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Outcomes of a Combined Mindfulness, Stuttering Modification, and Fluency Shaping Intervention for Children who Stutter

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by

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ABSTRACT

A week-long intervention for five school-age children who stutter was implemented using techniques of fluency shaping, stuttering management, and mindfulness training. The purpose of this study was to investigate if children who stutter stuttered less frequently, stuttered with less struggle, and demonstrated changes in mindfulness measures after the completion of this week-long intervention. Pre- to post-treatment measures were analyzed by individual and group-level results. A comparative analysis between reading and narrative tasks was also performed. Findings indicate that three out of five children reduced the total number of disfluencies during the reading task, and two children reduced this total during the narrative task. Four out of five children decreased the level of struggle in both tasks. Two children improved their overall mindfulness scores; however, additional changes in sub-divisions of mindfulness varied by participant. As a group, the total number of disfluencies decreased during the reading task, while the total number of disfluencies did not change from pre- to post-treatment measures during the narrative task. The group demonstrated improvements in mindfulness in the areas of communication attitudes, cognitive reappraisal, and expressive suppression. A comparison between reading and narrative tasks suggest that performance on these tasks approximated to one another by the end of the treatment. The results of this study should be interpreted with caution as this was a pilot study with clinical limitations; however, future studies are necessary to verify and support these findings.

INTRODUCTION

Historically, speech-language pathologists have implemented a variety of intervention approaches for treating stuttering in adults and children. For children, approaches include using principles of positive and negative reinforcement in a program that uses a gradual increase in length and complexity of utterances (GILCU), delayed auditory feedback, speech motor training and electromygraphy (Nye et al., 2013). Additionally, two principle approaches for treating stuttering in older children and adults include fluency shaping and stuttering management (Bothe et al., 2006; Nye et al., 2013, Ryan & Ryan, 1983). Fluency shaping aims to elicit fluent speech to prevent moments of stuttering, while stuttering management promotes calm, effortless reactions to stuttering (Prins & Ingham, 2009). A hybrid approach of these two methods aims to reduce the number of disfluencies and reduce tension and effort during speech production (Prins & Ingham, 2009). Although these are two widely-used treatment methods, to date there is limited evidence to support their efficacy (Bothe et al., 2006).

In addition, while fluency shaping and stuttering management aim to modify speech production, there is also evidence that social, emotional, and cognitive factors contribute to stuttering persistence and, thus, should be addressed, too (Jones et al., 2014). As such, clinicians sometimes incorporate supplemental forms of treatment to enrich "traditional" interventions (e.g., stuttering modification and fluency shaping). These may include habit-reversal programs (de Kinkelder & Boelens, 1998), breathing regulation (Conelea et al., 2006), cognitive-behavioral therapy (Koc, 2010; Blood, 1995) and pragmatic development (Weiss, 2004).

Mindfulness training has also been proposed as a method for augmenting traditional intervention for stuttering (Boyle, 2011). Mindfulness is generally operationalized as "…paying attention in a particular way: on purpose, in the present moment, and non-judgmentally" (Kabat-Zinn, 1994, p. 4). Mindfulness requires individuals to think about and acknowledge internal and external stimuli as well as their thoughts and feelings in response to such circumstances. According to Boyle (2011), training to enhance mindfulness can help to shape communication attitudes, metacognitive awareness (self-monitoring ability) and emotional regulation in people who stutter.

Despite Boyle's claim that mindfulness training can support positive outcomes in therapy for stuttering, no published research directly supports this idea, although some elements of mindfulness training have made their way into stuttering intervention research to date. For example, breathing regulation, which requires individuals to focus their attention on their breath, when used with children, has yielded clinically significant reductions in the percentage of syllables stuttered and improved perceptions of speech (Gagnon & Ladouceur, 1992). Additionally, habit-reversal treatment which targets awareness training, breathing regulation, and positive reinforcement to reduce unfavorable behaviors, is associated with less frequent moments of stuttering, improved naturalness of speech, and increased speech rates in treatment sessions, at home, and at school (de Kinkelder & Boelens, 1998). These results tentatively suggest that at least some aspects of mindfulness may foster positive outcomes in treatment for stuttering.

The aim of this thesis is to investigate the relationship of mindfulness abilities and performance in an intensive stuttering management and fluency shaping program for school-aged children who stutter. The following section will briefly summarize epidemiological findings and quality-of-life impacts related to childhood stuttering. Next, current approaches to the treatment of childhood stuttering and their limitations will be discussed. Finally,

clinical applications of mindfulness training in relation to childhood stuttering and propose a preliminary intervention that includes a mindfulness component will be reviewed. Results of this project will have implications for informing diagnostic and treatment approaches for stuttering in school-age children.

Epidemiology of Childhood Stuttering, Factors in Persistence and Impact

The prevalence of stuttering is approximately 1% of the population with a childhood incidence rate ranging from ~5% to 8% (Yairi & Ambrose, 2013). Prevalence reflects the number of cases present within a population, while incidence reflects the number of new cases that have developed in a given time. A period of natural recovery may occur during childhood. Natural recovery refers to the phenomenon of recovery without treatment (Yairi & Seery, 2011) which may be due external circumstances such as receiving feedback from parents (Ingham, 1976; Ingham & Cordes, 1998). Using statistical deduction, an indirect rate of recovery from stuttering can be conservatively calculated at 80% with a persistency rate of 20% (Yairi & Ambrose, 2013). In other words, for every 100 children who stutter, 80 of them will recovery spontaneously, while 20 children will continue to stutter.

A comparison of five recent studies that investigated onset in preschool children determined the average age of onset of stuttering is 33 months old, which is about 6 months younger than previous studies reported (Yairi & Ambrose, 2013). Yairi & Ambrose (2005) found that 95% of children began to stutter before 4 years old. An increase in sudden onset has been reported by parents; studies now report that sudden onset occurs in 40%-50% of children who stutter (Yairi & Ambrose, 2005; Reilly et al., 2009). In regard to gender, it is widely accepted that there are a greater number of adult males than females who stutter, producing a 4 to 1 ratio (Bloodstein, 1995), although the gender distribution of stuttering in children is two boys for every girl (Yairi & Ambrose, 2005).

With a considerably high natural recovery rate, one may question why stuttering persists in some children while many others recover without intervention. There are numerous hypotheses that outline various factors that contribute to this mystery. One relates to genetic factors in stuttering. Numerous twin studies found higher concordance rates for stuttering in monozygotic twins than in dizygotic twins (Ooki, 2005; Dworzynski et al., 2007; van Beijsterveldt, Felsenfeld, and Boomsma, 2010). Additionally, Yairi & Ambrose (2005) reported that family history plays a role in predicting which children will persist and which will recover. In this study, 88% of children whose stuttering persisted had a family history of stuttering in comparison to the 65% of children who recovered. Researchers have made progress in genetic mapping to identify genes that are associated to stuttering (Wittke-Thompson et al., 2007; Kang et al., 2010); however, further investigation and replication studies are necessary to determine the reliability of these findings.

In addition to genetic factors, Walden et al. (2012) proposed a diathesis-stress model to examine the relationship of temperament and emotion with stuttering persistence. According to their model, every child has predispositions and individual differences in their emotional reactivity (i.e., diathesis) and when faced with an interruption of equilibrium (i.e., stressor), these stressors may activate a reaction within the child that becomes psychopathological. In the case of individuals who stutter, stress may exacerbate disruptions in the coordination of fluent speech production. According to Walden et al. (2012), children with diatheses consisting of greater negative reactivity and lower emotional regulation are typically associated with more frequent moments of stuttering. Conversely, children with stronger emotional regulation skills tend to stutter less, signifying that tempered emotional reactions to stuttering can play a role in recovery (Walden et al., 2012). Based on this model, children whose stuttering persists are likely to have a profile defined by a combination of negative reactivity and reduced emotional regulation.

The apparent association of temperament, emotional reactivity, and emotional regulation with persistent stuttering in children is of particular relevance to this project. Temperament, as defined by Jones et al. (2014), is an individual's inclination to react to emotionally arousing situations (i.e., emotional reactivity) and how one maintains and manages such reactions (i.e., emotional regulation), which may be unconscious processes. Using caregiver rating scales, behavioral observations, and psychophysiological measures, Jones et al. (2014) found that preschool children who stutter tend to be emotionally more reactive, have more negativity in their emotions, and have higher anger and frustration approaches and motor activation in comparison with preschool children who do not stutter. Preschool children who stutter may also demonstrate poorer ability to shift attention, receive poorer ratings of attention by their caregivers, and are less successful at ignoring background stimuli. They may also be less likely to adapt to their environment, regulate emotions or attention, and control their inhibitions. Additionally, disfluencies tend to increase when these same children experience a positive emotional encounter, utilize regulatory strategies at a lower duration and frequency, and exhibit higher emotional reactivity with low emotional regulation. Moments of stuttering decreased during tasks involving attention on non-speech tasks (Jones et al., 2014).

While disfluent speech is not typically considered to be a life-threatening condition, individuals who stutter often report having reduced quality of life (Craig et al., 2009) which can lead to more serious concerns. During the child and adolescent years, individuals who stutter are more likely to be victims of bullying (Blood & Blood, 2004) and have lower academic performance (O'Brien et al., 2011). In adulthood, stuttering can lead to negative evaluations in the workplace (Brecker-Katz, Lincoln, & Cumming, 2013) or avoidance of positions that require strong communication skills (MacAllister, Collier, & Shepstone, 2012). As the severity of one's stuttering increases, so does the risk of having poor emotional

functioning as an adult (Craig, Blumgart, & Tran, 2009). Heightened anxiety may be associated with stuttering due to negative impacts stuttering can have on one's qualify of life (Iverach & Rapee, 2014). Even worse, there have been incidences of suicide with adults who stutter (Cocoran & Stewart, 1998). Because of these concerns, it seems important to address stuttering and its impacts in childhood as effectively as possible.

Current Approaches to the Treatment of Childhood Stuttering

As mentioned previously, two primary approaches to the treatment of persistent stuttering in older children and adults are stuttering management and fluency shaping. Stuttering management (or stuttering modification) aims to change the way an individual produces disfluent speech and replaces it with more relaxed and favorable speech (Yairi & Seery, 2011). To do this, the following techniques are taught and practiced in therapy:

- Stuttering exposure – Clients are asked to stutter openly while maintaining eye contact with listeners. As part of this exercise, secondary behaviors of stuttering are identified and systematically eliminated with the aim of exposing "raw" stuttering. Secondary behaviors may include any gross motor behaviors, fine motor behaviors, breath stream/laryngeal behaviors and verbal behaviors that individuals may use to escape from or limited the presence of stuttering.
- Desensitization – As secondary behaviors are eliminated and clients become more comfortable with stuttering openly, they are asked to do this with unfamiliar listeners. The aim of this task is to foster "acceptance of stuttering" (i.e. willingness to experience stuttering) by desensitizing one's internal reactions to stuttering and to listener reactions to stuttering.
- Stuttering easily – As clients become increasingly comfortable stuttering openly, they may be encouraged to modify their moments of stuttering. Typically, older children and adults will stutter with increased levels of muscle tension and a

tendency to “rush through” stuttering which can lead to rapid and irregular repetitions, audible prolongations (frozen articulatory postures with audible air flow or voicing) or silent blocks (frozen articulatory postures without audible air flow or voicing). Clients are encouraged to stutter with less tension, greater range of motion in the articulators, and without a tendency to “rush through” stuttering, with the aim of reducing struggle reactions to stuttering.

- Anatomy of the mouth – Clients are taught basic anatomy of the speech mechanism, using age-appropriate labels for major landmarks including the lips, teeth, tongue tip, tongue body, alveolar ridge (or “gum ridge”), hard palate, soft palate, larynx (“voice box”), and nose. Anatomy is learned to at least 90% accuracy.
- Phonetics – Clients also learn that every speech sound has a manner, placement, and voicing feature. Phonetic knowledge is also learned to at least 90% accuracy.
- Post-block corrections - With post-block corrections (also called “cancelations”), the individual pauses after a moment of stuttering, dissects the moment of stuttering, determines the lack of movement in the speech mechanism, and makes a second attempt at the word with greater control. This is accomplished by beginning the speech attempt with a neutral mouth position (“schwa” position), initiating the first sound of the word and transitioning to the second sound very slowly using articulatory gestures without any “snappy movements”, making “feather light” articulatory contacts, and initiating voicing “easily” by proprioceptively “buzzing on” the larynx. Auditory monitoring is usually deemphasized in post-block corrections.
- In-block corrections – In-block corrections (also called “pullouts”) involve stabilizing stuttering mid-word, again by dissecting the moment of stuttering,

figuring out the lack of movement, stabilizing the mechanism (e.g. reducing muscle tension, locating the articulators correctly, establishing appropriate air or sound flow), and making an exaggerated phonetic transition out of the moment of stuttering.

In a hybrid stuttering management/fluency shaping program, the therapy transitions into fluency shaping by teaching pre-block corrections (also known as "preparatory sets" or "pre-determined speech"). With pre-block corrections, the client initiates and transitions through a word without any stuttering. This is accomplished by instructing the client to utilize a post-block modification without stuttering first. In other words, the client initiates a word beginning with a neutral position (mouth postured in "schwa" position), transitions into the first sound and to the second sound without any snappy articulatory movements, using feather-light articulatory touches, and proprioceptively "buzzing on" the voice where appropriate. Again, auditory self-monitoring is discouraged (i.e. clients are instructed to "turn off your ears"), and proprioceptive monitoring is encouraged. The client is typically also required to mentally-rehearse pre-block corrections before initiating them. Initially, pre-block corrections are done at a one-word level, with clients self-evaluating their performance on each attempt. Upon mastering one-word pre-block corrections, utterance length is expanded to two-word utterances, three-word utterances and so forth. As longer utterances are used, clients are instructed to shorten the pre-block correction at the beginning of each utterance, and to focus on "highlighting" between words (i.e. maintaining forward movement in transitioning between words using gestures without any snappy movements, using feather-light articulations and often using continuous voicing).

Fluency shaping therapy is punctuated with lessons about using naturalness to enhance speech; that is, using prosody to emphasize certain words, particularly when using slower speech rates. Clients typically learn a range of slow-normal speech rates (e.g., 120 words per

minute, 130, 140 and 150 WPM). Clients also learn to identify emotional stressors, and to "gear down" (use a slower speech rate) when stress is heightened while "gearing up" (using a faster speech rate) when stress is reduced.

To date, there are limited studies that reflect the effectiveness of stuttering management with children. In a meta-analysis of intervention studies for stuttering, Bothe et al. (2006) identifies one study (Ryan & Ryan, 1983) using stuttering modification techniques that meets their inclusion criteria of a reduction of stuttering in post-treatment measures of 5% or less or 50% less than pre-treatment measures. Ryan & Ryan (1983) used a stuttering management intervention requiring children to use Stuttering Easy, Post-Block Corrections and In-Block Corrections when producing reading, monologue, and conversational language samples. For their small sample of four children, the number of stuttered words per minute resulted in a decrease of 90 percent while the number of words spoken per minute increased by 14 percent. Similar findings were reported for generalization of skills in natural speech samples. In a question-and-answer style interaction, the number of stuttered words per minute decreased by 83 percent; the number of words spoken per minute increased by 14 percent. In speech samples at school or in the home, rates of stuttered words per minutes decreased by 45-47 percent and the rates of words spoken per minute increased by 15-22 percent. These findings indicate that a stuttering management program can reduce the overall number of disfluencies and increase the rate and naturalness of speech in children.

There have been other studies investigating stuttering management efficacy since the publication of Bothe et al.'s article in 2006. One was an intensive stuttering management program for children and adolescents by Laiho & Klippi (2007). In this study, the authors reported positive findings after an intensive program for 21 children and adolescents, ages 6-14 years old. The authors divided the participants into two groups based on age; the children's group consisted of the participants who were 6 to 10 years old, while participants

who were 11 to 14 years old comprised the adolescents' group. The children's group met for 14 days consisting of 35 ½ hours of therapy and the adolescents' group met for 18 days consisting of 52 ½ hours of therapy. The groups met for a total of 2 ½ to 3 hours per day. The treatment incorporated speech proprioception, desensitization through the use of pseudostuttering, and self-monitoring activities to analyze moments of disfluency using techniques of cancellations, pull-outs, and preparatory sets. Results of this study show that the percentage of syllables stuttered decreased in 66% of participants (n= 14), stayed the same for 19% of participants (n= 4), and slightly increased in 14% of participants (n= 3). Additionally, avoidance behaviors also decreased by 27% from pre- to post- treatment measures. The changes within each type of disfluency were also reported: Repetitions decreased by 30%, prolongations increased by 13%, and blocks increased by 58%. Avoidance behavior, struggle, and muscle tension decreased by ~30% in each area.

In contrast to stuttering management, fluency shaping aims to elicit fluent speech (Yairi & Seery, 2011). As described previously, fluency shaping encourages a new manner of speaking in which the client uses predetermined speech with highlighting and variable rate to reduce moments of stuttering. These strategies produce smooth speech which may sound unnatural in the beginning of treatment. However, as therapy progresses, clients work towards using more natural-sounding speech. Fluency shaping does not address negative attitudes or feelings associated with stuttering, but it operates under the assumption that the negative behaviors will diminish once fluency is improved.

Fluency shaping is commonly used with school-aged children. In the meta-analysis by Bothe et al. (2006), thirteen studies using fluency shaping techniques were identified that met the same criteria previously mentioned. Of those studies, four incorporated fluency shaping with children. Two studies using fluency shaping techniques were conducted by Ryan & Ryan (1983, 1995). In both studies, prolonged speech was incorporated with delayed

auditory feedback. Both studies showed favorable results: A reduction in moments of disfluency and an improvement in speech rate amongst child participants. A drawback noted of this method was that skills were not successfully transferred as well as in other programs such as gradual increase in length and complexity of utterances (GILCU). These findings concur with those of an earlier study which also implemented fluency shaping through the use of delayed auditory feedback (Turnbaugh & Guitar, 1981).

Another study using fluency shaping techniques in treatment is the work of Craig and colleagues (1996). In this study, 97 children and young adolescents, ages 9-14 years old, were divided into four treatment groups: Intensive smooth speech, home-based smooth speech, electromyography (EMG) feedback, and control groups. The use of smooth speech included the use of controlled airflow, gentle articulatory contacts, phrasing, and pauses with increasing speech rates. In the home-based smooth speech program, parents provided therapeutic feedback, while the intensive smooth speech model did not involve parent participation. The treatment using EMG feedback focused on muscle control and technological feedback from a computer. Results of fluency measures immediately after therapy across all treatment groups indicated improved rates of fluency with slight increases of disfluency at 3- and 12- months post treatment. However these increases were not found to be statistically significant. Follow-up measures taken one year after treatment showed that children in the intensive smooth speech group had improved by 68% and those in the home-based smooth speech group improved by 70%, suggesting significant gains after one year. Further, the participants improved their speech rate and naturalness, even when the amount of disfluencies increased over time.

Finally, there have been studies that have combined both stuttering management and fluency shaping as its clinical intervention. Druce, Debney, and Byrt, (1997) conducted a one-week intensive program for 15 children, ages 6-8 years old, which involved elements of

stuttering management (e.g. identifying bumps in their speech) and fluency shaping (e.g. using "sleepy" speech) previously described in earlier sections. Follow-up visits and repeated measures continued for 3 months after the conclusion of treatment. After the third follow up visit, the percentage of syllables stuttered decreased in 14 of 15 children through 18 months post-treatment, suggesting positive long-term maintenance of skills. Similar trends were reported for ratings of speech naturalness and severity. The percentage of syllables stuttered slowly increased over the months following treatment. Druce et al. (1997) suggest that continued maintenance therapy is necessary for children who stutter.

A more recent publication of combined stuttering management and fluency shaping intervention is a single case study by Daniels (2012). The participant was a 10 year old boy with familial history of stuttering and who had previously received treatment. The approach to treatment incorporated various components such as acknowledging that stuttering is acceptable and meeting other individuals who stutter. However, components most relevant to the current study included education of stuttering and speech production, techniques to overcome self-defeating thoughts and feelings about difficult speaking situations, and stuttering management and fluency shaping techniques to modify speech such as psuedostuttering, easy onsets, light articulations, cancellations, and pull-outs. After one semester of treatment, the participant's scores on the Stuttering Severity Instrument- Fourth Edition (SSI-4) showed that the frequency of stuttering decreased while measures of duration and physical concomitants stayed the same. Although the participant's severity rating was rated as very mild, the clinician continued therapy to address the participant's negative thoughts about his speech. The participant's post-treatment fluency results were consistent after the second and third semesters of therapy. Results of the Communications Attitude Test-Revised (CAT-R) showed improved attitudes and feelings towards his speech. The third semester of treatment was shorted to only 6 weeks and served as a maintenance period.

Consistent results after the third semester warranted dismissal from therapy. While the results of this case study are favorable, Daniels (2012) concludes that stuttering management and fluency shaping alone are not sufficient to improve negative attitudes towards one's speech and suggests that speech fluency outcomes should not be the only criteria that warrant treatment discharge.

There were several limitations noted when providing stuttering management and fluency shaping interventions for children. Most commonly reported was the lengthy amount of time to complete stuttering management programs (Ryan & Ryan, 1983; Daniels, 2012). Additionally, Laitho & Klippi (2007) report that children have limited awareness which can limit treatment progress, although other studies contradict this claim (Boey et al., 2009). Boey et al. (2009) states that about 56% of children as young as two years old have a sense of awareness of speech and fluency and awareness increases with age. According to this study, nearly 90% of seven year old children are self-aware. Druce, Debney, & Byrt (1997) indicate that children require continued support for long term maintenance of skills; further, follow up visits were offered in just about all of the studies that were reported in this section. Lastly, it is widely accepted that treatment for stuttering should also address negative attitudes and feelings about one's speech. However, a curriculum or program outlining how to directly address such thoughts and feelings has not been described in the previously summarized literature.

Applications of Mindfulness Training as a Therapeutic Method

As previously discussed, some researchers have proposed that a comprehensive approach to treatment of stuttering should address concerns relating to socio-emotional factors including emotional regulation and temperament (Bothe et al., 2006; Walden et al., 2012). Utilizing methods such as stuttering management and/or fluency shaping alone does

not target these concerns. One augmentative program to supplement the traditional approach is the use of mindfulness training. Mindfulness is most often defined as, "…paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally" (Kabat-Zinn, 1994, p.4). Further, Kabat-Zinn clarifies that mindfulness through practice of meditation does not require one to block out thoughts, but instead, it involves "seeing things clearly, and deliberately positioning yourself differently in relationship to them" (Kabat-Zinn, 1994, p. 65). The origins of mindfulness date back thousands of years and is rooted in principles of Buddhism (Kabat-Zinn, 1994).

The challenge of mindfulness is striving for acceptance. Acceptance, a key component of mindfulness training, is the piece of the mindfulness puzzle that enables an individual to think about experiences in a nonjudgmental way, seeking curiosity and full awareness of a given moment (Germer, 2005). During our exploration of mindfulness-based training, the authors of the current study have dissected mindfulness into three areas that promote acceptance. These include communication attitude, emotional regulation, and metacognitive awareness.

CommunicationAattitude: Attitudes relate to the thoughts or representations that are developed through one's experiences and influence behavior (Breckler & Wiggins, 1989). Communication attitude, therefore, reflects an individual's thoughts regarding the way he or she speaks and interacts with others. When an individual practices mindfulness, the goal is to achieve a neutral or arguably optimistic attitude, in the case about one's communication, favoring a "glass half full" mentality.

Emotional Regulation: Emotional regulation involves one's ability to manage and control the frequency, intensity, and extent of diverse feelings (Thompson, 1994). Through mindfulness training, an individual recognizes his or her feelings as they are and resists

reacting negatively to them. Gullone & Taffe (2011) identify two strategies within emotional regulation. First, cognitive reappraisal is operationalized as thinking about a situation that might be emotionally provoking in another way. Individuals who use this strategy redefine situations with a more optimistic perspective. Second, expressive suppression relates to one's inhibition of emotions. In theory, if children suppress their emotions, they limit the positive emotions in their experiences (John & Gross, 2004).

Metacognitive Awareness: Finally, metacognitive awareness involves the ability to reflect upon and understand the cognitive processes in which one learns (Schraw & Dennison, 1994). In mindful activities, individuals tap into their metacognitive awareness through exploration of their thought processes that lead to their conclusions or decisions.

For individuals who stutter, acceptance becomes an integral part of the therapeutic process. For example, an individual may feel upset, frustrated, embarrassed, or angry when he or she experiences disfluent speech. First, the individual acknowledges these feelings (i.e., regulates his/her emotion) and behaviors in which these feelings influence (i.e., addresses attitudes). Next, the individual should identify what lead to these emotions or behaviors (i.e., becoming metacognitively aware). Instead of associating the experience of stuttering with negative feelings, thinking mindfully would inspire a thought process similar to: "I stuttered. I sounded disfluent, but that's okay, because I can correct myself and continue speaking." Nowhere in this example is there an opportunity for feelings of negativity to consume the individual. Instead, the moment of disfluency is acknowledged and thought about in a nonjudgmental or neutral way, and the individual chooses to simply move on.

The integration of mindfulness as a therapeutic strategy is not a novel idea. Mindfulness has been used in a variety of therapies to treat individuals with behavioral health disorders including depression, anxiety, and post-traumatic stress disorder (Batten et al.,

2005). Dialectical Behavior Therapy, Mindfulness-Based Stress Reduction, Mindfulness-Based Cognitive Behavioral Therapy, Acceptance and Commitment Therapy are some of the approaches that use mindfulness to counsel and treat individuals with such behavioral health concerns (Corey, 2008). Mindfulness has been used in other disciplines such as oncology treatment (Mackenzie et al., 2007) and family social work education (Berceti & Napoli, 2006). These programs have been implemented with individuals across the lifespan from preschoolers to older adults (Flook et al., 2015; Foulk et al., 2014). Overall, results from mindful-based programs suggest positive gains. For example, mindfulness training shows increases of self-regulation skills and prosocial behavior in preschool-aged children (Flook et al., 2015).

Mindfulness programs have also made their way from clinical applications to educational-based programs in schools. Schonert-Reichl and colleagues (2015) implemented a mindfulness based program for 4th and 5th graders. The results of their program concluded that there was an increase in students' empathy, perspective-taking skills, emotional control, optimism, school self-concept, and overall mindfulness. Additionally, self-reported symptoms of depression and peer-rated aggression decreased after the program and the students were perceived by their peers to exhibit more prosocial behaviors, thus resulting in an increase in peer acceptance.

These results of mindfulness training programs suggest favorable outcomes across a variety of settings and populations. Boyle (2011) identified mindfulness-based training as a beneficial therapeutic strategy for individuals who stutter because it reduces avoidance behaviors and increases emotional regulation, acceptance, attention, and proprioceptive awareness which are crucial for long-term maintenance skills for individuals who stutter. However, there has yet to be any research investigating Boyle's recommendations to integrate mindfulness training with treatment for stuttering until the present study.

Summary and Aims of the Current Study

While it is established that children who stutter can benefit from treatment, there are many mysteries that remain including reliable and consistent outcomes of interventions. Stuttering management and fluency shaping are two approaches that have been used to treat children who stutter. Currently, the literature provides a limited number of studies that support the efficacy of these methods.

In the current study, principles and techniques of stuttering management and fluency shaping were combined in a one-week intensive program for children. In addition to these intervention techniques, lessons from a mindfulness-based curriculum were also incorporated into the treatment. Based on this design, we aim to investigate whether children who stutter a) stutter less frequently following therapy (within and between modalities); b) stutter with less struggle following therapy (within and between modalities); c) improve mindfulness in regards to attitudes, emotional regulation, and metacognitive awareness.

METHODS

Participants

Five children ranging in age from 9 to 11 years old enrolled in the week-long program. These children previously received evaluations and/or participated in therapy at the University of South Florida Speech-Language-Hearing Clinic prior to beginning the intensive program. Participants were four boys and one girl from the greater Tampa Bay area. No history of co-occurring cognitive, developmental, or other speech/language impairment were reported. Figure 2.1 represents each participant in terms of age, grade level, and gender.

Table 2.1: Demographics of Participants

Participant	Age	Grade Level	Gender
Participant 1	9 years old	3rd	Male
Participant 2	10 years old	5th	Male
Participant 3	10 years old	4th	Female
Participant 4	11 years old	6th	Male
Participant 5	9 years old	3rd	Male

Materials

Materials for Eliciting Speech: Speech samples were collected from each participant and scored to measure the frequency and type of stuttering produced. A grade-appropriate reading passage and a narrative story retelling were used to measure the children's fluency during literacy and spontaneous language tasks. The Dynamic Indicators of Basic Early Literacy Skills 6th Edition (DIBELS, Good & Kaminski, 2007) are standardized reading passages that were used for the reading samples. Because the program occurred just a few weeks after

the school year concluded, the children were given reading passages based on the grade they recently completed. The children were given the passage to briefly skim so they could ask for clarification if they came across an unfamiliar word.

To elicit a spontaneous narrative language sample, the children told the story of a wordless picture book from the series, "A Boy, a Dog, and a Frog" by Mercer Meyer (2003). The children reviewed the story independently before providing their narrative response. They were also given a graphic organizer from the Story Grammar Marker program (MindWing Concepts, Inc., 2015) to help them retell the story if needed. These measures were taken four times over the course of the program: prior to beginning the program (pre), after the first day, after the third day, and at the completion of the fifth day (post).

Mindfulness Surveys: In addition to the language samples for speech analysis, four self-reported surveys were used to measure various aspects of mindfulness assessing overall mindfulness, communication attitude, emotional regulation, and metacognitive awareness. The scales for these measures may be found in the appendix of this manuscript. Each survey was administered prior to and at the completion of the program.

The Child and Adolescent Mindfulness Measure (CAMM; Greco, Baer, & Smith, 2011) is a standardized assessment for children 9-11 years old and was used as an overall mindfulness assessment. Using a Likert scale, the children rated their responses as never true, rarely true, sometimes true, often true, or always true. This scale aims to measure non-avoidant and nonjudgmental response to thoughts, feelings, and awareness.

The Communication Attitudes Test-Revised (CAT-R; Grutten, 1985) assesses a child's attitude towards his or her oral communication abilities. The 35 true or false questions on this survey directly relate to the child's fluency and ask the child to compare his or her speech to other children.

The Emotional Regulation Questionnaire for Children and Adolescents (ERQ-CA; Gullone & Taffe, 2011) assesses cognitive reappraisal and expressive suppression, resulting in two scores. The cognitive reappraisal score (ERQ-CR) aims to measure one's ability to change his/her perspective on a situation or an experience. The expressive suppression score (ERQ-ES) aims to measure one's inhibition of emotional expression.

The Junior Metacognitive Awareness Inventory (Jr. MAI; Sperling, Howard, Miller, & Murphy, 2002) was designed to assess metacognitive skills in children. Also using a Likert scale, the children were asked to reflect on their experiences at home and school and rate how often statements related to them using the terms never, seldom/rarely, sometimes, often/frequently, or always.

Intervention Program Procedures

The children participated in a 3-hour group session each day over the course of one week (Monday-Friday). The focus of the treatment was to provide stuttering management and fluency shaping techniques (Manning, 2008) with supplemental lessons in mindfulness training using the MindUP curriculum (The Hawn Foundation, 2011). The program began with introducing elements of stuttering management including stuttering openly, talking about acceptance of stuttering, and reducing secondary behaviors, and learning post-block, in-block, and pre-block modification. As the week progressed, the children were introduced to fluency shaping techniques such as easy onsets, gentle movements of the articulators, and natural speech. Mindfulness lessons included learning about the decision making areas of the brain, mindful breathing exercises, mindful awareness by engaging the five senses, perspective taking, and optimism. A full schedule of specific lessons and topics can be found in Figure 2.2.

Table 2.2: Schedule of Treatment Lessons and Measures

	Pre	Day 1	Day 2	Day 3	Day 4	Day 5
Stuttering Management and Fluency Shaping Lessons	No intervention	Introduction to stuttering, anatomy & physiology of speech production, stuttering openly, acceptance of stuttering	Review anatomy & physiology, stuttering openly, acceptance of stuttering, reducing secondary behaviors	Stuttering openly, acceptance of stuttering, post-block modification, in-block modification	Review of post- and in-block modification, pre-block modification	Introduction to naturalness, review of post-, in-, and pre-block modification, acceptance of stuttering
Mindfulness Training (MindUP Curriculum, 2011)	No intervention	MindUP Lesson 1: Getting Focused (Areas of the Brain) MindUP Lesson 3: Mindful Breathing	MindUP Lesson 2: Mindful Awareness	MindUP Lesson 10: Perspective Taking	MindUP Lesson 11: Choosing Optimism	Review of mindfulness lessons
Measures	**Language Samples:** Reading passage and story narrative **Mindfulness Measures:** CAMM, CAT-R, ERQ-CR, ERQ-ES, Jr. MAI	**Language Samples:** Reading passage and story narrative	No measures	**Language Samples:** Reading passage and story narrative	No measures	**Language Samples:** Reading passage and story narrative **Mindfulness Measures:** CAMM, CAT-R, ERQ-CR, ERQ-ES, Jr. MAI

Fluency Assessment Procedures

To score the language samples, the researchers used the Lidcombe Behavioral Data Language Scoring of Stuttering (LBDL; Bryant & Packman, 1999), a taxonomy used to describe defining characteristics of stuttering. This system accounts for repetitions of complete syllables, incomplete syllables, and multiple syllables; fixed postures with audible or inaudible airflow; and superfluous verbal and nonverbal behaviors. Together, both researchers analyzed each language sample and collectively determined the total number of moments of disfluency for all samples across all participants. The categorization of disfluencies and examples are listed in figure 2.3.

Table 2.3: Lidcombe Behavioral Language Data Scoring of Stuttering

Type of Disfluency	Example
Syllable Repetitions	"Where…where…where's the ball?"
Incomplete Syllable Repetitions	"I went to S…S…Sydney."
Multisyllabic Syllable Repetitions	"It's a…It's a… It's a great day."
Fixed Posture with Audible Airflow	"FFFFFFFFishy gone!"
Fixed Posture without Audible Airflow	"I.. (no sound)… bought."
Superfluous Verbal Behaviors	"I went—oh well—oh well—I went over."
Superfluous Nonverbal Behaviors	Tics, grimacing, eye movements

In addition to the seven types of disfluency outlined in the LBLD scoring system, researchers also measured the amount of struggle that the participants exhibited in each sample, totaling to eight characteristics of stuttering. Struggle as defined in this study was identified any "trick" or verbal or nonverbal behavior that occurred at the same time as another type of disfluency. The co-occurrence of these behaviors suggest that the participant anticipated a moment of disfluency and tried to avoid the stutter by using a "trick."

Analysis

The stuttering frequency measures were analyzed in three steps, as follows:

1) Results for each participant were summarized separately for each symptom of disfluency and for each of the self-reported mindfulness measures.
2) The frequency counts for each of the eight coded symptoms of stuttering were submitted to a Friedman's ANOVA (Friedman, 1937). Statistically significant ANOVAs were followed-up with pairwise Wilcoxon t-tests (Wilcoxon, 1945) comparing the frequency of stuttering pre-intervention versus at each of the other three measurement points (Day 1, Day 3, and Day 5, respectively). Non-parametric statistics were used as they are more appropriate for data sets with smaller sample

sizes that also violate assumptions required by parametric statistics (Mack & Skillings, 1980).

3) Finally, a potential complication of the analysis between the pre- to post-treatment measures lead to concerns with the reliability of a single pre-intervention baseline. Typically, the pre-stimulus baseline would be used as the reference point for later performance in the intervention (Timler & Bourgeois, in press). Moreover, there would typically be multiple baseline measurement points against which to compare later performance (Pustejovsky, Hedge, & Shadish, 2014). However, limited availability to participants before the intervention began prevented us from taking more than one baseline measure. Furthermore, it has been noted that even multiple baseline measures in stuttering can be limited in reliability due to the highly variable nature of stuttering manifestation over time (Timler & Bourgeois, in press). As an alternative, in this third analysis, we chose to compare stuttering frequencies between two different speaking modes: reading a passage aloud and narrating a story from a wordless picture book. As a general rule, children who stutter tend to stutter less when reading aloud than when producing speech spontaneously and reading aloud can serve as a predictive factor of spontaneous speech if the passage is at grade level or one grade below the child's current grade (Blood & Hood, 1978). One explanation is that whereas narration requires language generation in addition to speech motor control, reading aloud involves primarily orthographic-to-phonological translation and speech motor execution. An additional advantage of this approach is that any subject-driven variability in stuttering should be present in both reading and narration on any given day. That is, if, on Day 1, a child is having a bad day, this would be reflected in both speech modes recorded on that day. On Day 3, this

same child may be enjoying a wonderful day, which would also be reflected in both speech modes. Comparing between days might not be appropriate due to the high levels of variability. In order to investigate for group-level differences in intervention outcomes, frequency counts were again submitted to a Freidman's ANOVA (Friedman, 1937), separately for each disfluency type. When a statistically significant ANOVA result was detected, Wilcoxon t-tests (Wilcoxon, 1945) were carried out to investigate the presence of pairwise differences, specifically between narrative and reading performance on each day. In general, the expectation was that, by the end of the treatment, the frequency of stuttering in narration would more closely approximate to that in reading. In other words, as the child learned to manage fluency more effectively in narrative mode nearing the end of the intervention.

Finally, in order to test for changes in self-reported mindfulness, scores on each of five mindfulness scales (CAMM, ERQ-Cognitive Reappraisal subtest, ERQ-Expressive Suppression subtest, MAI and CAT) were compared pre- versus post-intervention using the Wilcoxon t-test.

RESULTS

Descriptive Results for Each Participant

The frequency of each of the eight disfluency symptoms and scores of the mindfulness surveys are shown separately for each child on each day and in each speech mode in Tables 3.1 through 3.5. The following system is used to represent changes in mindfulness measures: ☺ indicates a positive, desirable change, ☹ indicates a negative, undesirable change, and 😐 indicates that no change occurred.

By post-treatment measures, Participant 1 increased the total number of disfluencies in both the reading and narrative tasks. He produced mostly fixed postures without audible airflow and verbal and nonverbal superfluous behaviors. His level of struggle, however, was reduced in both modes. His overall mindfulness score did not improve. Scores relating to attitude, expressive suppression, and metacognitive awareness also did not indicate improvements. His score relating to cognitive reappraisal was the only mindfulness area that increased from pre- to post- treatment measures.

Participant 2 reduced the total number of disfluencies in both the reading and narrative tasks at post-treatment measures. He produced the greatest total number of disfluencies of all five participants, and he frequently exhibited superfluous verbal and nonverbal behavior primarily in the narrative task, however these symptoms decreased by post-treatment measures. His level of struggle decreased at post-treatment measures for both modes as well. His overall mindfulness score did not improve, however his scores relating to attitude, cognitive reappraisal, and expressive suppression showed positive gains. His metacognitive awareness maintained the same score at post-treatment measures.

At post-treatment measures, Participant 3 reduced the total number of disfluencies in the reading task, however the number of disfluencies increased in the narrative task. She primarily exhibited incomplete syllable repetitions in both the reading and narrative tasks. Her level of struggle decreased in the reading task and maintained at the same level during the narrative task. Her score on the CAMM, used as an overall mindfulness measure, improved. The additional measures indicate that her emotional suppression and metacognitive awareness improved while her cognitive reappraisal score was consistent from pre to post measures. Her scores on the CAT-R indicate that her attitude did not improve.

Participant 4 reduced the total number of disfluencies in the narrative task, but not in the reading task at the collection of post-treatment measures. Collectively across modes, he produced mostly fixed postures and verbal and nonverbal superfluous behaviors. The amount of struggle increased during the reading task and maintained at the same level during the narrative task. His score on the CAMM indicates that his overall mindfulness measures improved. His attitude, cognitive reappraisal, emotional suppression and metacognitive awareness also improved, showing favorable gains in all mindfulness areas.

Participant 5 reduced the total number of disfluencies in the reading task, but increased the number of disfluencies in the narrative task. While he produced the least total amount of disfluencies of all five participants, the primary disfluent symptom in his speech is the use of verbal superfluous behaviors. The level of struggle was maintained in both modes from pre to post measures. His scores of overall mindfulness and metacognitive awareness did not improve, however scores relating to attitude, cognitive reappraisal, and expressive suppression indicate improvements in these areas.

Table 3.1: Results of Disfluency and Mindfulness Measures- Participant 1

Reading Task	Pre	Day 1	Day 3	Post	Results (Pre to Post)
Total # of Disfluencies	11	13	16	16	Increased
Syllable Reps	0	0	0	0	Maintained
Incomplete Syllable Reps	3	1	0	4	Increased
Multisyllabic Syllabic Reps	0	0	2	1	Increased
With Audible Airflow	0	1	1	0	Maintained
Without Audible Airflow	4	8	10	7	Increased
Verbal Behaviors	0	2	1	2	Increased
Nonverbal Behaviors	4	1	2	2	Decreased
Struggle	3	1	2	1	Decreased
Narrative Task	Pre	Day 1	Day 3	Post	Results (Pre to Post)
Total # of Disfluencies	21	16	31	23	Increased
Syllable Reps	3	1	3	5	Increased
Incomplete Syllable Reps	4	6	10	2	Decreased
Multisyllabic Syllabic Reps	3	1	1	1	Decreased
With Audible Airflow	1	0	0	0	Decreased
Without Audible Airflow	4	2	7	4	Maintained
Verbal Behaviors	4	3	3	6	Increased
Nonverbal Behaviors	2	3	7	5	Increased
Struggle	2	6	8	0	Decreased
Mindfulness Surveys	Pre Score	Post Score	Results		
CAMM	20	18	Overall mindfulness worsened		☹
CAT-R	6	7	Attitude worsened		☹
ERQ-CA	17	20	Cognitive reappraisal improved		☺
ERQ-ES	10	14	Expressive suppression worsened		☹
Jr. MAI	26	20	Metacognitive awareness worsened		☹

Table 3.2: Results of Disfluency and Mindfulness Measures- Participant 2

Reading Task	Pre	Day 1	Day 3	Post	Results (Pre to Post)
Total # of Disfluencies	15	7	13	5	Decreased
Syllable Reps	1	0	1	2	Increased
Incomplete Syllable Reps	1	2	3	3	Increased
Multisyllabic Syllabic Reps	2	2	0	0	Decreased
With Audible Airflow	4	0	1	0	Decreased
Without Audible Airflow	4	3	4	0	Decreased
Verbal Behaviors	1	0	2	0	Decreased
Nonverbal Behaviors	2	0	2	0	Decreased
Struggle	2	0	2	0	Decreased
Narrative Task	Pre	Day 1	Day 3	Post	Results (Pre to Post)
Total # of Disfluencies	38	44	36	23	Decreased
Syllable Reps	4	4	1	2	Decreased
Incomplete Syllable Reps	2	3	3	3	Increased
Multisyllabic Syllabic Reps	4	3	3	3	Decreased
With Audible Airflow	0	0	0	0	Maintained
Without Audible Airflow	4	2	0	2	Decreased
Verbal Behaviors	13	13	15	11	Decreased
Nonverbal Behaviors	11	21	14	2	Decreased
Struggle	11	15	11	3	Decreased
Mindfulness Surveys	Pre Score	Post Score	Results		
CAMM	26	23	Overall mindfulness worsened		☹
CAT-R	12	7	Attitude improved		☺
ERQ-CA	17	20	Cognitive reappraisal improved		☺
ERQ-ES	13	10	Expressive suppression improved		☺
Jr. MAI	32	32	Metacognitive awareness maintained		😐

Table 3.3: Results of Disfluency and Mindfulness Measures- Participant 3

Reading Task	Pre	Day 1	Day 3	Post	Results (Pre to Post)
Total # of Disfluencies	12	9	5	8	Decreased
Syllable Reps	2	1	1	1	Decreased
Incomplete Syllable Reps	0	3	1	3	Increased
Multisyllabic Syllabic Reps	2	0	1	2	Maintained
With Audible Airflow	0	1	1	1	Increased
Without Audible Airflow	3	3	0	1	Decreased
Verbal Behaviors	0	0	1	0	Maintained
Nonverbal Behaviors	5	1	0	0	Decreased
Struggle	4	0	0	0	Decreased
Narrative Task	Pre	Day 1	Day 3	Post	Results (Pre to Post)
Total # of Disfluencies	10	16	6	13	Increased
Syllable Reps	5	4	2	4	Decreased
Incomplete Syllable Reps	2	5	2	6	Increased
Multisyllabic Syllabic Reps	0	3	1	1	Increased
With Audible Airflow	0	1	0	1	Increased
Without Audible Airflow	0	0	0	0	Maintained
Verbal Behaviors	3	2	0	1	Decreased
Nonverbal Behaviors	0	1	1	0	Maintained
Struggle	0	1	1	0	Maintained
Mindfulness Surveys	Pre Score	Post Score	Results		
CAMM	24	30	Overall mindfulness improved		☺
CAT-R	9	14	Attitude worsened		☹
ERQ-CA	19	19	Cognitive reappraisal maintained		😐
ERQ-ES	12	11	Expressive suppression improved		☺
Jr. MAI	29	30	Metacognitive awareness improved		☺

Table 3.4: Results of Disfluency and Mindfulness Measures- Participant 4

Reading Task	Pre	Day 1	Day 3	Post	Results (Pre to Post)
Total # of Disfluencies	5	2	6	18	Increased
Syllable Reps	0	0	1	2	Increased
Incomplete Syllable Reps	0	0	1	3	Increased
Multisyllabic Syllabic Reps	2	1	3	1	Decreased
With Audible Airflow	1	0	0	3	Increased
Without Audible Airflow	0	1	0	4	Increased
Verbal Behaviors	0	0	0	1	Increased
Nonverbal Behaviors	2	0	1	4	Increased
Struggle	1	0	1	2	Increased
Narrative Task	Pre	Day 1	Day 3	Post	Results (Pre to Post)
Total # of Disfluencies	12	12	15	9	Decreased
Syllable Reps	0	0	1	0	Maintained
Incomplete Syllable Reps	0	2	0	0	Maintained
Multisyllabic Syllabic Reps	1	1	0	1	Maintained
With Audible Airflow	1	1	0	0	Decreased
Without Audible Airflow	3	2	4	3	Maintained
Verbal Behaviors	0	0	1	2	Increased
Nonverbal Behaviors	7	6	9	3	Decreased
Struggle	2	3	2	2	Maintained

Mindfulness Surveys	Pre Score	Post Score	Results	
CAMM	24	30	Overall mindfulness improved	☺
CAT-R	13	10	Attitude improved	☺
ERQ-CA	18	24	Cognitive reappraisal improved	☺
ERQ-ES	12	11	Expressive suppression improved	☺
Jr. MAI	57	61	Metacognitive awareness improved	☺

Table 3.5: Results of Disfluency and Mindfulness Measures- Participant 5

Reading Task	Pre	Day 1	Day 3	Post	Results (Pre to Post)
Total # of Disfluencies	5	3	3	2	Decreased
Syllable Reps	2	0	1	0	Decreased
Incomplete Syllable Reps	0	1	0	1	Increased
Multisyllabic Syllabic Reps	2	1	1	0	Decreased
With Audible Airflow	0	0	0	0	Maintained
Without Audible Airflow	0	0	1	0	Maintained
Verbal Behaviors	1	0	0	1	Maintained
Nonverbal Behaviors	0	1	0	0	Maintained
Struggle	0	1	0	0	Maintained
Narrative Task	Pre	Day 1	Day 3	Post	Results (Pre to Post)
Total # of Disfluencies	5	9	4	6	Increased
Syllable Reps	0	1	0	2	Increased
Incomplete Syllable Reps	0	0	2	0	Maintained
Multisyllabic Syllabic Reps	0	3	0	1	Increased
With Audible Airflow	0	0	0	0	Maintained
Without Audible Airflow	0	0	1	0	Maintained
Verbal Behaviors	5	2	1	3	Decreased
Nonverbal Behaviors	0	3	0	0	Maintained
Struggle	0	2	0	0	Maintained
Mindfulness Surveys	Pre Score	Post Score	Results		
CAMM	32	25	Overall mindfulness worsened		☹
CAT-R	12	5	Attitude improved		☺
ERQ-CA	8	26	Cognitive reappraisal improved		☺
ERQ-ES	16	12	Expressive suppression improved		☺
Jr. MAI	28	27	Metacognitive awareness worsened		☹

Group-Level Comparison of Performance Over Time: Pre- versus Monday, Wednesday and Friday

The average frequency of each of the eight disfluency symptoms and mindfulness surveys are shown at a group-level for each day and in each speech mode in Table 3.6. A box shaded in dark gray indicates a statistically significant change where $p < 0.5$, while a light gray box indicates change with trending significance where $p = 0.6$ or 0.7.

Table 3.6: Group Average Frequency (and Standard Deviation) of Each of the Eight Disfluency Symptoms, Separately for Each Day, in Each Speech Mode

Reading Task	Pre	Day 1	Day 3	Post	Results (Pre to Post)
Total # of Disfluencies	9.6 (3.1)	5.8 (3.2)	6.8 (3.7)	7.8 (4.4)	Decreased
Syllable Reps	1 (0.9)	0.2 (0.4)	0.8 (0.4)	1 (0.9)	Maintained
Incomplete Syllable Reps	0.8 (1.2)	1.4 (1)	1 (1.1)	2.8 (1)	Increased
Multisyllabic Syllabic Reps	1.6 (0.8)	0.8 (0.7)	1.4 (1)	0.8 (0.7)	Maintained
With Audible Airflow	1 (1.5)	0.4 (0.5)	0.6 (0.5)	0.8 (1.2)	Maintained
Without Audible Airflow	2.2 (1.8)	3 (2.8)	3 (3.8)	2.4 (2.7)	Maintained
Verbal Behaviors	0.4 (0.5)	0.4 (0.8)	0.8 (0.7)	0.8 (0.7)	Maintained
Nonverbal Behaviors	2.6 (1.7)	0.6 (0.5)	1 (0.9)	1.2 (1.6)	Decreased
Struggle	2 (1.4)	0.4 (0.5)	1 (0.9)	0.6 (0.8)	Decreased
Narrative Task	Pre	Day 1	Day 3	Post	Results (Pre to Post)
Total # of Disfluencies	8.2 (5.6)	8.6 (3.2)	8.2 (6.5)	8.2 (3.9)	Maintained
Syllable Reps	2.4 (2.1)	2 (1.7)	1.4 (1)	2.6 (1.7)	Maintained
Incomplete Syllable Reps	1.6 (1.5)	3.2 (2.1)	3.4 (3.4)	2.2 (2.2)	Maintained
Multisyllabic Syllabic Reps	1.6 (1.6)	2.2 (1)	1 (1.1)	1.4 (0.8)	Maintained
With Audible Airflow	0.4 (0.5)	0.4 (0.5)	0 (0)	0.2 (0.4)	Maintained
Without Audible Airflow	2.2 (1.8)	0.8 (1)	2.4 (2.7)	1.8 (1.6)	Maintained
Verbal Behaviors	5 (4.3)	4 (4.6)	4 (5.6)	4.6 (3.6)	Maintained
Nonverbal Behaviors	4 (4.3)	6.8 (7.3)	6.2 (5.2)	2 (1.9)	Decreased
Struggle	3 (4.1)	5.4 (5.1)	4.4 (4.3)	1 (1.3)	Decreased

As shown in Table 3.6, significant results of Friedman tests were found for incomplete syllable repetitions, which increased by post-treatment measures, and struggle, which decreased. Results of incomplete syllable repetitions and nonverbal superfluous behaviors indicate trending results. Finally, null results were reported for total number of disfluencies, syllable repetitions, multisyllabic syllable repetitions, fixed postures with audible airflow, fixed postures without audible airflow, and verbal superfluous behaviors.

Alternative Group-Level Comparison of Performance Over Time: Reading versus Narration

Finally, Table 3.7 demonstrates the group-level trends of statistical significance from pre- to post- treatment measures by each disfluency type between modes. A box shaded in dark gray indicates a statistically significant change where $p < 0.5$, while a light gray box indicates change with trending significance where $p = 0.6$.

Table 3.7 reveals significant results of Friedman tests for the total number of disfluencies, verbal superfluous behaviors, and struggle. Results of verbal superfluous behaviors, nonverbal superfluous behaviors, and struggle indicate trending results. Null results were reported for syllable repetitions, incomplete syllable repetitions, multisyllabic syllable repetitions, fixed postures with audible airflow, and fixed postures without audible airflow.

Table 3.7: Group-Level Statistically Significant Trends of Each Disfluency Type from Pre- to Post- Treatment Measures between Modes

Reading Task	Pre	Day 1	Day 3	Post	Results (Pre to Post)
Total # of Disfluencies	9.6 (3.1)	5.8 (3.2)	6.8 (3.7)	7.8 (4.4)	Decreased
Syllable Reps	1 (0.9)	0.2 (0.4)	0.8 (0.4)	1 (0.9)	Maintained
Incomplete Syllable Reps	0.8 (1.2)	1.4 (1)	1 (1.1)	2.8 (1)	Increased
Multisyllabic Syllabic Reps	1.6 (0.8)	0.8 (0.7)	1.4 (1)	0.8 (0.7)	Maintained
With Audible Airflow	1 (1.5)	0.4 (0.5)	0.6 (0.5)	0.8 (1.2)	Maintained
Without Audible Airflow	2.2 (1.8)	3 (2.8)	3 (3.8)	2.4 (2.7)	Maintained
Verbal Behaviors	0.4 (0.5)	0.4 (0.8)	0.8 (0.7)	0.8 (0.7)	Maintained
Nonverbal Behaviors	2.6 (1.7)	0.6 (0.5)	1 (0.9)	1.2 (1.6)	Decreased
Struggle	2 (1.4)	0.4 (0.5)	1 (0.9)	0.6 (0.8)	Decreased
Narrative Task	Pre	Day 1	Day 3	Post	Results (Pre to Post)
Total # of Disfluencies	8.2 (5.6)	8.6 (3.2)	8.2 (6.5)	8.2 (3.9)	Maintained
Syllable Reps	2.4 (2.1)	2 (1.7)	1.4 (1)	2.6 (1.7)	Maintained
Incomplete Syllable Reps	1.6 (1.5)	3.2 (2.1)	3.4 (3.4)	2.2 (2.2)	Maintained
Multisyllabic Syllabic Reps	1.6 (1.6)	2.2 (1)	1 (1.1)	1.4 (0.8)	Maintained
With Audible Airflow	0.4 (0.5)	0.4 (0.5)	0 (0)	0.2 (0.4)	Maintained
Without Audible Airflow	2.2 (1.8)	0.8 (1)	2.4 (2.7)	1.8 (1.6)	Maintained
Verbal Behaviors	5 (4.3)	4 (4.6)	4 (5.6)	4.6 (3.6)	Maintained
Nonverbal Behaviors	4 (4.3)	6.8 (7.3)	6.2 (5.2)	2 (1.9)	Decreased
Struggle	3 (4.1)	5.4 (5.1)	4.4 (4.3)	1 (1.3)	Decreased

Pre- versus Post-Intervention Comparisons of Self-Reported Mindfulness Measures

As shown in Table 3.8, scores for some self-reported mindfulness scales remained relatively stable pre- to post-intervention, while others exhibited some change. The following system is used to represent changes in mindfulness measures: ☺ indicates a positive, desirable change, ☹ indicates a negative, undesirable change, and 😐 indicates that no change occurred. However, Wilcoxon t-tests detected no significant changes in scores on any of the five tests ($p > .05$), suggesting no hearty changes in mindfulness abilities at a group-level.

Table 3.8: Group average (and standard deviation) of mindfulness survey scores

Mindfulness Surveys				
	Pre Score	Post Score	Results	
CAMM	25.2 (3.9)	25.2 (4.5)	Overall mindfulness did not change	😐
CAT-R	10.4 (2.6)	8.6 (3.1)	Attitude improved	☺
ERQ-CR	17 (4.9)	22 (2.6)	Cognitive reappraisal improved	☺
ERQ-ES	12.6 (2)	11.6 (1.4)	Expressive suppression improved	☺
Jr. MAI	34.4 (11.5)	34 (14.1)	Metacognitive awareness did not change	😐

DISCUSSION

A review of the current literature reveals lacking evidence in the efficacy of treatment options for children who stutter. Stuttering management and fluency shaping, as well as a combination of the two methods, are frequently used in treatment for individuals who stutter. However, there are limited studies that demonstrate their effectiveness, especially when used with children. While it is widely accepted that treatment for children who stutter should consist of a component to address emotions and quality of life concerns, many interventions fail to provide specific direction as to how clinicians can implement such goals in therapy.

The current study investigated a combined stuttering management and fluency shaping approach in conjunction with mindfulness training designed as a one-week intensive model to treat children who stutter. The purpose of this study was to investigate whether children who stutter a) stutter with less struggle following therapy (within modality and between modalities); b) stutter less frequently following therapy (within and between modality); c) improve mindfulness in regards to attitudes, emotional regulation, and metacognitive awareness.

Group-Level Impacts on Stuttering Behaviors: A Traditional Pre- versus Post- Comparison

In a group of 5 children, ages 9-11 years old, some overall group-level trends from pre- to post-treatment measures were observed. In the reading task, the group decreased the number of total disfluencies, nonverbal superfluous behaviors, and amount of struggle and maintained the number of disfluencies of syllable repetitions, multisyllabic repetitions, fixed

postures with and without audible airflow, and verbal superfluous behaviors. The amount of incomplete syllable repetitions increased. On the narrative task, group-level results indicate a decreased amount of nonverbal superfluous behaviors and amount of struggle. As a group, the participants did not change the total overall number of disfluencies, syllable repetitions, incomplete syllable repetitions, multisyllabic repetitions, fixed postures with and without audible airflow, and verbal superfluous behaviors. Because a primary emphasis of treatment was placed on stuttering openly, the authors hypothesized that the results would show several increases in disfluency types. Only one type, incomplete syllable repetitions, actually increased in one mode. Across both modes, 27.7 percent (n= 5) of the disfluency types decreased, showing favorable improvements in fluency. About 66.6 percent of the types (n= 12) showed no change and only 5.5 percent of disfluency types (n= 1) increased by post-treatment measures.

As other researchers of fluency have already identified, it is quite difficult to compare treatment results with those of related published studies due to inconsistency in measurements (Andrews et al., 1980; Conture & Guitar, 1993; Druce, Debney, & Byrt, 1997). Thus the following review of the literature in comparison to current findings may not be a side by side comparison. However, related findings and conclusions are discussed.

While the reduction of total number disfluencies were not largely significant compared with other intervention studies using stuttering management (Ryan & Ryan, 1983), fluency shaping (Craig et al., 1996), or combination of stuttering management and fluency shaping (Druce, Debney, & Byrt, 1997), the current study's pre- to post- treatment results demonstrated an 18.75 percent decrease in total number of disfluencies during the reading task while no difference was observed in total number of disfluency types for the narrative task. Ryan & Ryan (1983) reported an 83 percent decrease in disfluency during a question-and-answer speech task following stuttering management treatment, thus the current results

do not meet a similar reduction in disfluency for a spontaneous language task. Another stuttering management treatment study by Laiho & Klippi (2007) included a 14-day treatment model which yielded a 27 percent reduction in struggle from pre- to post-treatment measures. The current study reports a 70 percent and 66 percent reduction in struggle in reading and narrative tasks respectively, yet the current approach occurred in half the time of Laiho & Klippi's program. While the current treatment model reduced the level of struggle within one week, one may consider the impact of the mindfulness based training might have made on the level of struggle in such a short amount of time. Replicated control studies are necessary to warrant this conclusion of the mindfulness training's impact on reduction of struggle.

The current model of treatment bears a similarity to the treatment of Druce, Debney, & Byrt (1997). Using a combined stuttering management and fluency shaping approach, Druce and colleagues established a one-week intensive program for children ranging in age from 6-8 years old. Druce et al. identified improvements in short-term and long-term outcomes including reduced stuttering severity and improved naturalness with some increase in these measures during the follow-up measures. While the treatment method did not focus on addressing communication attitudes, emotions, or metacognitive awareness, the current study yielded similar gains in the reading task as well as addressing these secondary concerns relating to the children's overall emotional well-being.

In Daniels' (2012) more recent case study of a 10 year old boy who stutters, after one semester of stuttering management and fluency shaping, the participant's stuttering severity decreased, however there was no change in duration and level of struggle. While a stuttering severity score was not collected for the participants in the current study, group-level results show a decrease in number of total disfluencies for the reading task and no change in the narrative task. However, in both modes, the level of struggle was reduced by the end of one

week. While Daniels (2012) acknowledges that negative thoughts relating to the participant's speech were addressed, he does not provide details as to how the clinician targeted these feelings. The current study provides a curriculum and specific lessons to address the emotional component often related to stuttering. As Daniels (2012) concludes, stuttering management and fluency shaping do not improve negative attitudes towards one's speech, thus the proposed treatment in the current study serves as a viable alternative to address negative feelings associated with stuttering.

Group-Level Impacts on Stuttering Behaviors: A Novel Reading versus Narrative Comparison

In addition to the traditional comparison of pre- versus post- treatment measures, the study also investigated the difference of number of disfluencies in reading and narrative tasks. As discussed previously, obtaining a true baseline for fluency in children who stutter is a difficult task and can be misrepresenting of a child's true level of disfluency. The work of Blood & Hood (1978) suggest an alternative to the traditional approach to measure levels of fluency: a comparison between reading and narrative tasks. According to Blood & Hood, reading tasks often approximate the level of stuttering in a narrative task, so this model was also adopted for the current study.

The limitation of using this method is that there are very few studies that have also adopted this model. Armson & Stuart (1998) utilized this comparison between reading and narrative tasks in a treatment using frequent auditory feedback with 12 adults who stutter. Their results yielded no group-level statistically significant results in the total number of disfluencies. Further, this study did not find any differences between reading and narrative tasks, contrasting Blood & Hood's study (1978). In regards to the current study, results of Friedman tests indicate significant changes in the total number of disfluencies, verbal superfluous behaviors, and level of struggle. Results of verbal superfluous behaviors,

nonverbal superfluous behaviors, and struggle yield trending results. While more research is necessary to determine the validity of this untraditional, between modes approach, the results of the current study concurs with Blood & Hood's study that suggested reading can approximate narrative language samples in children, as supported by the current statistical significant group-level findings.

Individual Differences and Impacts of Stuttering Behaviors

Many clinicians who treat children who stutter will agree that intervention for fluency disorders is not a "one size fits all" approach. Consequently, clinicians must be prepared to treat children who stutter dynamically and flexibly (Yaruss, 2002). There have also been efforts to identify subtypes of stuttering, which recognizes that not all individuals who stutter present with the same qualities (Trautman, Healey, & Norris, 2001; Yairi, 2007; Seery et al., 2007). Therefore, a look at the current results on an individual basis seems warranted.

Participant 1: Upon first glance, Participant 1 appears to have made no progress in improving his overall number of disfluencies in both the reading and narrative tasks. However, as other clinicians have indicated, successful outcomes of treatment should not solely be determined based on stuttering severity (Daniels, 2012). Participant 1 did show a decrease in his level of struggle by the end of the treatment across both modes. The multidimensional treatment described in this study aimed not only to reduce the total number of disfluencies, but to also reduce the amount of struggle. It should be noted that Participant 1 is the youngest of all participants and, when compared to Participant 5 who is in the same grade, Participant 1 was subjectively considered to have a more severe level of stuttering.

Participant 2: By post-treatment measures, Participant 2 decreased the number of total disfluencies in the reading task by 66.6 percent and decreased the number of

disfluencies by 39.4 percent in the narrative task. Additionally, a considerable decrease in the amount of struggle was observed. Participant 2 demonstrated the greatest amount of nonverbal superfluous behaviors and greatest level of struggle throughout the week amongst all participants. However, by the end of the week, nonverbal superfluous behaviors decreased by 81.8 percent in reading and level of struggle reduced by 72.7 percent in the narrative task.

Participant 3: Participant 3 showed mixed results in the pre- to post-treatment measures in both reading and narrative tasks. In the reading task, the total number of disfluencies decreased by 33 percent, while the total number of disfluencies increased by 30 percent in the narrative task. Struggle improved by 100 percent in the reading task. However, Participant 3 demonstrated only 2 accounts of struggle in the narrative task across the four days of measures and the pre- to post-treatment measures did not report any signs of struggle.

Participant 4: While Participant 4 demonstrated favorable gains in all 5 areas of mindfulness, his progress on reducing the total number of disfluencies was not as successful. On the reading task, Participant 4 demonstrated only 5 moments of disfluency during pre-treatment measures. By post-treatment measures, the total number of disfluencies soared to 18, demonstrating a 260 percent increase. In the more spontaneous language sample during the narrative task, Participant 4 demonstrated a reduction of total number of disfluencies by 25 percent. While Participant 4 reduced his level of struggle by 100% in the reading task, his level of struggle during the narrative task stayed the same. One explanation as to why Participant 4 incurred a huge increase in number of disfluencies in the reading task is that he was becoming more aware of his stuttering behaviors, as his mindfulness survey scores indicate. During a reading task, the words an individual is supposed to say is printed on paper and his listener knows what he is expected to say. Thus, it is harder to switch words or escape a more challenging word when there is a written and expected script. His performance may

reflect this awareness and his willingness to stutter openly which was also targeted throughout the week.

Participant 5: Participant 5 was subjectively rated by both examiners to have the least severe level of stuttering amongst all participants. Participant 5 exhibited a decrease in stuttering in the reading task by 60 percent. However, the number of disfluencies increased by 20 percent in the narrative task. Although Participant 5 was one of the youngest children in the group, he demonstrated the fewest number of disfluencies and amount of struggle.

These individual findings are quite varied, but each child showed improvements in their fluency in different ways. Some children reduced the total amount of disfluencies in two modes of speech; others indicate reduced amount of struggle; and further, some showed reductions in both frequency of fluency and amount of struggle. As much of the literature of fluency intervention suggest, each child will respond to treatment in a different way, and the current study supports this claim of contrasted results. The outcomes of treatment results vary depending on the individual, considering his or her characteristics of disfluency, learning styles, specific needs, and other external factors.

Group-Level and Individual Impacts on Mindfulness Factors

Although there have been several indications that treatment for children who stutter should incorporate an emotional regulation and awareness component, there have yet to be any systematic investigations that include mindfulness training as part of the intervention design for childhood stuttering. Other supplemental therapies such as habit reversal therapy (Azrin & Nunn, 1978; Ladouceur & Martineau, 1982; Wagaman, Miltenberger, & Arndorfer, 1993) and cognitive behavioral therapy do share similar qualities with mindfulness training (e.g. developing a sense of awareness and focusing on one's breath) and have been utilized

with children who stutter. These studies typically show favorable results in decreasing number of disfluencies, improving naturalness of speech, and increasing awareness.

In a case study by Murphy, Yaruss, & Quesal (2007), a 9 year old boy participated in a program that incorporated elements of stuttering management and fluency shaping augmented by cognitive behavioral therapy. Results of this study report a decrease in disfluency, stuttering severity, and concern about stuttering and increased his communication attitudes.

The results of the current study present similar findings. Four out of five subjects improved their attitude towards their communication (CAT-R), cognitive reappraisal (ERQ-CR), and expressive suppression (ERQ-ES), suggesting that attitude and emotional regulation are likely to be the first domains of mindfulness to show an improvement with this combination of treatment. Subjects 3 and 4 improved their overall mindfulness (CAMM) and metacognitive awareness (Jr. MAI). No other subject improved in either of these domains, suggesting that in order to improve mindfulness, a child must also achieve an improvement in his/her metacognitive awareness. Subject 2 maintained his level of metacognitive awareness, but his overall mindfulness score did not increase, thus supporting this theory that a change in metacognitive awareness concurs or leads to a change in overall mindfulness.

Subject 4 demonstrated improvements in all five mindfulness domains and demonstrated an increase in number of disfluencies in the reading task (pre to post), but decreased the number of disfluencies in the narrative task (pre to post). This finding suggests that children who achieve improvements in mindfulness, attitudes towards communication, cognitive reappraisal, expressive suppression, and metacognitive awareness may be more likely to stutter during a structured task such as reading which involve expectations from the listener, yet they may be less likely to stutter during natural speaking tasks such as a story

narrative. Additionally, Subject 4 was the oldest participant in the program, suggesting that age and/or grade level may affect one's ability to improve these mindfulness areas.

While there has been some disagreement as to whether children can develop self-monitoring skills and a sense of awareness (Laitho & Klippi, 2007; Boey et al., 2009), the results of this study suggest that changing elements of mindfulness, specifically communication attitudes and emotional regulation in the forms of cognitive reappraisal and expressive suppression, are possible even within a one-week's time, siding moreso with that of Boey et al. (2009). While individual changes in mindfulness and metacognitive awareness were found in two of the participants, these areas may require additional time to be consolidated in children.

Clinical Implications

The findings of this study can be applied to future treatment for children who stutter. First, this stuttering management and fluency shaping approach combined with mindfulness training can be used appropriately for older school-aged children and yield some gains in fluency especially to reduce the amount of struggle one experiences and limit the number of superfluous nonverbal behaviors associated with moments of disfluency.

Results of the proposed study are likely to be categorized into five profiles. The participants in the current study fall into 3 of these profiles. These profiles may assist in evaluating a child's prognosis in therapy. Further analysis of diagnostic implications from this treatment will be discussed in future work by Graepel (in press).

Profile 1: Children who reduced the number of disfluencies in both modes and improved overall mindfulness score. Participant 3 showed improved speech in both the reading and narrative task as well as improved her overall mindfulness score. She

demonstrated gains in overall mindfulness, expressive suppression, and metacognitive awareness. At the end of the treatment, she did not improve her scores relating to communication attitudes and cognitive reappraisal.

Profile 2: Children who reduced the number of disfluencies in both modes and did not improve overall mindfulness scores. Participant 2 reduced his symptoms in both tasks, but he did not improve his overall mindfulness score. He also improved his communication attitude, cognitive reappraisal, and expressive suppression. Metacognitive awareness did not improve after the treatment.

Profile 3: Children who reduced the number of disfluencies in one mode and improved overall mindfulness score: Participant 4 reduced the total number of disfluencies in the narrative task, but increased the number of disfluencies in the reading task. He also presented with favorable gains in mindfulness, showing an improvements across all mindfulness measures.

Profile 4: Children who reduced the number of disfluencies in one mode, but did not improve overall mindfulness score**:** Participant 5 reduced the total number of disfluencies in the reading task, but he did not improve his overall mindfulness score. He demonstrated gains relating to his communication attitude, cognitive reappraisal, and expressive suppression.

Profile 5: Children who did not reduce the number of disfluencies in either mode and did not improve overall mindfulness score: Participant 1 did not reduce the total number of disfluencies in either mode or show an improvement in overall mindfulness. Additionally, his scores relating to attitude, expressive suppression, and metacognitive awareness do not indicate improvements. His cognitive reappraisal score improved from pre- to post- treatment measures.

Study Limitations and Future Directions

The results of the current study should be interpreted with caution, as there are several limitations to the findings of this preliminary study. First, it is widely accepted to incorporate control groups when completing an intervention study, aiming to compare the results of the proposed novel intervention model to the results of a standard approach. In the current study, a small sample size did not allow the use of a control group. The specific age group, timing during the year when the intervention was offered, as well as the schedules of the participants and their families affected the availability of current and other interested participants and is often an obstacle faced when conducting intervention studies. Given these challenges, future studies should make every effort to include a control group in its design.

Maintenance of skills is often a component of measuring post-treatment results. That is, understanding how well an individual can maintain the level of progress made in therapy is vital information for determining the efficacy of treatment. Many studies, including those reviewed prior to conducting this study, discuss long-term results and maintenance of skills. Repeated follow-up measures post-treatment determine the level of carry-over of the skills, but they could not be collected in the current study due to time and scheduling conflicts. In future studies, post-treatment measures of skill maintenance should be planned well in advanced and communicated to participants so that all individuals involved can make proper arrangements to account for follow-up measurements.

Additionally, as previously mentioned, a difficulty when it comes to intervention for stuttering is obtaining accurate baseline measures prior to treatment. Because of the variability of fluency, obtaining a true and accurate baseline is no easy task. Families and children often report having “good days” and “bad days” which suggest that a child’s fluency ebbs and flows depending on external factors. Because of this variability, the current study

used a between measures baseline model (i.e. comparing narrative language samples to a reading passage). This approach is not frequently used and the necessity for multiple baselines does not commonly pose concern in the literature. However, further investigation of the validity and reliability of this approach is encouraged. If it is a reliable method of obtain baseline data, clinicians should also measure children's literacy levels as Blood & Hood (1978) suggest that reading samples should be at grade level or one grade below. In the case of the current study, the most recent grade completed as reported by families at the time of enrollment for the study was used as the child's reading level. If a child was performing below level in reading, then the results of their narrative language sample may be impacted by a too-difficult reading passage. Thus, testing literacy would give clinicians valuable insight before starting reading-based tasks and using these measures as a baseline for narrative language samples.

Next, one may consider the level of cueing during measurements of reading and narrative samples. In the current study, the researchers did not provide any cues or prompts before or during the participants' language samples because the intent was to obtain the truest and most natural sample of their speech. This, however, leads to questions relating to the children's performance had cues been given. If cues yield more significantly and more favorable results, future investigations may explore strategies to offer effective cueing in daily functions and activities in a subtle, publically appropriate manner.

Finally, the week-long intensive model may provide benefits to the participant's fluency in reading tasks, however children may require more time to make these changes in their spontaneous language samples. Additionally, targeting overall mindfulness and metacognitive awareness may also require more than one week to experience change. Like other cases of behavioral modification, once a change has been made, maintenance of the behavior is necessary. It would be advantageous for future studies to also collect post-

treatment measures a few weeks following the treatment to determine how the skills in stuttering management and fluency shaping as well as principles of mindfulness were maintained.

Summary and Conclusions

The current study provided a unique intervention model for treating school-aged children who stutter. Through the integration of stuttering management, fluency shaping, and mindfulness training, this treatment approach demonstrated a variety of changes within reading and narrative speech samples of five participants over the course of one week. Individual results demonstrated variability in results for fluency treatment: some children improved fluency, level of struggle, components of mindfulness, or a combination of these three areas. Group-level results indicate a reduced amount of disfluencies in reading tasks and no change in pre- to post-treatment measures in the narrative task. Group-level results also show reduction in struggle in both tasks. The results of the between-modes approach demonstrated that overall number of disfluencies, nonverbal superfluous behaviors, and the amount of struggle were statistically significant and approximated reading to narrative scores. This pilot study has its limitations, and future studies are necessary to replicate and validate the current findings.

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APPENDICES

Appendix A: IRB Letter of Determination

USF
UNIVERSITY OF
SOUTH FLORIDA

RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 00001669
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX (813) 974-7091

June 17, 2015

Nathan Maxfield, PhD
Communication Sciences and Disorders
4202 East Fowler Avenue, PCD1017 Tampa, FL
33620

RE: **Expedited Approval for Initial Review**
IRB#: Pro00022118
Title: Predictors and Treatment Outcomes of a Combined Stuttering and Mindfulness Intervention in Children

Study Approval Period: 6/17/2015 to 6/17/2016

Dear Dr. Maxfield:

On 6/17/2015, the Institutional Review Board (IRB) reviewed and **APPROVED** the above application and all documents outlined below.

Approved Item(s):
Protocol Document(s):
Stuttering and Mindfulness Protocol Version #1_ 5-26-15.docx
This study involving data pertaining to children falls under 45 CFR 46.404 – Research not involving greater than minimal risk.

Consent/Assent Document(s)*:
Waiver of process granted

It was the determination of the IRB that your study qualified for expedited review which includes activities that (1) present no more than minimal risk to human subjects, and (2) involve only procedures listed in one or more of the categories outlined below. The IRB may review research through the expedited review procedure authorized by 45CFR46.110 and 21 CFR 56.110. The research proposed in this study is categorized under the following expedited review category:

(5) Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for nonresearch purposes (such as medical treatment or diagnosis).

Your study qualifies for a waiver of the requirements for the informed consent process as outlined in the federal regulations at 45CFR46.116 (d) which states that an IRB may approve a consent procedure which does not include, or which alters, some or all of the elements of informed consent, or waive the requirements to obtain informed consent provided the IRB finds and documents that (1) the research involves no more than minimal risk to the subjects; (2) the waiver or alteration will not adversely affect the rights and welfare of the subjects; (3) the research could not practicably be carried out without the waiver or alteration; and (4) whenever appropriate, the subjects will be provided with additional pertinent information after participation.

Your study qualifies for a waiver of the requirement for signed authorization as outlined in the HIPAA Privacy Rule regulations at 45CFR164.512(i) which states that an IRB may approve a

waiver or alteration of the authorization requirement provided that the following criteria are met

(1) the PHI use or disclosure involves no more than a minimal risk to the privacy of individuals; (2) the research could not practicably be conducted without the requested waiver or alteration; and (3) the research could not practicably be conducted without access to and use of the PHI.

A waiver of HIPAA Authorization is granted for this retrospective chart review of children who stutter who were treated at the University of South Florida Speech-Language-Hearing Clinic (USF-SLH Clinic) between January 1, 2012 and June 15, 2015. This waiver allows the study team or its honest broker to obtain PHI from the medical records of children in this cohort.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval by an amendment.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

Kristen Salomon, Ph.D., Vice Chairperson

USF Institutional Review Board