koch, Paulus, Weiller, & Buchel, 2002), motor skills development (Kelly, Smith, & Goffman, 1995), and/or linguistic processing abilities (Miles & Ratner, 2001). The knowledge that stuttering runs in families suggests that some of these variables may be genetically transmitted, although this does not explain why stuttering emerges in some children but not others (Farber, 1981). Starkweather (2002) argued that genes only increase the likelihood that a behavior will occur and that it is the environment or context that influences the "extent to which a behavioral trait finds expression" (p. 275). With the passage of time, additional variables, such as parent interaction behaviors (Kloth et al., 1999), the child's articulatory skills (Kloth et al., 1999), and/or the child's temperament (Conture, 2001; Guitar, 2006), may become significant in relation to the moment of stuttering, the chronicity of the disorder, and the impact that it has on the child's life. The assumption that drives these indirect approaches is that the manipulation of the environmental variables—specifically, parent interaction styles—can influence the long-term development of stuttering.

Relationship Between Parent Interaction Styles and Stuttering

There is no evidence that the onset of stuttering can be attributed to parents' interaction styles. Parents

of CWS are no different from parents of children who do not stutter (CWNS) in terms of their rate of speech (Yaruss & Conture, 1995; Zebrowski, 1995), response time latencies (Zebrowski, 1995), interrupting behaviors (Kelly & Conture, 1992), levels of assertiveness and responsiveness (Weiss & Zebrowski, 1991), or interaction style (Embrechts & Ebben, 2000).

There is, however, some evidence that stuttering in children can have an impact on an adult's style of interaction (Meyers & Freeman, 1985a, 1985b). Parents of both CWS and CWNS have been found to use a faster rate of speech (Meyers & Freeman, 1985b), interrupt more frequently (Meyers & Freeman, 1985a), and be more anxious (Zenner, Ritterman, Bowen, & Gronhord, 1978) when interacting with CWS compared with CWNS. In a longitudinal study of 93 children monitored before stuttering emerged, no differences were found in the behaviors of mothers whose children started to stutter and those who did not (Kloth, Janssen, Kraaimaat, & Brutton, 1998), supporting the view that interaction style does not have a role in onset. However, 4 years later, the mothers of the children who persisted in stuttering had changed their interactive style (Kloth et al., 1999), using more turn-exchanges, more requests for information, and more affirmatives. Mothers of children whose stuttering remitted did not change their style. The authors concluded that the mothers of the children who persisted in stuttering had adopted a more intervening style over time, exerting more direct pressure on their children to respond verbally. The results suggest that mothers changed their interaction styles in response to the child's stuttering. It is important to note that the children included in Kloth et al.'s (1998, 1999) study all had at least one parent who stuttered, and it is possible that the parents' experience of stuttering or living with a person who stuttered influenced their response to the stuttering over the longer term. There is a need for these findings to be replicated not only for this subgroup but also for individuals with no family history of stuttering in first-degree relatives, to explore the relationship between parent interaction and the chronicity of the disorder.

Evidence that a change in a parent's interaction style can also affect the child's fluency further demonstrates a bidirectional relationship between stuttering and parent interaction. Through the manipulation of interaction variables, stuttering has been shown to decrease in association with reduced parental rate of speech (Guitar, Kopf-Schaefer, Donahue-Kilburg, & Bond, 1992), increased response latency time (Newman & Smit, 1989), and structured turn-taking (Winslow & Guitar, 1994). Interestingly, the impact of these changes made by parents seems to be somewhat idiosyncratic (Zebrowski, Weiss, Savelkoul, & Hammer, 1996), with the frequency of stuttering reducing in some children but not in others. This variable response is not surprising given

the heterogeneous nature of children and stuttering, and it may also explain lack of agreement between studies that have investigated parent interaction style and stuttering. Single-subject data may help in the quest to tease out the factors that may predict a child's response to a particular interaction style by providing data from which hypotheses may be drawn.

Parent–Child Interaction Therapy

The *parent–child interaction therapy (PCIT) approach* (Rustin et al., 1996) has been developed and modified over many years in response to clinical experience; user feedback; and, where it has been available, research evidence (Kelman & Nicholas, 2008). The approach is flexible and can be suited to meet the individual needs of the child and family. Stuttering is discussed openly, and parents are encouraged to acknowledge the stuttering with the child. The program is explicit in its aim to empower parents to manage their child's stuttering and increase their confidence in their own skills as well as seeking to increase fluency in the child.

As with other programs (Conture, 2001; Yaruss et al., 2006), indirect therapy was recommended as the first stage of management by Rustin et al. (1996), but this does not exclude more direct methods. Rustin et al. believe that the indirect approach of PCIT will be sufficient to help most children achieve fluency. For those who continue to stutter, the aim is to establish parent strategies that support the child's fluency and minimize the impact of the stuttering while laying the foundations for future direct therapy. Rustin et al. suggested use of the Fluency Development System for Young Children (Meyers & Woodford, 1992) as a direct method; since publication of that text, the Lidcombe Program (Onslow et al., 2003) is also used.

Although a summary of the PCIT program and its methods is pertinent to this article, readers are referred to the original text for greater detail, along with copies of the assessments used (Rustin et al., 1996), and to Kelman and Nicholas (2008) for an update. Training is available and recommended. PCIT begins with a detailed consultation assessment followed by six once-weekly sessions of clinic-based therapy and a 6-week period of home consolidation. The number of sessions was originally based on standard packages of care directives given to speech and language therapists in the United Kingdom at the time the program was developed. The overall structure of the sessions is consistent across families, although the content of the therapy varies from family to family according to individual need.

The Consultation Assessment

The consultation assessment has two components: (a) a child assessment and (b) a case history. The child

assessment involves an evaluation of the child's speech, language, and fluency skills and a series of questions that attempt to establish the child's awareness of and insight into the stuttering and the degree of impact that the stuttering has on the child socially or emotionally. Both parents (unless the child is from a single-parent family) are considered essential in the process in order to improve the likelihood of an agreement about the treatment plan as well as to provide support for each other (Douglas, 2005). The clinician's role is to integrate and interpret the information from the child assessment and the case history in order to consider the physiological, linguistic, environmental, or psychological factors that may have been significant in the development of the child's stuttering and to make recommendations for therapy on the basis of these. An explanation of stuttering as a multifactorial disorder helps parents understand how the stuttering has evolved and aims to reduce any self-blame or guilt that parents often feel. It is important to address such feelings because these can interfere with the therapy process and prevent parents from making changes (Biggart, Cook, & Fry, 2007; Douglas, 2005). Therapy is recommended if the child is considered to be at risk of persistent stuttering, if the parents are concerned and seeking support, or if the child is reacting negatively to the stuttering.

Format of the Therapy Sessions

The structure of the sessions remains consistent across families. In Session 1, feedback from the consultation is reviewed, and "Special Time" is negotiated. Special Time is a 5-min playtime that each parent has individually with the child, between three and five times per week (Rustin et al., 1996). The purpose of Special Time is to provide parents with a designated time in which they practice their chosen interaction target in a relaxed, one-to-one communicative setting. Special Time is considered to be the foundation of the therapy program and is conducted throughout the therapy process. Parents are asked to reflect on their use of targets during Special Time and make a written record to provide and receive feedback at the start of each subsequent session. Parents eventually generalize their skills outside Special Time to other contexts as they become more confident and proficient.

Sessions 2 through 6 begin with a review of the Special Time feedback form and a review of progress during the week. A parent–child playtime is then videorecorded and appraised by each parent, interaction targets are selected individually, and the rationale for proposed changes is discussed. Parents then practice their target individually with the child during another brief playtime that is also videorecorded so they can identify occasions when they have achieved their targets.

Content of Therapy

PCIT differs from other indirect approaches in the broad scope of the strategies that may be adopted as part of the program. PCIT encompasses both management strategies and interaction strategies, and it is the selection of the strategies within each of these categories that allows the program to be individualized.

Management strategies. PCIT is explicit about the need to help parents address issues such as managing anxiety about stuttering; coping with sensitive children; confidence building; and other behavior management techniques, such as setting boundaries and routines with, for example, sleeping, eating, and turn-taking. Although there is, as yet, no evidence that these areas are directly related to stuttering, they are often reported by parents as stressful issues that affect the child's fluency and/or the parent-child relationship.

Stuttering is an anxiety-inducing behavior (Zenner et al., 1978). Parents' anxiety about their child's difficulties can be transmitted to the child and can affect how parents react to their child (Biggart et al., 2007; Douglas, 2005). Parenting has a tendency to be less consistent when parents are feeling very emotional (Allen & Rapee, 2005), and some parents report that they respond differently to sleeping, eating, and behavioral issues because of their worry about exacerbating the stutter. Sleeping and eating difficulties in young children, in particular, can have a negative impact on parents' self-esteem and confidence in managing their child (Douglas, 2005), and difficulties managing a child's problems in general can cause some parents to question their parenting skills (Schmidt, 2005). Helping parents to recognize and understand how their own emotional state affects their reactions to the child, and reducing their anxiety in relation to the child and the stuttering, is therefore considered an important part of the therapeutic process.

The main principles of managing aspects of child behavior are broadly based on behavioral methods. The desired outcome is reduced to a series of achievable steps, the target behaviors required of the child are made explicit, and a reward system is put into place. The parents reward the target behaviors with praise and tangible reward systems, such as star charts. Star charts not only act as a reinforcer for the child but are also a concrete way to reflect parents' successful management skills (Douglas, 2005). It is anticipated that the ability to break down long-term aims into realistic, attainable goals, while fostering a positive environment that attends to achievements and skills, has both short- and long-term benefits for the therapeutic process.

In relation to management strategies for building confidence and dealing with sensitive children, one session includes the topic of "praise." Parents are asked to consider why praise is important, the impact of praise

on the recipient and provider, and how praise can be delivered and received so that it has most effect. A method of specific praise is introduced (Faber & Mazlish, 1980). There are a number of reasons why praise may be a helpful topic for the child and family. For the child, praise can be helpful in encouraging motivation, developing individual potential, promoting independence and autonomy (Henderlong & Lepper, 2002), and encouraging confidence and self-esteem, all of which could be considered essential for developing social communication skills. For the parents, praise may be beneficial as a method of behavior management and a source of feedback and reinforcement about their own parenting skills, and it may have an impact on the parent-child relationship by encouraging a positive focus and perspective of the child's skills and achievements. The method of giving praise described by Faber and Mazlish (1980) requires the parents to describe the behavior they wish to praise and then to add an attribute; for example, "You put all of your toys into the box; that was very helpful of you." This conveys to the child that the praise is sincere and the expectations are attainable (Henderlong & Lepper, 2002). The parents record examples of praise that they have given the child (these are not fluency specific) and note the child's response on a "praise log," which is returned on a weekly basis.

Interaction strategies. Because change in one aspect of interaction may be helpful for one child's fluency and not another's (Zebrowski et al., 1996), there are no universal or prescribed targets within the program. Targets are selected by parents on the basis of their understanding of their child's needs and their knowledge of times when their child is more fluent. Because change in one interaction variable can have an indirect impact on another (Bernstein Ratner, 1992), targets are not all identified with the parents at the start of the therapy but are selected in a cumulative manner over the sessions.

PCIT differs from other indirect approaches in the methods used to identify and rehearse the interaction targets for each family. Observations or instructions made by the clinician that can be interpreted as criticism of the parents' behavior or a suggestion that they have been doing something wrong can have the effect of discouraging parents and undermining their self-confidence (Dadds & Barrett, 2001). Therefore, in PCIT the speech and language therapist does not provide instruction, demonstrate targets, or act as a role model. Instead, parents are encouraged to select their own targets, having first identified the positive aspects of their behavior that are supporting communication. Each parent makes these observations from a short videorecording that is made while they play with the child. The parent is encouraged to identify why the change that they have identified might be helpful for their child, and this is practiced in the session. This practice play time is videorecorded, and the parent

identifies examples of when they have achieved their aim.

It is important to stress that the style in which the approach is implemented is one of collaboration with parents, with the speech and language therapist facilitating, encouraging, and reinforcing the process, through feedback that focuses on strengths. Any change is attributed to the parents' efforts (Douglas, 2005).

Parents' interaction targets may include reducing their rate of speech (Guitar et al., 1992; Stephenson-Opsal & Bernstein Ratner, 1988) to match that of the child (Yaruss & Conture, 1995), increasing response time latency (Newman & Smit, 1989), or reducing linguistic complexity to a level that is appropriate for the child (Rommel, 2000).

Some parents choose to modify their use of questions. This may involve reducing the use of questions and increasing the use of comments in order to reduce the demands on the child to speak (Starkweather & Gottwald, 1990), increasing the time the child has to respond to a question (Newman & Smit, 1989), or using less linguistically demanding question forms (Weiss & Zebrowski, 1992).

One target that is often selected is to "follow the child's lead in play." In terms of supporting the child's speech, the goal with this target is to ensure that the pace of the interaction is set at the child's level and to reduce the demands on the child's attention, linguistic, and fluency skills (Starkweather & Gottwald, 1990). Parents also identify this target as promoting their child's problem-solving skills, independence, and confidence. There is no direct evidence relating these targets to stuttering specifically, but there is literature that indicates that an overinvolved or overprotective parenting style is associated with childhood anxiety and restricts the child's opportunities to develop successful coping strategies (Hudson & Rapee, 2002; Rapee, 1997). As part of this target, the parents may adopt a less physically active role, attend to the child's actions, focus on the child's aims for the activity, wait for verbal and nonverbal cues to indicate that direct involvement is required, and/or allow the child time to think and solve problems for themselves. The parent maintains participation in the activity by showing interest, maintaining appropriate eye contact, making comments about the child's actions and what is happening in the play, and using fewer instructions. Typically, a parent may identify one aspect of this target and may build on it over subsequent sessions.

The Consolidation Period

Once the clinic sessions are completed, the parents continue to carry out Special Time at home and to implement the management strategies that they have adopted. The parents mail or e-mail their feedback forms to the speech and language therapist on a weekly basis,

with comments about how the targets are progressing and any difficulties they are encountering. The speech and language therapist provides written feedback for each homework sheet received along with further advice as required. This home-based therapy period lasts for 6 weeks, with the aim of consolidating and generalizing the skills developed. At the end of this period, the child's progress is reviewed.

Research Status

Robey and Schultz (1998) presented a five-phase model for treatment outcome research that moves from *treatment efficacy*, where a therapy is conducted under optimal conditions, through to *treatment effectiveness*, where treatment is conducted under typical clinical conditions. Phase 1 research seeks to determine whether there is evidence that a treatment is effective, through single-case and small-group studies. Phase 2 research seeks to define how therapy works, to establish which clients are suitable for a particular program, to determine the duration of therapy, and to identify the method of delivery that will have greatest impact. Within this phase, outcome measures are also identified. Large-scale studies are considered within Phase 3. Traditionally, Phase 3 research has emphasized the randomized controlled trial (RCT) as the design of choice. However, there are practical and methodological difficulties and limitations of the RCT in relation to heterogeneous communication disorders and clients with individual therapy needs, which includes the inability to generalize group results to the individual (for a discussion of the issues, see Pring, 2004). These limitations have led to the suggestion that the replication of single-subject studies should be considered alongside the RCT as Phase 3 evidence (Kully & Langevin, 2005). This is a logical extension given the high internal validity associated with single-subject studies and the increased external validity that comes with replication. Treatment effectiveness is considered within Phase 4, and consumer satisfaction, cost-effectiveness, and quality of life issues are investigated within Phase 5.

The majority of research into treatment effectiveness has focused on direct methods (Bothe, Davidow, Bramlett, & Ingham, 2006), with the Lidcombe Program (Onslow et al., 2003) in particular being the subject of extensive research (Bonelli, Dixon, Bernstein-Ratner, & Onslow, 2000; Jones, Onslow, Harrison, & Packman, 2000), culminating in a Phase 3 clinical trial (Jones et al., 2005). With respect to indirect methods, Phase 1 evidence to support and inform a large-scale study is becoming stronger (Conture & Melnick, 1999; Crichton-Smith, 2003; Franken, Schalk, & Boelens, 2005; Matthews, Williams, & Pring, 1997; Nicholas & Millard, 2003; Yaruss et al., 2006).

To date, only one published peer-reviewed article has reported empirical data relating to Rustin et al.'s (1996) PCIT program. Matthews et al. (1997) monitored the progress of a 4-year-old boy for 6 weeks before therapy, 6 weeks during therapy, and 6 weeks posttherapy. The dependent variable was the percentage words stuttered in speech samples obtained while the child played in a clinical environment for a period of 20 min with each parent, once a week. The authors concluded that the therapy resulted in a significant reduction in the child's stuttering.

There is a clear need for further research to be conducted in relation to this therapy approach. Single-subject studies that consider an individual's response to a given approach have a number of strengths that are relevant when investigating a clinical population, particularly one which is not homogeneous (Pring, 1986). Pring (1986) suggested that single-subject designs are more clinically relevant in that they reflect clinical practice more closely, allowing variations in input from individual to individual, which is critical to a program such as PCIT. The aim of this study was to determine the efficacy of PCIT as described by Rustin et al. (1996) with individual preschool children. This study intended to address the limitations of Matthews et al.'s (1997) study by increasing participant numbers, obtaining nonclinic measures, and incorporating a long-term monitoring of 1-year posttherapy while considering natural recovery and stuttering variability within the methods.

Method

Setting

This study was conducted at a specialist clinic in London that offers a tertiary service to CWS and their families. Referrals are received from speech and language therapists from all over the United Kingdom.

Study Design

This was a single-subject replication study with three discrete phases. During each phase, multiple child speech samples were obtained. In an attempt to obtain reliable and representative fluency samples by reducing the potential influence of an unfamiliar adult, each parent videorecorded him- or herself playing with the child at home, for 20 min. Parents were given written information about how to make the recordings, advising them to avoid television, books, rough-and-tumble games, and board games during these sessions. It was suggested that the most suitable activities were those that they could play with the child on the floor or at a table, such as playing with building bricks, cars, farms, dolls, and so on. It was explained that the aim was to obtain as

naturalistic a sample of the child interacting as possible and not to make a particular effort to elicit speech from the child.

Phase A was a no-treatment baseline phase that lasted for 6 weeks. During this phase, parents each made a recording once a week. At the end of Phase A, both parents and child attended the consultation assessment. Two language assessments were administered: (a) the British Picture Vocabulary Scales (BPVS; Dunn, Dunn, Whetton, & Pintilie, 1982), which is a receptive vocabulary test, and (b) the Renfrew Action Picture Test (RAPT; Renfrew, 1988), an expressive language assessment which yields a score for the amount of information provided and grammatical complexity.

Phase B was a 12-week treatment phase consisting of six once-weekly clinic-based sessions and 6 weeks of home-based therapy. Recordings were made weekly.

Phase C was a 1-year posttherapy follow-up phase. During Phase C, the child and parents attended the clinic to review progress 3 months, 6 months, and 1 year posttherapy and made recordings on a once-monthly basis.

Throughout the study, the clinicians working with the families were not informed of any stuttering data collected as part of the study, and so management decisions were based on clinical expertise and client feedback. The researchers were blind to the clinical decisions made by the clinicians.

Participants

All children who were referred to the clinic who met the following criteria were invited to participate: below the age of 5 years; stuttering for a minimum of 12 months to reduce the likelihood of natural recovery (Yairi & Ambrose, 1992; Yairi, Ambrose, Paden, & Throneburg, 1996); speaking English as the main language at home; living with two parents; no therapy received in the previous 12 months; and no learning difficulties or syndromes identified.

Stuttering was confirmed at assessment by two clinicians who specialize in fluency disorders. Nine children were recruited to the study, but 3 failed to complete it. One child withdrew during the baseline phase, and 1 was withdrawn at the end of the baseline phase because therapy was not recommended following assessment. The third child withdrew during the therapy phase because the parents were unable to meet the requirements of the study in addition to the commitments of therapy. This child did complete therapy and was later discharged because his fluency was within normal limits and his parents were no longer concerned.

Subject 1 (S1) was male, age 4;02 (years;months), with a 13-month time since onset (TSO) and no family history of stuttering. S1 had younger twin siblings and

attended preschool four mornings per week. He obtained a standard score of 118 on the BPVS (normal range: 85–115), a grammar score of 30 (normal range: 14–23), and an information score of 35.5 (normal range: 23–30) on the RAPT. Both parents were educated until 16 years of age.

Subject 2 (S2) was male, age 4;02, with a TSO of 30 months and a family history of recovered stuttering. He had an older brother and attended preschool for five mornings per week. He obtained a standard score of 117 on the BPVS (normal range: 85–115), a grammar score of 22 (normal range: 14–23), and an information score of 36 (normal range: 23–30) on the RAPT. Both parents had left school without qualifications.

Subject 3 (S3) was male, age 3;11, with a TSO of 24 months and a family history of persistent stuttering. He was the middle child with an older and younger sister and attended preschool five afternoons per week. He obtained a standard score of 114 on the BPVS (normal range: 85–115), a grammar score of 15 (normal range: 14–23), and an information score of 26.5 (normal range: 23–30) on the RAPT. His mother had obtained a post-graduate degree, and his father had left school without qualifications.

Subject 4 (S4) was male, age 4;10, with a TSO of 26 months and a family history of persistent stuttering. He had an elder brother and elder sister and attended full-time school. S4 obtained a standard score of 121 on the BPVS (normal range: 85–115), a grammar score of 25 (normal range: 17–25), and an information score of 36 (normal range: 25–32) on the RAPT. Both parents were educated to degree level.

Subject 5 (S5) was female, age 3;03, with a TSO of 15 months and no family history of stuttering. She was the youngest of four children (two brothers and one sister) and attended preschool five mornings per week. She obtained a standard score of 113 on the BPVS (normal range: 85–115). S5 was below the age required for the RAPT, and so norms are not available for her age. S5's scores are reported with the normal range for age 3;6–3;11. S5 obtained a grammar score of 20 (range: 8–19) and an information score of 28.5 (range: 19–27). Both parents were educated to degree level.

Subject 6 (S6) was female, age 4;01, with a TSO of 16 months and a family history of recovered stuttering. She had a younger brother and attended preschool five mornings per week. She obtained a standard score of 121 on the BPVS (normal range: 85–115), a grammar score of 29 (normal range: 14–23), and an information score of 32 (normal range: 23–30) on the RAPT. Both parents were educated until 16 years of age.

The targets selected by each parent during the clinic sessions, using the methods previously described, are listed in Table 1.

Speech Analysis

The videorecordings were randomly evaluated. The first 5 min of the videorecordings were omitted, and the following 10 min of the parents' and child's speech were orthographically transcribed. Syllables were considered stuttered if they exhibited the following characteristics: monosyllabic whole word repetitions, sound/syllable

Table 1. Parent interaction and family targets selected as part of therapy.

Parent	Use comments rather than questions	Follow child's lead in play	Follow child's pace of play	Reduce parental rate of speech to match rate of child	Take shorter/fewer conversational turns	Increase listening	Increase semantic contingency	Praise	Turn-taking as a family	Behavior management
S1 Mother	✓	✓						✓		
S1 Father	✓	✓	✓					✓		
S2 Mother	✓	✓		✓				✓	✓	
S2 Father	✓			✓		✓		✓	✓	
S3 Mother	✓	✓						✓	✓	
S3 Father	✓	✓						✓	✓	
S4 Mother	✓	✓	✓					✓		
S4 Father	✓				✓			✓		
S5 Mother	✓	✓		✓				✓	✓	
S5 Father		✓					✓	✓	✓	
S6 Mother	✓		✓	✓				✓		✓
S6 Father	✓	✓	✓					✓		✓

Note. S = subject.

repetitions, audible or inaudible sound prolongations, or blocking of sounds (Ratner, Rooney, & MacWhinney, 1996; Yaruss, LaSalle, & Conture, 1998). The percentage of syllables stuttered (%SS) was calculated by dividing the number of syllables stuttered by the total number of syllables spoken and multiplying by 100.

An estimation of the stuttering severity was made from the first and last recordings, based on stuttering frequency (%SS), duration of three longest stutters, and the degree of tension and secondary behaviors present. This yielded a score ranging from 0 (*normal speech*) to 7 (*very severe stuttering*; Yairi & Ambrose, 1999, 2005). Because there were occasional differences between the scores obtained with each parent, the highest score is the one reported.

Interrater Reliability

Similar to the methods used by Onslow, Andrews, and Lincoln (1994), the transcriptions from one point in each phase of the study were randomly selected for blind analysis by a second rater. Percentage interrater agreement was based on point-by-point agreement for the presence of stuttering in each syllable (Hubbard & Yairi, 1988). Interrater agreement was calculated using the *percentage agreement index* (Suen & Ary, 1989): the number of agreements divided by the sum of the number of agreements and the number of disagreements, multiplied by 100. Interrater agreement was 96.9%.

Results

Participation

Four of the 6 children were monitored for the full 12 months postclinic therapy as intended. These were S3, S4, S5 and S6, who submitted a total of 9, 12, 6, and 8 videorecordings, respectively, during the 12-month period. The other 2 children, S1 and S2, submitted videos consistently each month but completed only 8 and 7 months of the follow-up phase, respectively. In the case of S1, parental report suggested that the improvements had been maintained until 12 months posttherapy.

Individual Analysis of Percentage Stuttering Data

The data obtained from each child while interacting with each parent were subjected to *cusum analyses* (Montgomery, 1997), which monitor variability during a baseline and detect shifts of more than 1 *SD* from the target mean of the baseline phase. The method was originally used to evaluate quality control data to determine

when a process is out of control. It has been used to monitor data that naturally fluctuate, such as population incidence data (Yang et al., 1997), clinician performance (Steiner, Cook, Farewell, & Treasure, 2000), and physiological outcome data (Stanton, Cox, Atkins, O'Malley, & O'Brien, 1992). The aim in each of these is to detect when there is a systematic, nonrandom change in the data, resulting in a trend that cannot be explained by the normal variability. The technique has been demonstrated to be sensitive and effective in measuring deviations in individual performances over time (Shehab & Schlegel, 2000).

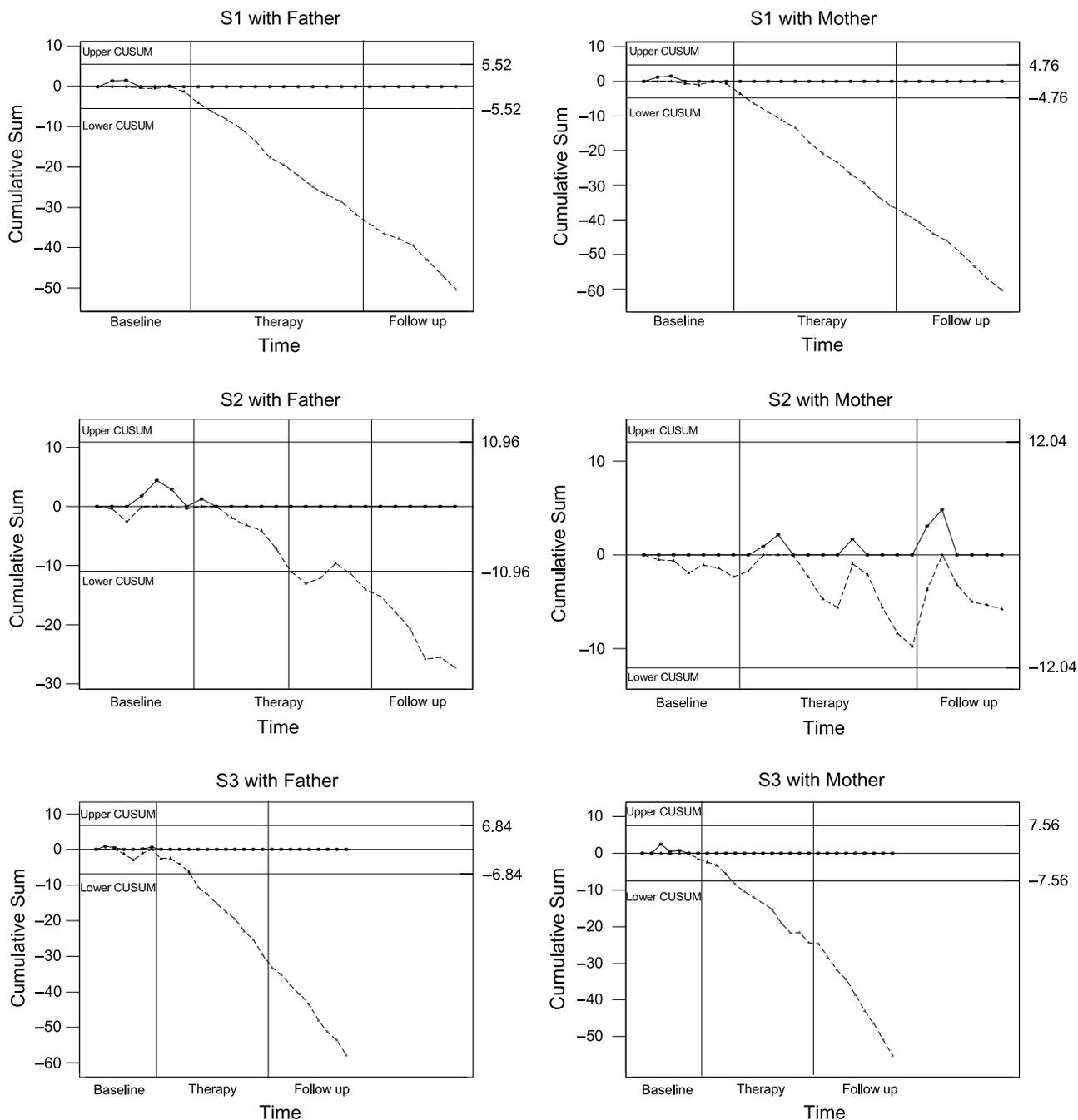
The *target line*, which is the horizontal line drawn from 0 on the *y*-axis, represents the mean of the data in the baseline (see Figures 1 and 2). Each round point marked on the target line represents a data collection point. In the baseline and therapy phases these are 1 week apart, and in the follow-up phase these are 1 month apart. The upper and lower cusum limits are a function of the standard deviation of the data in the baseline phase ($h = 4, k = 0.5$). Therefore, the greater the variability in the baseline phase, the wider the cusum limits are set. Readers are directed to the values of the cusum limits that are recorded on the right-hand side of the graphs in line with the cusum limit lines, because these vary from graph to graph depending on the variability of each child's fluency with each parent. A line above the target line reflects a cumulative increase in the frequency of stuttering compared with the mean of the baseline, whereas a line below the target line indicates a cumulative decrease in the data. The changes are considered to be significant in relation to both the target mean and the range of variability observed in the baseline phase if the graph lines cross the cusum limit lines. Crossing the upper cusum limit indicates a significant increase in stuttering frequency, and crossing the lower cusum limit indicates a significant reduction in stuttering frequency, compared with the mean and standard deviation in the baseline phase.

These analyses were conducted with each parent-child dyad. The cusum control charts for each child's stuttering while interacting with each parent are reported in Figures 1 and 2.

S1 significantly reduced the frequency of his stuttering with both parents during the therapy phase. His stuttering severity rating reduced from 2 to 1. He was discharged 1 year posttherapy.

S2 significantly reduced his stuttering with his father, but not with his mother, by the end of the therapy phase. Six months after PCIT, there was still concern about his fluency, and a direct program of therapy was recommended (Rustin et al., 1996; Kelman & Nicholas, 2008). His parents stopped making home recordings at this point. S2's stuttering severity rating was 4 at the

Figure 1. Cusum analyses of stuttering: S1, S2, and S3 with each parent. S = subject; CUSUM = cumulative sum.



start of the study and 4 at the end. S2 continued in therapy after the end of the study.

S3 significantly reduced the frequency of his stuttering with both parents during the therapy phase. His stuttering severity rating reduced from 3 to 0. He was discharged at the end of the study.

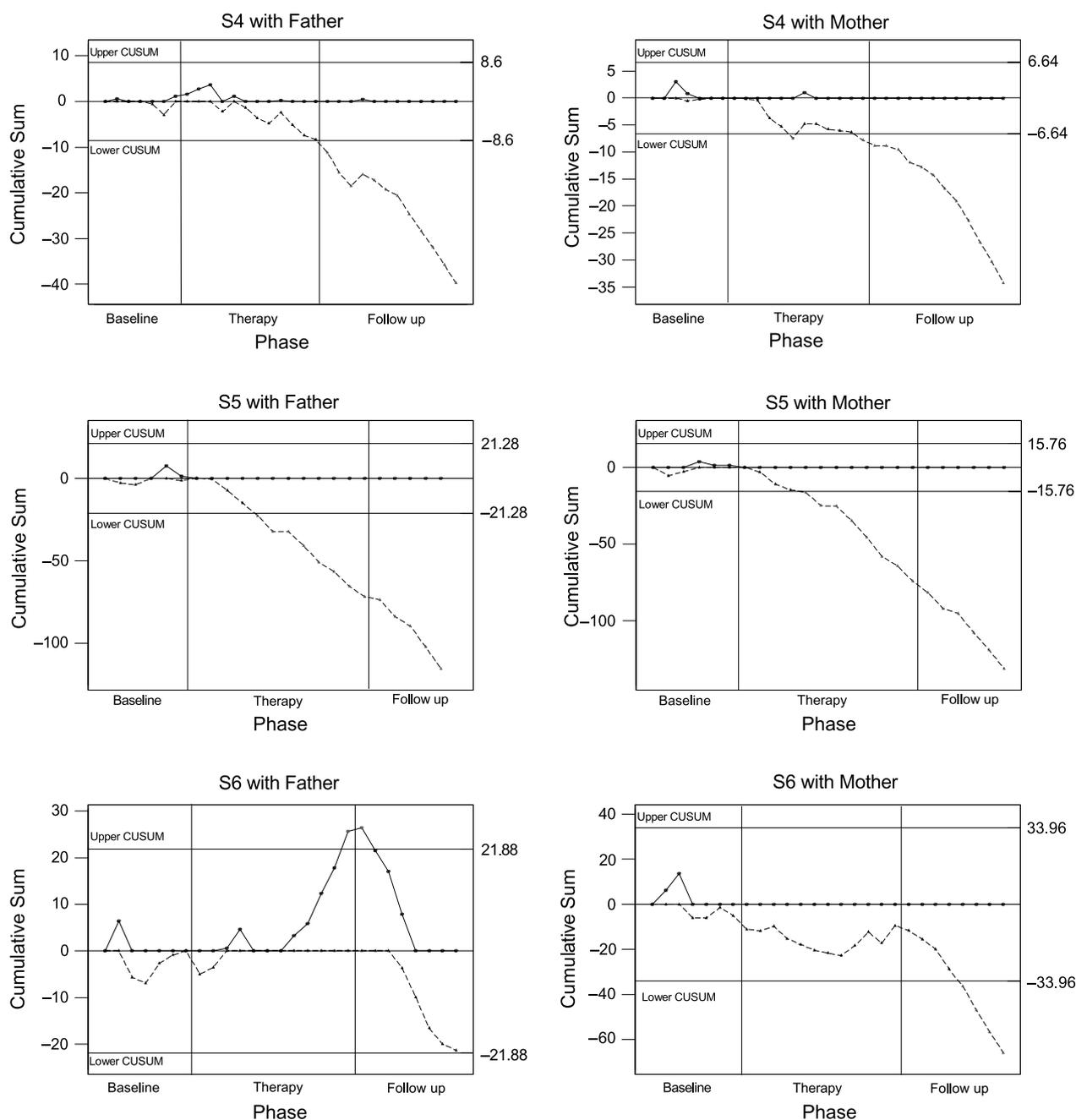
S4 significantly reduced the frequency of his stuttering with both parents during the therapy phase. His

stuttering severity rating reduced from 2 to 0 and he was discharged at the end of the study.

S5 significantly reduced the frequency of her stuttering with both parents during the therapy phase. Her stuttering severity rating reduced from 5 to 0 and she was discharged at the end of the study.

S6's stuttering did not reduce significantly with either parent during the therapy phase, and a direct therapy

Figure 2. Cusum analyses of stuttering: S4, S5, and S6 with each parent.



program was recommended 6 weeks after PCIT. The severity of her stuttering reduced from 5 to 2 over the period of the study. The significant reduction observed in the follow-up phase cusum data and the severity ratings obtained at the start and end of the study therefore reflect the combination of indirect and direct methods. It is interesting to note that the direct therapy program was led by S6's mother, yet reductions in her stuttering are also observed with her father during

the follow-up phase, perhaps reflecting a carryover of skills.

Discussion

The results demonstrate that 4 of the 6 children studied (S1, S3, S4, S5) significantly reduced the frequency of their stuttering with both parents by the end

of the therapy phase. One child significantly reduced the frequency of stuttering with one parent only (S2), and the remaining child (S6) made significant progress when a direct fluency management program was introduced. Multiple measures of stuttering allowed the variability of the stuttering to be considered within the analysis. Because the cusum analysis (Montgomery, 1997) takes account of naturally occurring fluctuations in data, we can be confident that the improvements observed are greater than can be accounted for by each child's natural stuttering variability. As far as we have been able to ascertain, this is the first time that a treatment efficacy study has considered variability in the analysis of percentage stuttering data in this way. Although the likelihood of the results occurring as a result of natural recovery is reduced by the length of time the children had been stuttering (more than 2 years in 2 of the children who improved), the possibility cannot be ruled out entirely, because natural recovery can occur 5 years postonset (Yairi & Ambrose, 2005). However, the analysis demonstrates that there were systematic reductions in stuttering during therapy that occurred in advance of any fluctuations of the data in the baseline phase. This increases confidence that the change is attributable to the therapy rather than to natural recovery.

The research data are further validated by the clinical decisions that were made in relation to each of the children, and vice versa. The clinicians did not have access to the research data, and the researchers were not informed about the decisions made by the clinicians until the end of the study, yet both were in agreement. The clinicians discharged the children who were later demonstrated by the study to have improved (S1, S3, S4, and S5) and provided further treatment and support for those whom the study showed to have responded less well (S2 and S6).

It can be seen from the results that the children who made significant progress did so with both parents, and this was achieved by the end of the 12-week program. These results suggest that if significant progress is not observed in the 12-week time frame, further or alternative intervention is indicated at the first review session. In hindsight, therefore, additional input for S2 could and should have been implemented earlier in the follow-up period.

Although S2 significantly reduced his stuttering with his father by the end of the therapy phase, this was not clinically significant, suggesting that improvement needs to be observed with both parents and supporting the need to involve both parents in the therapy process.

The finding that 4 out of 6 participants were discharged following indirect therapy is consistent with clinical outcome data reported in relation to other indirect approaches. Conture and Melnick (1999) reported discharge for 70% of children following indirect therapy,

and Yaruss et al. (2006) reported that 12 out of 17 children (approximately 70%) achieved stuttering frequency scores of 3% or less at the end of therapy. The replication of outcome across participants within this study, and consideration of the findings alongside previous studies, helps to strengthen the support of using indirect methods with this particular group of children (Muma, 1993; Pring, 2005).

There is no evidence within the reported therapy targets (see Table 1) to indicate which target or combination of targets could be critical to the process for every child. However, if it is assumed that parental change is a critical component of the therapy, then perhaps the parents of the children who significantly improved (S1, S3, S4, and S5) selected the appropriate targets to meet the needs of the child. It may be that in the case of S2 and S6, a failure in identifying a target or combination of targets that was essential for the individual child accounts for their nonsignificant results. Alternatively, the differing responses to the program might be explained according to whether the parents were able to make—or indeed, maintain—changes over time. An exploration of the parent interaction, both verbal and nonverbal, would help to determine whether parents made changes, whether any such changes corresponded to the targets identified, and whether these correlated to change in the child. It would also be interesting to learn whether change needs to be long term or whether adaptations are necessary only during a critical period while the child establishes fluency. Further group analysis of parent interaction variables may not necessarily contribute to our understanding of how therapy works, because the modifications parents make vary (Bonelli et al., 2000), and the changes affect a child's fluency in an idiosyncratic manner (Zebrowski et al., 1996).

It is possible, though, that the assumption that parental change is the key component to the program is misplaced. Wampold (2001) suggested that it is the commonalities between therapies that account for their success, rather than the differences between various approaches. This proposal might explain Franken et al.'s (2005) finding that the Lidcombe Program and a Demands and Capacities approach yielded similar outcomes with children randomly allocated to each of the therapies. It is feasible that parental involvement and time spent with the child alone are the critical elements, regardless of the program used, or that there is a feature of the speech and language therapist–client relationship, or speech and language therapist allegiance to a particular program, that is critical (Wampold, 2001).

It is also interesting to consider whether there are variables that could be identified before therapy begins that may influence therapy outcome. Information about the children's age, gender, presence of a family history of stuttering, and the time since stuttering onset was presented because these factors have been associated with persistence and natural recovery (Ambrose, Cox, & Yairi,

1997; Yairi et al., 1996). S6 was a female with a family history of recovered stuttering, information that would have suggested that she was more likely to naturally recover. S4 was male with a family history of persistent stuttering; he was the eldest child enrolled in the study and had been stuttering for 26 months. These factors would have suggested that he was at greatest risk of persistence (Ambrose et al., 1997; Yairi et al., 1996). The outcomes may simply be a reflection of the difficulties in generalizing group data to individuals (Pring, 2004), or they may indicate that the factors that are predictive of persistence and improvement in the clinical population of children who have been stuttering for more than 12 months may differ from those in the nonclinical population of children who ever stutter.

Perhaps hypotheses regarding potential factors may be generated by closer examination of S2 and S6, who had two of the most variable stutters in terms of frequency, during the baseline phase, as reflected in the cusum limits (see Figure 1). Variability or instability in speech motor control has been proposed as a factor that may account for persistency of stuttering (Brosch, Hage, & Johannsen, 2002). Perhaps the children who exhibited greatest stuttering variability in the baseline phase are those with the greatest variability in speech motor control, which may in turn explain the persistency of their stuttering despite this therapy. This has not been investigated, but if it were found to be the case then it seems likely that a treatment approach that focuses on establishing more reliable speech motor patterns may be more appropriate for these specific children. Although S5 was one of the children with greatest variability in stuttering frequency, she did demonstrate improvements in her speech without direct intervention. Nevertheless, it would seem that greater variability is a factor that warrants further investigation.

Limitations and Recommendations for Future Research

Single-subject studies comprise an important stage in the treatment efficacy process (Ingham & Riley, 1988; Jones, Gebiski, Onslow, & Packman, 2001; Pring, 2005; Robey & Schultz, 1998), allowing the investigators to identify whether there is evidence that a treatment works before a large-scale study is undertaken.

One of the limitations of the single-subject design is that although internal validity is high, the numbers are small, and the participants are not necessarily representative of the population of CWS. Therefore, the ability to generalize the results is limited. The findings from this study indicate that a larger Phase 3 study is justified, to increase the single-subject data set (Kully & Langevin, 2005) and develop a large-scale RCT (Franken-

et al., 2005). Future studies will also need to evaluate the program's efficacy with differing populations. As a priority, studies need to focus on the implementation of the program with other clinical groups, such as individuals who require interpreters or those who have concomitant disorders.

Although the aim of this study was to investigate the effectiveness of the overall process, the identification of the mechanisms of change and the variables that may predict prognosis are the next stage of the research program now that therapeutic effects have been demonstrated (Robey & Schultz, 1998; Pring, 2005). Exploration of these factors would help inform the clinical decision-making process, and the results of this study suggest that the variability of a child's fluency should be considered as a potential influencing factor.

A further consideration within the long-term research strategy relates to the number of sessions of PCIT. Therapy was predefined in two 6-week blocks (Rustin et al., 1996), but it is not known whether this period is the most effective both in terms of outcome and cost. Perhaps fewer sessions for S1, S3, and S5 may have been justified, and perhaps increasing the number of sessions for S2 and S6 may have yielded more positive outcomes. These results compare favorably with reports from other therapy approaches that describe a significant improvement in fluency associated with a mean of approximately 11 (Jones et al., 2000) or 12 (Yaruss et al., 2006) clinic-based therapy sessions.

Summary

This study set out to examine whether PCIT was effective in reducing stuttering in young children, to provide evidence that would support clinicians in the decision-making process. Overall, the results suggest that six clinic-based sessions of PCIT, followed by a 6-week period of close monitoring of parent-led therapy at home, can be successful in significantly reducing stuttering in young CWS. Furthermore, the results suggest that children who do not make adequate progress in this time frame are those who will require ongoing intervention.

These findings add to the growing body of data supporting structured intervention with young CWS. Specifically, this study provides evidence that indirect methods, in particular those used in PCIT, can be successfully used to reduce stuttering and that this program is an evidence-based management option. Furthermore, these results demonstrate that PCIT can be effective with children who have been stuttering for up to 2 years prior to the onset of therapy and who are considered to be at risk of persistent stuttering. The study also demonstrates that for some children the indirect component

of this program can be effective on its own, but for others more direct methods and ongoing therapy may be required.

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