ABSTRACT: Purpose: This article describes different intervention approaches for preschool and school-age children who stutter, including the name of the approach and its components and limitations.

Method: A review of the literature was conducted to summarize and synthesize previously published research in the area of stuttering treatment. The goal of this literature review was to increase the clinician’s knowledge base about different intervention approaches that are used with children who stutter. If a clinician has an extensive understanding of intervention techniques, then he or she can conduct well-developed therapy sessions.

Conclusion: Despite the increasing size of the literature in the area of stuttering, there remains a dire need for evidence-based intervention approaches.

KEY WORDS: stuttering, intervention approaches, preschool children, school-age children, literature review

Initiating Treatment

There is much controversy regarding when intervention should begin for preschool- and school-age children who stutter. A review of existing literature serves many functions, including summarizing findings, identifying consistencies and inconsistencies in the research available, and identifying implications for future research and practice (Bothe, Davidow, Bramlett, Franic, & Ingham, 2006). A literature review provides clinicians with some of the information necessary for evidence-based practice (Bothe et al., 2006; Yaruss et al., 2006). Moreover, assessing treatment methods has helped researchers establish new approaches for the design and conduct of more rapid clinical studies.
stutter. The matter is complicated because of the high percentage (approximately 70%) of children who recover spontaneously (e.g., Finn, 1996; Peters & Guitar, 1991). Yairi and Ambrose (1999) stated that 74% of children who stutter recover naturally within the first 2 years of onset. The controversy concerning when to begin treatment reflects different philosophies regarding the nature of the disorder. Curlee and Yairi (1997), for example, suggested “active monitoring” for 2 years postonset rather than active intervention.

There are many variables that affect treatment time; therefore, knowledge of the variables is essential to determine when treatment for preschool-age children should begin (Rousseau, Packman, Onslow, Harrison, & Jones, 2007). Although guidelines have been developed for the timing of several treatment programs (e.g., the Lidcombe Program; Packman, Onslow, & Attanasio, 2003), it is important to identify the child’s concomitant disorders (e.g., language and phonology) in order to predict treatment time and decide when to begin treatment for early intervention (Rousseau et al., 2007).

Treatment Reliability

An important aspect of assessing various treatment programs is whether the treatment was administered correctly. This aspect determines whether the treatment was effective as reported in the literature (Conture & Guitar, 1993). Siegel (1990) stated that replication is the most rigorous test of reliability. In a number of studies, researchers have reported that replication in treatment efficacy research has been overlooked (Attanasio, 1994; Meline & Schmidt, 1997; Muma, 1993; Onslow, 1992). Muma (1993), for example, surveyed 1,712 studies in the Journal of Speech and Hearing Disorders and the Journal of Speech and Hearing Research. Based on statistical analysis, he claimed that Type I (false positive) and Type II (false negative) errors were likely to be found in 50–250 findings. In addition, Onslow (1992) reviewed the literature on stuttering intervention and reported that few studies have been replicated. These findings could be misleading the development of treatment in the field, indicating the necessity for further replication studies.

Indirect and Direct Approaches

Indirect approaches to treating stuttering involve modifying the child’s environment rather than working directly with the child (R. J. Ingham & Cordes, 1998; Richels & Conture, 2007). Indirect therapy approaches are often implemented when the child is not aware of, or is frustrated by, his or her stuttering. The aim of indirect therapy is to facilitate fluent speech through changes in the environment and modifications to parents’ speaking patterns. Indirect methods target children’s attitudes, feelings, fears, and language in daily interactions (e.g., pragmatics), and may result in a reduction of the child’s speaking rate (Conture, 2001; Gottwald & Starkweather, 1995; Guitar, 1998; Shapiro, 1999; Starkweather, Gottwald, & Halfond, 1990). This is directly related to the diagnostic theory of stuttering, which states that stuttering is a result of parental attention to the child’s disfluencies (Bernstein Ratner & Tetnowski, 2006). R. J. Ingham (1993) noted that many clinicians favor indirect approaches because they place less pressure on the child; however, she claimed that these practices were not supported by evidence. Furthermore, she noted that indirect treatments have too many variables and are difficult to measure objectively.

Direct approaches, on the other hand, target the child’s individual speech behaviors (R. J. Ingham & Cordes, 1998; Richels & Conture, 2007). Direct therapy approaches are often implemented when children are aware of and/or frustrated by their stuttering, as well as when they exhibit secondary behaviors (Coleman, Yaruss, Butkiewicz, & Roccom, 2005). Direct treatment may be professionally directed or parent directed; that is, either the SLP or the parent may target the child’s speech disfluencies. Behavior modification techniques have yielded positive results in various studies (e.g., Onslow, Andrews, & Lincoln, 1994; Onslow, Packman, Stocker, van Doom, & Siegel, 1997).

Some examples of direct treatment include modeling reduced speaking rate, increasing pauses during turn taking, allowing the child to finish his or her statement without interruption, and relaxed breathing techniques (Hill, 2003; Kelly, 1995; Walton & Wallace, 1998; Zebrowski, 1997; Zebrowski, Weiss, Savelkoul, & Hammer, 1996). Specific programs include the Lidcombe Program (Onslow, 1997) and Gradual Increase in Length of Complex utterance (Ryan & Ryan, 1983). Onslow (1995), however, noted a decline in the effectiveness of behavior modification techniques after 5 years of age.

Some clinicians favor direct approaches to eliminate stuttering behaviors (Adams, 1984; Prins & Ingham, 1983; Shine, 1984). Bernstein Ratner (1997) indicated that clinicians have favored indirect approaches for early stuttering (e.g., Cooper & Cooper, 1985; Cooper & Rustin, 1985). She stated that direct treatment may not be suitable for children with an average age of 2:6 (years;months). Nonetheless, it has become increasingly popular to begin short-term indirect treatment and proceed, if necessary, to direct treatment (Coleman et al., 2005).

Family-Focused Treatment, Counseling, and Support Groups

For treatment of preschool children who stutter to be successful, parental intervention is essential (Lawrence & Barclay, 1998). There are two major components involved in parental intervention: (a) parental knowledge and feelings about stuttering in general, their child who stutters, and themselves, and (b) parental behaviors with their child while stuttering and without stuttering (Shapiro, 1999). Parents are advised not to criticize the child, not to constantly remind the child to speak slower, and not to repeat words that were said disfluently (Lawrence & Barclay, 1998). Moreover, Peters and Guitar (1991) and Van Riper (1973) suggested diminishing time pressure, interruptions, rapid speech rates, hectic or unpredictable schedules, punishments, and guessing what the child intends to say. Parents need to be educated about what they can contribute to the
development of their child’s communication and fluent speech (Shapiro, 1999).

Yaruss et al. (2006) described a family-focused treatment approach for preschool-age children (between the ages of 2 and 6) who stutter. The treatment included parent-focused strategies to help parents alter their speaking patterns and reduce their anxiety about stuttering and child-focused strategies meant to help children modify their behaviors and communication attitudes. Overall, the treatment method targeted improved speech fluency, effective communication skills, and healthy communication attitudes for both parents and children. The efficacy of the treatment was validated with a preliminary study examining the outcomes of treatment for 17 preschool-age children. All children demonstrated gains in fluency and maintained the gains at the long-term follow-up.

Treatment groups for both children and parents can also be implemented to help the child achieve fluency (Richels & Conture, 2007). Richels and Conture (2007) explained that whereas child treatment groups help the child achieve fluency, parent treatment groups prepare parents for their child’s therapy expectations and goals. To increase participation from all members, child groups should be limited to 5 children. Throughout the session, the SLP should use a slow rate of speaking and syntactically appropriate utterance lengths and should not interrupt the child or modify the child’s speech. The session should begin with a conversation so the clinician can monitor the child’s disfluencies within a 100-word sample. The disfluency count allows the clinician to monitor the child’s progress.

The parents in Richels and Conture (2007) were advised to purchase a book, Stuttering and Your Child: Questions and Answers (Conture, 2002), and a video, Stuttering and Your Child: A Videotape for Parents (Conture, 1997). In addition, the parents were given various strategies and suggestions to facilitate their child’s fluency: use slower rates of speech, use shorter sentences, do not interrupt your child, avoid correcting your child, and avoid reprimanding your child for producing disfluencies (Richels & Conture, 2007).

Counseling is another important aspect to the treatment of children who stutter that can help both parents and children deal with the necessary emotional adjustments. Rollin (2000) defined counseling as “a dynamic process that involves a complex interaction between and among people” (p. 2). Furthermore, Luterman (2001) stated that counseling is “a clinician trying to help a client manage change” (p. 9). Counseling, however, has received minimal attention in the stuttering literature (DiLollo & Manning, 2007). Luterman and Shames (2000) suggested that perhaps it is the clinician’s discomfort with counseling children and their parents that has contributed to the scarcity of research in this area.

Counseling children, especially preschool- and school-age children, may be a difficult task (DiLollo & Manning, 2007). The SLP can begin by listening to a narrative, or story, which often reflects the child’s anxiety, tension, and fear (Payne, 2002). The narrative can then be used to externalize the problem, making the stuttering a separate identity. In this way, the stuttering does not become an internal trait; that is, the disorder does not become a point of identification for the child (Payne, 2002; White & Epston, 1990).

Parents of children who stutter may face many emotional reactions (Crowe, 1997). Counseling parents should initially focus on the emotional adjustments such as grief, fear, anxiety, guilt, isolation, denial, and depression (Crowe, 1997; Kubler-Ross, 1969; Manning, 2001). Clinicians begin by listening and acknowledging the emotional responses. The clinician refocuses the parents’ energy, perhaps by making them more active in the treatment process (e.g., Lidcombe Program) or by encouraging them to join support groups.

Support groups and self-help groups are playing a larger role in the recovery process of individuals who stutter (Bradberry, 1995; Krall, 2001; Ramig, 1993; Yaruss, Quesal, Reeves, et al., 2002). Support groups provide members with newsletters, literature, and other information about stuttering (e.g., treatment programs). Members may also be provided with advice about treatment programs. These factors play an important role for both the SLP and the individual who stutters. The information received from the support group may play a large role in the attitudes and beliefs the individual may have toward a certain treatment option. The SLP must therefore become an active member in these groups and become acquainted with the information distributed to the members (Yaruss, Quesal, & Murphy, 2002).

The National Stuttering Association (NSA; http://www.nsastutter.org) is the largest self-help support group in the United States for individuals who stutter. The NSA-Kids division has many chapters for both preschool- and school-age children. They have several local support groups and have NSA Youth Days for children and their families. NSA Youth Days are events that bring individuals who stutter together in a supportive environment. FRIENDS (http://www.friendswhostutter.org) is another national organization by the National Association of Young People Who Stutter that helps children, teenagers, and their families cope with stuttering. FRIENDS has a bimonthly digest titled Reaching Out that provides information based on the experiences of young people who stutter. In addition, the association holds conferences and annual conventions so families and friends can share their experiences. These are just a few ways that parents, children, and therapists can become active members in children’s treatment process.

**Stuttering Modification Versus Fluency Shaping**

There are two therapeutic techniques used when treating stuttering—stuttering modification and fluency shaping. **Stuttering modification** aims to reduce speech-related avoidance behaviors, fears, and negative attitudes (Guitar & Peters, 1980; Peters & Guitar, 1991). The goal of stuttering modification is to modify stuttering moments by decreasing the tension so the stuttering is less severe and the fear or avoidance behaviors of stuttering are eliminated (Blomgren et al., 2005; Guitar, 1998). This may be accomplished by reducing struggle behaviors, tension, and the rate of stuttering (Guitar & Peters, 1980). Underlying this approach is...
the notion that stuttering results from various avoidance behaviors and feared situations (Guitar & Peters, 1980; Peters & Guitar, 1991). Stuttering modification approaches have been referred to in various ways in the literature: “stutter more fluently” (Gregory, 1979, p. 2) and “those that manage stuttering” (Curlee & Perkins, 1984, p. iii). Manning (1999) contended that although stuttering modification may decrease avoidance behaviors, it may in turn increase the frequency of the stuttering moments. This follows a logical pattern because as the individual relinquishes avoidances, the number of speaking opportunities increases. The World Health Organization (WHO, 2001) would therefore not consider the treatment effective because it does not reduce the impairment level (e.g., stuttering frequency). Moreover, Blomgren et al. (2005) stated that any stuttering modification program in its purest form (i.e., without fluency enhancing techniques) will not be effective in reducing an individual’s stuttering or core behaviors.

Fluency shaping, on the other hand, focuses on teaching the individual to speak more fluently (Blomgren et al., 2005; Guitar, 1998). The goal of fluency shaping is to work with the speaker’s speech motor control capabilities and apply various approaches to facilitate new speech production patterns (Blomgren et al., 2005). This technique establishes fluent speech in a controlled environment using both positive and negative reinforcement (Guitar & Peters, 1980; Peters & Guitar, 1991; Shapiro, 1999). Fluency is eventually generalized to normal conversational settings through successive approximations (Shapiro, 1999). A drawback of this method is that it does not incorporate the individual’s feelings and reactions to the disorder (Blomgren et al., 2005). Furthermore, Guitar and Peters (1980) stated that by using this method, speech becomes monotonous and artificial as the client strives for fluent speech.

Stuttering modification. Stuttering modification may be targeted through Van Riper’s (1972, 1973) exemplar termed MIDVAS: motivation, identification, desensitization, variation, approximation, and stabilization. According to Van Riper, motivation is the first, and most important, phase. During this phase, the SLP continues to modify the client’s speech to attain fluency. The rationale behind the identification of traits is that once awareness is attained, the habit may be changed. Goals include diminishing denial and identifying stuttering behaviors.

The third phase, desensitization, “implies stress” (Shapiro, 1999, p. 197). During this phase, the client’s negative feelings and emotions toward the disorder are addressed. Some techniques include relaxation, pseudostuttering, adaptation, and anxiety reduction by modifying stuttering (Van Riper, 1973). Following desensitization, the SLP may begin modifying the individual’s stuttering (e.g., modifying anticipated behaviors) in the fourth phase, called variation. As the client begins to learn new responses to diminish stuttering moments, he or she enters the approximation phase. During this phase, the SLP continues to modify the client’s speech to attain fluency. Some approximation techniques include cancellation, pullouts, and preparatory sets (Van Riper, 1973). Treatment is reduced during the stabilization phase. As the client gains a positive self-image, he or she begins to self-monitor the stuttering. Treatment may be terminated in this final stage (Van Riper, 1973).

Because stuttering modification focuses on desensitization and reducing the individual’s anxiety, it is difficult to obtain outcome measures and quantify the efficacy of the technique (Blomgren et al., 2005). The Successful Stuttering Management Program (SSMP; Breitenfeldt & Lorenz, 1989) is an example of a stuttering modification treatment; there is, however, no evidence of its effectiveness (Blomgren et al., 2005; De Nil & Kroll, 1996; Ham, 1996). The SSMP is a 3-week program that is based on stuttering modification techniques advocated by Van Riper (1973)—a combination of desensitization techniques and avoidance reduction therapy (Sheehan, 1970). Breitenfeldt and Girson (1995) described positive changes in individuals’ attitudes toward stuttering and secondary behaviors following this program. Eichstadt, Watt, and Girson (1998) also reported positive changes; however, no pretreatment baselines were obtained (Blomgren et al., 2005).

Stuttering modification: Measuring attitudes and beliefs. In creating a treatment plan for individuals who stutter, it is not sufficient to count the number of disfluencies or the frequency of stuttering moments. Assessing attitudes, emotions, self-esteem, and environmental factors is an essential aspect in preparing treatment goals. Sheehan (1970) stated, “Stuttering is like an iceberg, with only a small part above the waterline and a much bigger part below” (pp. 184–185). Because the overt aspects of stuttering account for only 10% of the problem (Hicks, 2003), it is important to evaluate the attitudes and emotions of the person who stutters, or 90% of the disorder, using the various scales available.

Self-measurement, self-monitoring, and self-observations are considered direct measures of behavior (Cone, 1999); however, they may also include many personal biases (Gilovich, 1991). The main purpose of self-measurement is to serve as a therapeutic intervention (Foster, Lavity-Finch, Gizzo, & Osantowski, 1999). Individuals who stutter develop belief systems over time that include attitudes about their individual abilities to speak and the effect of situations and listeners on their speech and fluency. Negative emotional reactions and avoidance behaviors are two measurable types of covert characteristics of stuttering.

Building a sense of confidence and self-worth is another central aspect in the treatment of stuttering. According to the Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965), self-esteem is a broad concept that is used to measure a person’s “global” or “unidimensional” self-evaluation (Gray-Little, Williams, & Hancock, 1997). McCarthy and Hoge (1982) stated that the scale has been found to be valid and reliable among students in Grades 7–12. The RSE includes 10 statements that are scored using a 4-point Likert scale ranging from 0, strongly agree, to 3, strongly disagree. Cooperman, Bloom, and Klein (2007) adopted
Rosenberg’s scale for children by simplifying the statements and the Likert scale. The Self-Esteem Scale—Modified for Children also contains a 4-point scale; however, 1 represents Yes, I think this is true, and 4 represents No, I never think this is true.

Other scales are used to assess children’s attitudes and perceptions toward the disorder, such as the Communication Attitude Test (CAT; Brutton, 1985) and the Communication Attitude Test—Revised (CAT–R; Brutton, 1985). The CAT consists of 35 true and false questions that are used to assess the child’s perception of stuttering. The CAT has been translated into various languages and has been researched in 15 countries (Brutton & Vanryckeghem, 2003, 2007; De Nil & Brutton, 1991; Vanryckeghem & Mukati, 2006). De Nil and Brutton (1991) and Vanryckeghem and Brutton (1992) have found significant test–retest reliability, high correlations, and interitem reliability for the CAT–R (Brutton & Dunham, 1989).

There have been high correlations between negative speech-associated attitudes and emotions among children who stutter and those who do not stutter. Moreover, there is a relationship between the negative beliefs about the speech, attitudes, and emotions of children who stutter and the anxiety associated with their communication (Vanryckeghem, Hylebos, Brutton, & Peleman, 2001). It is important, therefore, to determine a child’s attitudes toward his or her disorder at an early age. Vanryckeghem (1995) found that parents do not accurately convey their child’s belief systems. For this reason, there has been extensive research with the KiddyCat (Langevin, 2007), a communication attitude test for preschoolers and kindergartners who stutter (Ambrose & Yairi, 1994; Vanryckeghem & Brutton, 2007; Vanryckeghem, Brutton, & Hernandez, 2005). Researchers found that children who stutter develop negative attitudes toward their speech as early as 3 years of age.

A more comprehensive scale, the CALMS Rating Scale for Children Who Stutter (ages 7–15), is based on Healey, Scott Trautman, and Susca’s (2004) multidimensional model of stuttering. The scale addresses five key factors: cognitive, affective, linguistic, motor, and social. Each item on the scale is rated from 1 to 5, with 1 representing normal and no concern and 5 representing severe impairment and extreme concern. By computing the total value of all of the items and dividing it by the number of items scored, a mean score for each component is obtained. The average score is used to create a CALMS profile (Healey, 2007; Healey et al., 2004).

Coleman and Yaruss (2004) devised an alternative instrument, the Assessment of the Child’s Experience of Stuttering (ACES), to assess the overall impact of stuttering on the child’s life from the child’s perspective. The ACES was adapted from an adult scale, Overall Assessment of the Speaker’s Experience of Stuttering (OASES; Yaruss & Quesal, 2004), to assess stuttering in children 7 to 18 years of age. The ACES is divided into four sections: general information about stuttering, reactions to stuttering (affective, behavioral, and cognitive), communication in daily situations, and impact of stuttering on quality of life. The instrument evaluates (a) the child’s perception of speech fluency, speech naturalness, and speech therapy techniques; (b) the child’s affective, behavioral, and cognitive reactions to stuttering; (c) the child’s difficulty in communicating at school, at home, and in social situations; and (d) the impact of stuttering on the child’s overall quality of life (Coleman & Yaruss, 2004). The questionnaire consists of 100 items that can be completed in 15–20 min. After gathering the necessary information, the clinician can create a more individualized treatment plan for the child.

**Fluency shaping.** Aside from working on desensitization of stuttering, increasing the fluency of stuttering may be targeted by implementing two fluency shaping programs, Programmed Conditioning for Fluency (Ryan & Van Kirk, 1971) and Programmed Therapy for Stuttering in Children and Adults (Ryan, 1974). Fluency is established through one of four techniques: gradual increase in length and complexity of utterances (GILCU), delayed auditory feedback (DAF), programmed traditional, and punishment (Shapiro, 1999).

GILCU is a 54-step program that directs the client to produce fluent speech (Shapiro, 1999). It begins with single-word responses and is increased to six words. The client’s speech is gradually increased from 5 min of passage reading to monologue speech, ending in conversational speech with normal speaking rates (Ryan & Ryan, 1995). The method has been found to be effective and efficient (Costello, 1980, 1983; Rustin, Ryan, & Ryan, 1987; Ryan & Ryan, 1995; Shine, 1984). Costello (1980) used a more defined GILCU approach called the Extended Length Utterance (ELU) program. The ELU program is similar to the GILCU program; however, instead of beginning with words, it uses syllables. It is completed in 20 steps, beginning with monologue and ending in conversational speech (Costello, 1980).

Traditional programs identify an individual’s stuttered words and then shape fluent responses using Van Riper’s techniques, cancellation, pullouts, and preparatory sets (Shapiro, 1999). Punishment, on the other hand, reduces the frequency of stuttering by presenting an aversive condition (Shapiro, 1999).

**Lidcombe Program**

The Lidcombe Program is a behavioral parent-directed treatment for stuttering in preschool children that was developed by the Faculty of Health Sciences at The University of Sydney and the Stuttering Unit of the Bankstown Health Service in Sydney, Australia. Using this program, the SLP teaches the parent to deliver treatment to the child and to use a 10-point Likert scale to measure the severity of the child’s stuttering in his or her everyday environment (Omslow, Packman, & Harrison, 2003; Rousseau et al., 2007).

There are two stages to the program. In Stage 1, the parent and child meet with the SLP on a weekly basis for the parent to deliver treatment to the child and to use a 10-point Likert scale to measure the severity of the child’s stuttering in his or her everyday environment (Omslow et al., 2003; Rousseau et al., 2007). The SLP measures the percentage of syllables that are stuttered (%SS), and the parent monitors the child’s speech using a 10-point scale where 1 represents the absence of stuttering and 10 represents extremely severe stuttering (Rousseau et al., 2007).
Once the child’s stuttering decreases, Stage 2 (maintenance stage) begins, where the parent and child attend sessions less frequently, and treatment is decreased (Onslow et al., 2003).

Kingston, Huber, Onslow, Jones, and Packman (2003), as well as Jones, Onslow, Harrison, and Packman (2000), found that children with more severe stuttering took longer to complete Stage 1; however, those who had been stuttering longer completed Stage 1 faster than those who had been stuttering for a shorter period of time. Based on the authors’ retrospective file audits, the median treatment time was 11 visits. Rousseau et al.’s (2007) findings, however, indicate a median treatment time of 16 visits. The exact cause of the discrepancy is unclear; Rousseau et al. suggested that possible demographic differences may be responsible.

Rousseau et al. (2007) investigated the effect of language and phonology as predictors of treatment time using the Lidcombe Program. Knowing the relationship between language and phonology and whether it affects the timing of intervention is important for clinician decision making during the time of assessment (Rousseau et al., 2007). The authors did not find a relationship between phonological development and the time it takes to complete the first stage of the Lidcombe Program. They did, however, find a relationship between language and treatment time; that is, the higher the child’s mean length of utterance, the shorter the treatment time, and the higher the child’s mean length of utterance, the shorter the treatment time.

Because the Lidcombe Program does not require programmed instructions, nor does it require the child to change his or her manner of speaking, it is currently the first choice for treatment in preschool-age children (Conture & Curlee, 2007). Because of the social anxiety associated with stuttering at the school-age level (Conture & Curlee, 2007), there is a need to investigate the efficacy of the Lidcombe Program for older children (i.e., between 7 and 11 years of age). Rousseau, Packman, and Onslow (2005) began investigating the efficacy of the Lidcombe Program on school-age children. They investigated how well the children responded and how long it took them to respond. There is some data that suggest that the Lidcombe Program may be effective for school-age children (Lincoln, Onslow, Lewis, & Wilson, 1996); however, Conture and Curlee (2007) stated that based on the data from Rousseau et al. (2005), there are compelling reasons to believe that the program may not be suitable for school-age children.

### Altered Auditory Feedback

Altered auditory feedback (AAF) is a term that is used to encompass altering the speech signal electronically so that the speaker perceives his or her voice differently. There are several types of AAF, including DAF, frequently altered feedback (FAF), and masking auditory feedback (MAF). AAF techniques have been found to reduce stuttering by decreasing the child’s rate of speech (Armson & Stuart, 1998; Hargrave et al., 1994; Howell et al., 1999; Van Borsel et al., 2003). Kalinowski, Armson, Roland-Mieszkowski, Stuart, and Gracco (1993) and Hargrave et al. (1994), however, found that a reduction in speech rate is not necessary for the production of fluent speech using AAF programs.

DAF, or prolongation, has been studied extensively to reduce stuttering in adolescence and in adults who stutter (Boberg, 1980; R. J. Ingham & Andrews, 1973; Ryan & Ryan, 1995; Ryan & Van Kirk, 1974; Webster, 1980). DAF occurs when there is a 50–100 ms delay in the arrival of the voice signal to the speaker’s ear. In the early stages of DAF, a long delay was used (250 ms), which produced slow and prolonged speech (Ryan, 1974; Ryan & Ryan, 1995). There are 25 steps to the program. The least amount of time needed to complete the program is 110 min (Ryan, 1974; Ryan & Ryan, 1995; Ryan & Van Kirk, 1974). The aim of the DAF program is to produce slow, paced speech: a total of 40 words or less produced per minute (Ryan & Ryan, 1995). Current research indicates the effectiveness of the treatment with short delays (50 ms). In this manner, the person can continue a fast-paced speech while maintaining fluency (Kalinowski, Stuart, Sark, & Armson, 1996). The goal of DAF is to prolong the speaking rate so the client can produce fluent speech (Ryan & Ryan, 1995; Shapiro, 1999).

FAF alters the frequency of the individual’s speech (either up or down) between ¼ to 1 octave, affecting the perceived pitch of the person’s voice (Hargrave et al., 1994; Howell, El-Yaniv, & Powell, 1987). Howell et al. (1987) found that study participants using FAF produced fewer disfluencies than those using DAF. Several studies have reported a decrease in stuttering using 1-, ½-, and ¼-octave increasing or decreasing the frequency of speech (Hargrave et al., 1994; Howell et al., 1987; Kalinowski et al., 1993; Stuart, Kalinowski, Armson, Stenstrom, & Jones, 1996); nonetheless, the most consistent results have been found using the 1-octave increase and decrease (Hargrave et al., 1994). DAF, however, has been consistently reported to be more effective than FAF in reducing stuttering (Stuart, Kalinowski, & Rastatter, 1997; Zimmerman, Kalinowski, Stuart, & Rastatter, 1997).

Masking noise delivered via headphones or electronic devices has been used to help control stuttering in everyday situations (Armson & Stuart, 1998). The results regarding the effectiveness of masking studies are inconclusive (R. J. Ingham, Southwood, & Horsborough, 1981). This method, however, is now rarely employed because DAF and FAF have been found to be more effective than masking noise at reducing stuttering (Howell et al., 1987; Kalinowski et al., 1993).

Overall, AAF, specifically FAF, has been found to increase speech naturalness and reduce the degree of stuttering in difficult speaking situations (White, Kalinowski, & Armson, 1995). Lincoln et al. (2006) reviewed the literature over the past 10 years to assess the effect of AAF on different speaking situations. The authors concluded that in the laboratory, clinic, or classroom, AAF results in reduced stuttering during oral reading for those who stutter. The studies, however, did not suggest the reduction of stuttering in conversational speech. The authors concluded that the
true efficacy of the treatment cannot be determined until the effects on conversational speech are examined (Lincoln et al., 2006).

Yaruss and Gable (2005) reviewed the use of AAF devices, specifically, the SpeechEasy device. SpeechEasy is a fluency enhancing device for people who stutter who use DAF, FAF, or a combination of the two. Kalinowski, Stuart, and Rastatter invented the device after reviewing the effects of AAF on people who stutter. The device resembles a hearing aid and was designed for monaural use. There are three main models: behind the ear, in the canal, and completely in the canal. There are no published studies regarding the efficacy of the devices, and no studies have been reported regarding the use of the device with children. Only temporary fluency gains have been reported when using the device. Additionally, because the device is placed in one ear, there may be competing signals in the other ear, causing disruptions in communication.

Recently, Saltukaroglu and Kalinowski (2005) proposed that AAF may be a promising treatment option for school-age children. Howell et al. (1999) and Stuart et al. (2004) studied participants between 9 and 12 years of age and found that children did not respond as well as adults to AAF conditions. No conclusions can therefore be made regarding the effects of AAF devices on children. There is no evidence in the literature that suggests the use of AAF in children under the age of 9 years. Lincoln et al. (2006) stated that altered auditory input on children developing speech and language may create further complications.

Monterey Fluency Program

The Monterey Fluency Program (Ryan & Van Kirk, 1978) is a structured therapy program for preschool- and school-age children. The program is often combined with the token economy system (Dalton, 1983). This program was designed to provide two alternative schedules for fluency: GILCU and DAF (Bloodstein & Bernstein Ratner, 2008). The GILCU program is based on operant conditioning principles where there is an established structured program for reinforcement of utterances. The DAF program is used with older children and helps the client to read and speak in a slow manner where all the words are prolonged.

Fluency Rules Program

The Fluency Rules Program (FRP; Runyan & Runyan, 1993, 1999) was designed for preschool- and school-age children. Originally, the program was named “Rules for Good Speech” and consisted of 10 fluency rules. The program was expanded, however, to include three sections: universal rules, primary rules, and secondary rules. It was realized that not all children who stutter need the 10 rules. Universal rules, therefore, are rules that all children who stutter use. These rules include reduce the rate of speech, say each word once, and say it short. Reducing the rate of speech allows children to monitor their speech. Slow speech was reported by SLPs to have a calming effect on children who stutter (Runyan & Runyan, 2007). Using symbolic therapy materials (e.g., turtle or snail) may assist children in establishing a slow speech rate (Runyan & Runyan, 1986). The second rule, say the word once, reduces the number of repetitions (e.g., whole-word repetition, part-word repetition, single syllable repetition). The third universal rule, say it short, was designed to decrease prolongations (Runyan & Runyan, 2007).

If airflow and/or laryngeal difficulties are present, primary rules are enforced. These rules include use speech breathing and “start Mr. voice box running smoothly.” Speech breathing, or speaking on exhaled air, is illustrated to the child (Runyan & Runyan, 2007). In addition, children are taught to begin vocal fold movement smoothly, also referred to as easy onset (Bennett, 2006; Schwartz, 1999; Zebrowski & Kelly, 2002).

Lastly, when concomitant behaviors are present, two additional, secondary, rules are implemented: “Touch the speech-helpers lightly” and use only the “speech-helpers” to talk. The “speech-helpers” (e.g., tongue, lips, teeth) are depicted using cartoon characters. Children are taught to “touch the speech-helpers lightly” because if they close the articulators too tight, they will stop speech breathing, and speech production will cease (Runyan & Runyan, 2007).

Runyan and Runyan (1985) pilot tested the FRP in a public school on 9 children who stuttered (3–7 years of age) to determine its efficacy in a public school setting in school-age children. The results indicated, as per the Stuttering Severity Instrument—3rd Edition (SSI–3; Riley, 1972), that the frequency of stuttering, as well as the severity of the blocks, decreased. Additionally, the children remained fluent 1–2 years after treatment.

Comprehensive Stuttering Program for School-Age Children

Attitudinal and emotional aspects of stuttering and overt stuttering are addressed with the Comprehensive Stuttering Program for School-Age Children (CSP-SC; Boberg & Kully, 1985). The CSP targets four main goals: speech-related goals, attitudinal-emotional goals, self-management goals, and environmental goals. Teaching fluency enhancement skills, addressing attitudes and emotions, and incorporating the family into therapy address the targeted goals (Langevin, Kully, & Ross-Harold, 2007).

Speech-related goals are achieved by teaching fluency enhancing skills in various environments with normal rate and prosody, managing residual stuttering, and improving communication skills (Langevin et al., 2007). Fluency enhancing skills include prolongations, easy breathing, gentle starts, smooth blending, light touches, and tension modification. Feelings, attitudes, and emotions are addressed as well. Attitudinal-emotional goals include creating positive attitudes toward communication; comfort with fluency enhancing skills; comfort with stuttering; and ability to manage fear and anxiety, recognize relapse, and improve social skills (Langevin et al., 2007).

Self-management goals include problem-solving techniques, self-monitoring, self-evaluation, and the ability to manage the environment. Lastly, environmental goals target parental understanding of the disorder. Environmental goals include the etiology and development of stuttering, how to
deliver therapy, and how to deal with relapse (Langevin et al., 2007).

**Regulated Breathing**

Regulated breathing is designed to help individuals who stutter become aware of their stuttering moments. Using this technique, the SLP teaches the client to interrupt or prevent the occurrence of stuttering by completing responses that involve regulating airflow during speech. The technique includes awareness training, relaxation training, motivational training, and generalization training (Watson & Skinner, 2004). Researchers have shown that regulated breathing is an effective technique for increasing fluency in both children and adults. Reports regarding regulated breathing have indicated a decrease in stuttering without a reduction in speech rate (Andrews & Tanner, 1982; Ladouceur et al., 1982; Woods & Twohig, 2000).

Ladouceur et al. (1982), as well as Andrews and Tanner (1982), replicated the study done by Azrin and Nunn (1974) on the treatment of stuttering using regulated breathing training. The authors repeated the study for various reasons, including the various methodological limitations of the study, the lack of a definition of stuttering, and the fact that the measures of stuttering were based solely on self-reported estimates. Furthermore, Andrews and Tanner stated that no other accounts of the efficacy of the treatment method had been published.

**Self-Modeling**

Self-modeling has been described in the literature as self-as-a-model (Hosford, 1981) and as self-observation (McCurdy & Shapiro, 1988; Shear & Shapiro, 1993). Self-modeling includes training an individual using self-exposure of error-free behaviors to promote change (Webber, Packman, & Onslow, 2004). Dowrick (1999) defined self-modeling as an intervention approach in which the individual views a 2- to 4-min edited videotape of him- or herself engaging in exemplary behaviors. Through self-modeling, an individual learns the target behavior by observing him- or herself engaging in positive behaviors from prerecorded and pre-edited videotapes (Murphy, 2001).

According to Dowrick (1999), individuals can learn by observing their own behaviors. The efficacy of self-modeling has been reported to be successful: Meharg and Woltersdorf (1990) reviewed 27 articles, all of which indicated positive outcomes using the treatment method. Furthermore, Bray and Kehle (1996) found a reduction in stuttering and maintenance of treatment gains using self-modeling for the 3 students involved in their study. Bray and Kehle (2001) examined the long-term effects of self-modeling over 2 and 4 years of treatment. The authors found that the study participants’ fluency was maintained for the two periods under investigation. Webber et al. (2004) investigated whether their aims could be attributed to the watching of self-modeling videotapes. The authors found that self-modeling can reduce stuttering; however, they suggest incorporating the technique into other treatment methods.

There are several limitations to this intervention approach. First, it may be difficult to edit an acceptable behavior(s) into or out of the videotape to indicate the target behavior(s). In addition, the actual editing of the videotape is difficult, and the equipment may be expensive (Clark & Kehle, 1992). Second, the child’s interpretation of the behavior may not be in accordance with the clinician’s interpretation of the behavior (Clark & Kehle, 1992). Last, the client’s age and cognitive capacity need to be taken into account because the videotapes represent a behavior that will appear in the future. The child may or may not be able to self-reflect on his or her own abilities (Clark & Kehle, 1992).

**Synergistic Stuttering Therapy**

Bloom and Cooperman (1999) developed the Synergistic Model of Intervention with children who stutter. This model accounts for the integration of the physiological or speech-language factors (e.g., respiration, voice, articulation, and hearing), attitudes and feeling components, and communication environment (e.g., social and pragmatic influences of communication and family influences). The “treatment principles of the synergistic approach are based on the same principles that relate to normal speech production” (Bloom & Cooperman, 1999, p. 117). Bloom and Cooperman stressed the importance of teaching the mechanics of normal speech production so that clients could learn about the general processes of respiration, phonation, and articulation using visual devices. They then use various activities to help the client increase his or her awareness about the stuttering moment. Afterward, the client is taught the respiratory, phonatory, and articulatory targets of normal speech production. The treatment principles for the speech-language factors encompass using the target skills during four phases: identification phase, modification and establishment phase, stabilization phase, and transfer and maintenance phase. Bloom and Cooperman indicated that feelings and attitudes encompass three main areas: self-esteem, locus of control, and assertiveness. The last main domain is environmental aspect of the stuttering.

**Implications for the Treatment of Preschool Children Who Stutter**

For children younger than 6 years, response-contingent approaches (e.g., Martin, Kuhl, & Haroldson, 1972) to treating stuttering were most effective (Bothe et al., 2006). Response-contingency approaches may be delivered immediately after a stuttering moment or as part of a structural performance-contingent maintenance program (R. J. Ingham, 1980). Martin et al. (1972) achieved near zero stuttering in the home by using response contingencies in therapy. The authors shut the light on the puppet stage for 10 s contingent on stuttering for two preschool boys. Reed and Godden (1977) provided the verbal contingency “slow down” and found a dramatic decrease in the percentage of words stuttered. Onslow, Costa, and Rue (1990) found that verbal contingencies provided by parents reduced the frequency of stuttering as well.
CONCLUSION

In developing a treatment program for children who stutter, one must consider many variables and decide on an appropriate outcome measure: The measures should include both overt and covert behaviors. Bennett (2006) has written about the ABCs of stuttering, which include affective, behavioral, and cognitive components of stuttering. A treatment program should integrate all of these aspects of the disorder. For these reasons, the clinician’s task consists of choosing a well-developed, evidence-based assessment instrument that meets the client’s needs and goals.

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REFERENCES


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