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USING EXPOSURE THERAPY TO TREAT PEOPLE WHO STUTTER: A MULTIPLE
BASELINE DESIGN

by

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A thesis submitted in partial fulfillment of the requirements
for the degree of Master of Science
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in the College of Sciences
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ABSTRACT

Social anxiety disorder (SAD) is a debilitating condition, and it is estimated that approximately half of adults who stutter have SAD. Thus, there is a need for the assessment and treatment of SAD in this population. Cognitive-behavioral therapy (CBT) has shown promise in decreasing anxiety symptoms among adults who stutter and have SAD, but exposure, the key ingredient for successful CBT for SAD, has been understudied and underemphasized. The aims of this study were to develop an exposure therapy protocol specifically for people who stutter and have SAD and to evaluate its efficacy for reducing anxiety and stuttering severity. Utilizing a multiple baseline design, six participants were randomized to receive zero, two, or four sessions of progressive muscle relaxation therapy. This served to establish the staggered start and to account for the common factors of therapy. All participants received ten sessions of exposure therapy. Participants recorded daily social anxiety levels, and anxiety and stuttering severity were assessed at major assessment points. All participants demonstrated substantial reductions in social anxiety and substantial improvements in the affective, behavioral, and cognitive experiences of stuttering following exposure therapy. No reliable change was observed for stuttering frequency. Results suggest that exposure therapy may be useful for people who stutter and have SAD, but will not necessarily influence their speech fluency. These findings underscore the importance of the assessment and treatment of SAD among adults who stutter and suggest that the integration of care between psychologists and speech-language pathologists may prove beneficial for this population.

To Jason, for his unending and limitless support

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LIST OF ACRONYMS/ABBREVIATIONS

%WS	Percentage of Words Stuttered
ADIS	Anxiety and Related Disorders Interview Schedule
APA	American Psychiatric Association
BAB	Behavioral Assessment Battery for Adults
BCL	Behavior Checklist
BigCAT	Communication Attitude Test for Adults
BL	Baseline
CBT	Cognitive-Behavioral Therapy
DBR	Daily Behavioral Ratings
DSM	Diagnostic and Statistical Manual of Mental Disorders
EXP	Exposure Therapy
FSS-II	Fear Survey Schedule II
M	Mean
P	Participant
PMR	Progressive Muscle Relaxation Therapy
POST	Post-Assessment
QOLI	Quality of Life Inventory
SAD	Social Anxiety Disorder
SD	Standard Deviation
SPAI	Social Phobia and Anxiety Inventory

SSC – ER	Speech Situation Checklist - Emotional Reaction
SSC – SD	Speech Situation Checklist - Speech Disruption
STAI	State-Trait Anxiety Inventory
SUDs	Subjective Units of Distress
UCF	University of Central Florida

CHAPTER 1: INTRODUCTION

1.1 Social Anxiety Disorder

Social anxiety disorder (SAD), also known as social phobia, is an anxiety disorder characterized by fear of social judgment. Situations that individuals with SAD may fear, avoid, and/or endure with distress include social interactions, being observed, and performing in front of others. In particular, individuals with SAD fear that they will be negatively evaluated. With a lifetime prevalence of approximately 12%, SAD is one of the most prevalent lifetime mental disorders, following only major depressive disorder, alcohol abuse, and specific phobia (Kessler et al., 2005).

SAD is a serious, debilitating condition. The impairment and the associated reduced quality of life are substantial (Stein & Kean, 2000). Individuals with SAD experience more scholastic difficulties, dysfunction in daily activities, and problems related to interpersonal relationships (Stein & Kean, 2000). Quality of life for individuals with SAD is influenced by reduced satisfaction with leisure and daily activities, family life, friends, and income (Stein & Kean, 2000). Additional negative outcomes associated with SAD include increased cannabis and alcohol dependence (Buckner et al., 2008) and additional psychiatric disorders, especially other anxiety disorders and depression (Schneier, Johnson, Hornig, Liebowitz, & Weissman, 1992). When SAD is comorbid with other psychiatric disorders, it is associated with increased financial dependence and an increased number of suicide attempts (Schneier et al., 1992).

Due to the discomfort of social interactions, many individuals with SAD tend to engage in avoidant behavior, which may include overt or subtle avoidance. Simply avoiding social situations constitutes overt avoidance. Subtle avoidance may involve the individuals with SAD

focusing on themselves rather than the situation (Bögels & Mansell, 2004), mentally distancing themselves from the feared situation (Rodebaugh, Holaway, & Heimberg, 2004), or the use of safety behaviors (Wells et al., 1995). Safety behaviors in SAD are performed in an effort to reduce the likelihood of negative social evaluation. For example, researchers identified safety behaviors such as speaking quickly, taking deep breaths, rehearsing sentences, and avoiding eye contact in a participant with SAD who feared talking to a group of strangers (Wells et al., 1995). While the intention of engaging in safety behaviors is to avert fears, like other methods of avoidance, safety behaviors are problematic because they actually contribute to the maintenance and exacerbation of fear (Helbig-Lang & Petermann, 2010; Wells et al., 1995). Engaging in safety behaviors prevents full exposure to the feared event. Safety behaviors may prevent individuals from fully habituating to their feared event and/or from disconfirming their beliefs that they will be negatively evaluated (Kim, 2005; Wells et al., 1995).

1.2 Stuttering

Stuttering is a communication disorder characterized by involuntary interruptions in the forward flow of speech (Bloodstein & Bernstein Ratner, 2008). Most researchers and speech-language pathologists agree that stuttering consists of sound, syllable, or monosyllabic word repetitions; oral or silent sound prolongations; and broken words. The current edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, APA, 2013) places stuttering, also called childhood-onset fluency disorder, alongside other communication disorders in the neurodevelopmental disorders category. The lifetime prevalence of stuttering is estimated to be approximately 4% - 5%, while at any given

point in time, about 1% of the population stutters (Bloodstein & Bernstein Ratner, 2008). In adulthood, males who stutter outnumber females who stutter four to one (Iverach, O'Brian, et al., 2009).

Stuttering is a universal disorder which often presents prior to age three, but the age of onset ranges from two to seven years (APA, 2013; Yairi & Ambrose, 1992), which largely coincides with the speech and language developmental period. Onset can be gradual or rapid (APA, 2013; Yairi & Ambrose, 1992). Although the cause of stuttering remains elusive, neurological deficits are a likely component (Bloodstein & Bernstein Ratner, 2008; Smits-Bandstra & Luc, 2007) and genetic factors are likely involved (Bloodstein & Bernstein Ratner, 2008; Domingues et al., 2014; Frigerio-Domingues & Drayna, 2017).

While the majority of children who stutter naturally recover, stuttering develops into a lifelong problem for a small but significant proportion of adults (APA, 2013; Onslow, 2004). By disrupting speech production, stuttering impedes the ability to communicate effectively. Communication through speech is important to social and occupational functioning and overall quality of life (Iverach, O'Brian, et al., 2009). Thus, it is no surprise that stuttering is associated with numerous negative outcomes throughout the lifespan. Children as young as three who stutter are more likely to demonstrate impaired behavioral, emotional, and social development compared to typically-developing children (McAllister, 2016). Stuttering has the potential to elicit negative peer responses for children as young as three and four years old (Langevin, Packman, & Onslow, 2009). Preschool and kindergarten children who stutter report a more negative attitude about their speech than their nonstuttering peers (Vanryckeghem, Brutton, & Hernandez, 2005). Children who stutter are more likely to be rejected by their peers (Davis,

Howell, & Cooke, 2002); they are less likely to be popular (Davis et al., 2002); and they are often bullied (Blood & Blood, 2007). In adolescence, stuttering continues to be associated with greater risk for bullying, and it is also associated with lower self-perceived communicative competence (Blood & Blood, 2004). Adolescents who stutter who are at risk for bullying report lower self-esteem (Blood & Blood, 2004). Adults who stutter are at increased risk for developing social, psychological, and behavioral problems (Craig, 2003).

In general, people who stutter are likely to experience negative stereotypes and listener reactions throughout their lives (Klompas & Ross, 2004; Snyder, 2001). These negative experiences may lead to low self-esteem, withdrawal, and feelings of guilt, shame, embarrassment, and frustration (Langevin & Prasad, 2012). It is understandable, then, that many people who stutter develop negative attitudes toward speaking (Andrews & Cutler, 1974; Erickson, 1969; Vanryckeghem & Brutton, 2011, 2012; Yaruss & Quesal, 2006). Similar to many individuals with SAD, many adults who stutter fear, struggle with, and/or avoid situations in which they have to speak, and they engage in overt and subtle avoidant behaviors as a means of coping (Lowe et al., 2017; Plexico, Manning, & Levitt, 2009; Vanryckeghem & Brutton, 2011, 2012). Common subtle avoidant behaviors among people who stutter include substitution or avoidance of difficult words (Plexico et al., 2009). Indeed, the definition of stuttering, in addition to repetitions, prolongations, and blocking of sounds, often includes the substitution and avoidance of words (Bloodstein & Bernstein Ratner, 2008).

1.3 The Relationship between Social Anxiety and Stuttering

The role of anxiety in stuttering has been debated over the years. Many theorists have speculated that anxiety might be causally linked to stuttering. Few people who stutter and few speech-language pathologists would deny the role of anxiety and emotional reactivity in stuttering. Recent research supports a neurological cause for stuttering, yet anxiety remains one of the most common concomitants of stuttering (Menzies, Onslow, & Packman, 1999; Smits-Bandstra & Luc, 2007).

The temporal relationship between anxiety and stuttering suggests that stuttering may engender anxiety. In a review and analysis, Alm (2014) found that preschool children who stuttered were neither shyer nor more socially anxious than peers who did not stutter; yet, speech-related social anxiety develops in many cases of stuttering before adulthood. It has been suggested that some people who stutter develop anxiety in adolescence (Smith et al., 2017), and that the development of social anxiety may be due to continued negative experiences with speaking (Menzies et al., 2008). Iverach, Lowe, et al. (2017) found that self-reported stuttering severity predicted higher anxiety among adolescents who stutter. In a meta-analysis including almost 1,300 adults, Craig and Tran (2014) found that the majority of adults who stutter have moderately elevated trait anxiety and substantially elevated social anxiety. Considering the inherent reliance on speaking in social interactions, elevated social anxiety among adults who stutter is unsurprising. There is a growing body of evidence supporting the significant prevalence of social anxiety among adults who stutter (Blood & Blood, 2016; Blumgart, Tran, & Craig, 2010).

The fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; APA, 2000) precluded a diagnosis of SAD among individuals whose anxiety was related to stuttering, presumably under the belief that elevated social anxiety was a reasonable reaction to stuttering. Nonetheless, many researchers advocated for increased assessment and treatment of anxiety among people who stutter (Iverach, O'Brian, et al., 2009; Menzies et al., 2008; Stein, Baird, & Walker, 1996), noting the significant and problematic prevalence of social anxiety symptoms. The most recent version of the DSM, the DSM-5, now allows for SAD to be diagnosed in people who stutter, as long as the social fear, avoidance, or distress is either unrelated or excessive to the stuttering (APA, 2013).

It is clear that the role of anxiety, especially social anxiety, in stuttering is not fully understood, yet it is a serious problem for many adults who stutter. Hence, this matter merits further research.

1.4 Clinical Implications

Among children who stutter, an estimated 20% develop chronic stuttering (Craig, 2000). Among adults who stutter, an estimated 20% - 60% have significant social anxiety (Blumgart et al., 2010; Iverach, O'Brian, et al., 2009; Kraaimaat, Vanryckeghem, & Van Dam-Baggen, 2002; Menzies et al., 2008; Stein et al., 1996). In a study identifying the prevalence of anxiety disorders among children who stutter, Iverach et al. (2016) found that children who stutter had a six-fold increased odds for SAD compared to nonstuttering controls. In a study identifying the prevalence of anxiety disorders among treatment-seeking adults who stutter, Iverach, O'Brian, et al. (2009) found that adults who stutter had 16- to 34-fold increased odds of meeting criteria for

SAD compared to matched controls. The authors suggested that the comorbid presence of stuttering and significant anxiety might increase the likelihood that individuals who stutter will seek treatment for their stuttering. Noting the historical absence of SAD diagnoses, the authors elucidated the clinical implications of the exceptionally high prevalence of anxiety disorders among adults who stutter – the assessment and treatment of anxiety disorders, especially SAD, should be a critical priority among adults who stutter. It has been suggested that comprehensive treatment for stuttering should address anxiety specifically (Blumgart, Tran, & Craig, 2014; Craig, 1990; Iverach, Rapee, Wong, & Lowe, 2017), as targeted psychological assessment and intervention may improve overall stuttering treatment (Iverach, Jones, et al., 2009). Recently, researchers have advocated for the increased integration of care for adults who stutter between speech-language pathologists and clinical psychologists (Iverach, O'Brian, et al., 2009; Iverach & Rapee, 2014; Menzies et al., 2008).

Current treatment for stuttering typically uses fluency shaping, stuttering modification, or an integration of both approaches. Fluency shaping aims to teach individuals who stutter to speak more fluently. The goal is to learn and apply techniques that facilitate more fluent speech. Fluency shaping often uses variations of prolonged speech, which focuses on speech rate modification and fluency shaping strategies, such as easy onset, soft contact, and delayed auditory feedback. Using these techniques, people who stutter are taught to slow their speech rate, systematically reshape their speech toward more normal sounding speech, and generalize their methods to use outside the clinic. While fluency shaping has proven to be effective at reducing stuttering severity (Andrews, Guitar, & Howie, 1980), it largely ignores any role of anxiety. Stuttering modification, on the other hand, typically utilizes a multidimensional

approach that incorporates behavioral, affective, and cognitive components. Treatment is often aimed at modifying neuro-motoric involvement in speech by employing techniques to decrease the tension associated with stuttering behaviors, to facilitate desensitization to stuttering, and to increase acceptance of stuttering (Blomgren, Roy, Callister, & Merrill, 2005). Common components of the stuttering modification approach include preparatory set, cancellation, and pull-out (Van Riper, 1982). As with fluency shaping, the ultimate goal is to generalize these methods to use outside the clinic. Notably, while stuttering modification addresses anxiety, it does not explicitly address the widespread *social* anxiety among people who stutter.

Current treatment for SAD typically uses a form of cognitive-behavioral therapy (CBT), which has the greatest empirical support in the treatment of SAD (Rodebaugh et al., 2004). CBT can be considered a general term that incorporates a number of various techniques in varying combinations, such as exposure, applied relaxation, social skills trainings, and cognitive restructuring. However, exposure can be considered the essential component for successful treatment of SAD (Rodebaugh et al., 2004). In exposure therapy, the individual confronts his or her feared situations in a controlled manner. In SAD, the feared situations are social encounters in which the individual would be exposed to potential negative evaluation by others. The effectiveness of exposure in the treatment of SAD is supported in two separate meta-analytic reviews (Feske & Chambless, 1995; Gould, Buckminster, Pollack, & Otto, 1997).

In an experimental clinical trial of a CBT package for adults who stutter, Menzies et al. (2008) randomized 30 adults who stutter (60% of whom were diagnosed with comorbid SAD) into two groups. One group received a speech restructuring treatment program, which consisted of procedures designed to control stuttered speech. Participants in this group learned to produce

prolonged speech at a slower rate, and they practiced the new speech pattern. The speech restructuring treatment program was deliberately stripped of any activities that related to cognitive and/or behavioral intervention that would overlap with CBT. The other group received CBT in addition to the speech restructuring treatment. The CBT package consisted of ten weekly sessions that incorporated cognitive restructuring, graded exposure, and behavioral experiments. In cognitive restructuring, the participants systematically identified and modified their irrational thoughts; in graded exposure, they gradually and progressively confronted their feared situations; and in the behavioral experiments, they compared predicted negative outcomes to actual outcomes of exposure exercises. The group that received CBT and speech restructuring treatment had superior and sustained measures of improved psychological functioning compared to the group that received speech restructuring treatment only. The groups did not significantly differ in stuttering severity following treatment. Some of the gains in psychological functioning were apparent after the experimental group completed CBT, before they began the speech restructuring treatment, which lends support for the effectiveness of isolated CBT for people who stutter. More recently, Helgadóttir, Menzies, Onslow, Packman, and O’Brian (2014) developed a standalone internet treatment based on the same CBT package and found similar results – significant post-treatment improvements in psychological functioning, but no significant changes in stuttering frequency. In 2016, they developed a fully automated version of the treatment and again found similar results – treatment completion was associated with significant improvements in self-reported psychological functioning. This study did not measure stuttering severity (Menzies, O’Brian, Lowe, Packman, & Onslow, 2016). While the CBT package used in these studies is consistent with other commonly used CBT packages, it borrows heavily from the

cognitive model of social anxiety – it neither emphasizes nor isolates the effectiveness of exposure, the key ingredient of CBT and gold standard treatment for SAD.

Other researchers have reported positive outcomes from CBT with adults who stutter in both psychological functioning and speech fluency (Gupta, 2016; Gupta, Yashodharakumar, & Vasudha, 2016; Reddy, Sharma, & Shivashankar, 2010). However, they incorporated traditional speech-therapy techniques into their therapeutic programs. Thus, the isolated role of CBT is indeterminate. Similar to the other studies, they also emphasized a cognitive approach (e.g., relaxation techniques, cognitive restructuring), and thus underemphasized the role of exposure.

Walkom (2016) developed and piloted a program of exposure therapy via virtual reality for people who stutter. Several adults who stutter engaged in two separate exposure tasks lasting 5 minutes each that consisted of speaking in front of a virtual audience. Detailed outcome data were not reported, but the author concluded that the intervention showed promise in reducing anxiety and improving speech fluency among people who stutter and have social anxiety.

No previous studies have rigorously investigated the isolated effectiveness of exposure therapy for people who stutter and have SAD. Therefore, the aim of this research study was to develop an exposure therapy protocol for this population and evaluate its efficacy in reducing anxiety and stuttering severity. Individuals who stutter are often anxious about speaking in front of others. More specifically, they are commonly fearful of pronouncing their name disfluently; they often substitute or avoid certain sounds and words that are associated with their stuttering behavior; and they vary in their level of anxiety surrounding extemporaneous speech versus reading aloud. Hence, the exposure task incorporated all of these situations. A multiple baseline across participants design was utilized to test the intervention in a cost- and time-effective

manner. As is common in multiple baseline design research, repeated measures were recorded during baseline and intervention phases. This study added a psychological placebo intervention prior to the proposed active intervention to account for the common factors of therapy, to provide additional support for the effectiveness of exposure therapy. It was hypothesized that social anxiety levels would remain stable during the baseline phase, reduce slightly during the psychological placebo intervention, decrease gradually and substantially during the exposure intervention, and remain low at the post-assessment. Social, state, and trait anxiety were assessed at major assessment points to further evaluate change. Social and state anxiety were expected to reduce after the exposure intervention. No change was expected for trait anxiety. To evaluate change stuttering severity, stuttering frequency and the affective, behavioral, and cognitive experiences of stuttering were also assessed at major assessment points, and they were expected to improve only after the exposure intervention. Finally, participants' response to exposure therapy was examined.

CHAPTER 2: METHODS

2.1 Participants

Participants consisted of six individuals recruited from Central Florida. Inclusion criteria were: (a) at least 17 years of age; (b) English language proficiency; (c) met criteria for SAD, as defined by DSM-5 (confirmed via administration of Anxiety and Related Disorders Interview Schedule for DSM-5 [ADIS-5] - Adult Version); (d) if met criteria for another DSM-5 defined clinical disorder, SAD was determined to be primary (excluding childhood onset-fluency disorder [stuttering]); (e) onset of stuttering in early developmental period, not attributable to neurological insult or other medical condition; (f) stuttering frequency $\geq 3\%$ of words spoken during reading or extemporaneous speech; and (g) if taking psychotropic medications, dose must be stabilized for at least two weeks. Exclusion criteria were: (a) elevated risk requiring a higher level of care, including current suicidal/homicidal intent, psychosis, or substance use disorder; (b) suspected intellectual developmental disorders, autism spectrum disorders, or comorbid communication disorders; (c) concurrent enrollment in psychotherapy or speech therapy; and (d) previous course of exposure-based therapy for social anxiety.

Of note, towards the end of treatment, one of the participants (P6) revealed that they were concurrently enrolled in a program at their school based to their speech, but they were unsure if it was considered speech therapy. The program entailed meeting with an instructor at the school (unclear if this was a speech-language pathologist) and a peer with a different speech problem (diagnosis unknown) for approximately 0.5 hours per week. The participant reported that the sessions consisted of taking turns reading aloud with the peer. Due to the relatively low dose of

treatment and the absence of identifiable fluency shaping or stuttering modification techniques, this participant was included in the final analysis.

Participant ages were 17, 19, 30, 31, 40 and 43; three were females and three were males; three were Caucasian, two were Hispanic, and one was Asian; two participants were married and four were single; highest level of education ranged from high school to university degrees; and employment included student, truck loader/unloader, financial services/risk management specialist, and computer engineer.

2.2 Study Design

This study utilized a randomized, nonconcurrent, multiple baseline across participants design (Barlow, Nock, & Hersen, 2009). All participants recorded at least seven days of baseline (BL) data, then they were randomized to receive zero, two, or four sessions of progressive muscle relaxation therapy (PMR). PMR has demonstrated minimal effects when used as an isolated intervention and has successfully served as a control condition in SAD treatment outcome studies (Rodebaugh et al., 2004). Thus, PMR served to establish the staggered start and to control for the common factors of therapy, which is the aim of a psychological placebo. During the subsequent exposure therapy (EXP) phase, all participants received ten sessions of individual EXP, two to three sessions per week. Of note, one of the participants (P3) elected to take an approximately one-month break from treatment between EXP sessions 6 and 7, citing unexpected work and family responsibilities. Due to the relative continuity of treatment gains, despite this gap, this participant was included in the final analysis. Throughout enrollment in the treatment program, participants recorded a daily rating of social anxiety. Additionally, all

participants completed a battery of assessments at major assessment points: BL, post-PMR, and post-EXP.

The multiple baseline design allows for observation of symptom change over time. If symptoms change when and only when a new intervention is introduced, this allows for a causal inference about the effectiveness of the intervention. This study presents a unique adaptation of the multiple baseline design in that it utilizes a psychological placebo condition (PMR) to control for common factors of therapy before presenting the proposed active intervention (EXP). If the EXP leads to a reduction in symptoms above and beyond that of PMR, this will provide substantial support for the unique effectiveness of EXP. The use of a single case design is further justified due to the overall low base rate of the comorbid presentation of stuttering and SAD.

2.3 Procedures

Participants were recruited from the community via flyers posted at the University of Central Florida (UCF) Psychology Clinic and the UCF Communications Disorders Clinic and emails sent to members of an organization that supports people who stutter. Interested individuals who appeared to be eligible for the study were scheduled for part one of a two-part in-person assessment. In part one, a member of the research team provided an overview of the study, its purpose, and a brief description of the treatment and obtained informed consent. Participants were administered self-report questionnaires and speech samples were collected and recorded. Speech samples were independently transcribed and analyzed by two trained members of the research team, discrepancies were settled by consensus. The speech samples were reviewed by the master coder, a board certified fluency specialist, who confirmed the percentage

of words stuttered (%WS). Participants whose %WS was $\geq 3\%$ during either reading or extemporaneous speech were scheduled for part two. In part two, participants were administered a clinical interview and additional self-report questionnaires. Participants who met diagnostic criteria for SAD and none of the exclusion criteria were eligible for continued participation in the study. Treatment was offered at no cost.

The participants completed all self-report questionnaires with the assistance of a member of the research team. All assessment and treatment was conducted at the UCF Psychology Clinic by a clinical psychology doctoral student (the author), under the supervision of a licensed clinical psychologist. All procedures were approved by the University of Central Florida Institutional Review Board.

Participant flow is presented in Figure 1. Since participants serve as their own controls, noncompleters do not have sufficient data to be included in the analyses. Thus, recruitment remained open until six participants completed the post-EXP assessment. Only one participant began the treatment and subsequently dropped-out. The participant accepted an out-of-state job offer. There were no discernable differences between completers and the one noncompleter in regards to demographics or symptom presentation.

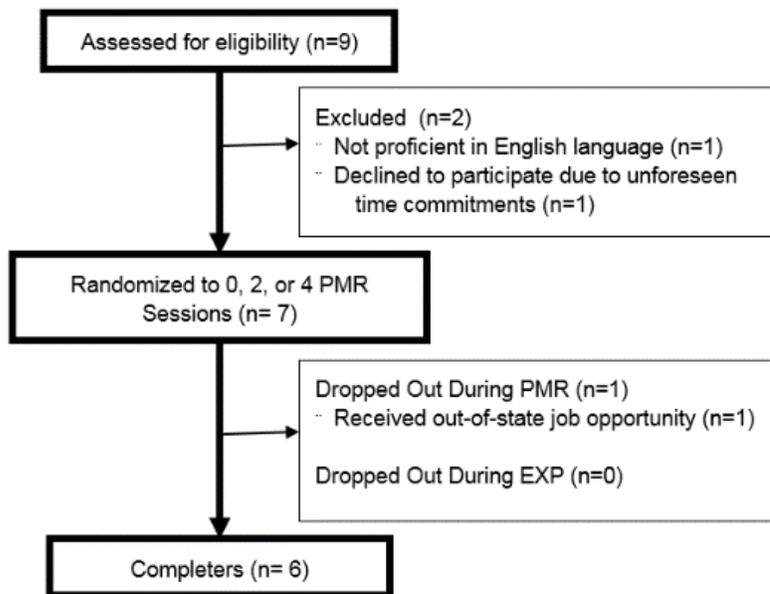


Figure 2-1: Participant Flow Chart

2.4 Measures

2.4.1 Primary

2.4.1.1 Anxiety

Throughout the BL, PMR, and EXP phases of the study, participants were provided with a Daily Behavioral Ratings (DBR) form, in which they monitored the frequency and severity of social- and speaking-related symptoms each day, such as overall social anxiety and avoided speaking situations. (See Appendix A.) The daily rating of overall social anxiety served as the main outcome for this study. Participants were asked to rate their social anxiety (0 – 10) each

day. Specifically, they were instructed: “Think over your whole day. How would you rate your overall anxiety due to social interactions or the possibility of social interactions?”

The Social Phobia and Anxiety Inventory (SPAI; Beidel, Turner, Stanley, & Dancu, 1989; Turner, Beidel, Dancu, & Stanley, 1989) and the State-Trait Anxiety Inventory (STAI) Form-Y (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) were administered at major assessment points to further assess anxiety. The SPAI assesses the range and severity of social fears as well as the somatic, cognitive, and behavioral aspects of SAD. The SPAI has high test-retest reliability ($r = .86$), good concurrent and external validity, and differentiates patients with SAD from normal controls or patients with other anxiety disorders. The STAI is a widely used measure for state and trait anxiety. It has demonstrated good psychometric properties (Spielberger et al., 1983).

Presence of SAD and other clinical disorders were assessed via the Anxiety and Related Disorders Interview Schedule for DSM-5 (ADIS-5) - Adult Version (Brown & Barlow, 2013, 2014), a semi-structured interview designed to diagnose anxiety and related disorders. It is the gold standard for the diagnosis of anxiety disorders and has well-established reliability and validity. All of the clinical interviews were audio and video recorded. Three recordings (25% of the total recordings) were randomly selected and viewed by an independent and blinded rater, also a clinical psychology doctoral student. Diagnostic agreement was 100%.

2.4.1.2 Stuttering Severity

Stuttering frequency was assessed at major assessment points via speech samples. Participants were audio and video recorded speaking in three contexts: reading, monologue, and

conversation. The speech samples were all collected in this order. For the reading sample, participants were provided with one of two 300-word scripts that were matched for reading level (Brutten, 1957). For the monologue sample, participants were asked to describe a series of 16 photos, presented in a random order, until they had spoken approximately 300 words. For the conversation sample, participants were asked to engage in conversation with the assessor on a series of topics until they had spoken approximately 300 words. The speech samples were independently transcribed and coded by two research assistants trained to identify stuttering behaviors. Each word containing a stuttering behavior (sound, syllable, or monosyllabic word repetition; oral or silent sound prolongation; or broken word) was counted as a stuttered word. Percentage of words stuttered (%WS) was calculated in relation to the total number of words spoken. Discrepancies were agreed on by consensus. The master coder reviewed all BL samples, the first 150 words for each post-PMR sample, and all post-EXP samples. Research assistant consensus matched the master coder at an accuracy rate of 96.48%.

The affective, behavioral, and cognitive experiences of stuttering were measured using the Behavioral Assessment Battery for Adults (BAB; Brutten, 1973, 1975; Vanryckeghem, 1999; Vanryckeghem & Brutten, in press). The BAB is a collection of self-report measures that assess affective, behavioral, and cognitive accounts of people who stutter. A modified version of the Fear Survey Schedule II (FSS-II; Geer, 1965), which is commonly included with the BAB, was also administered. The BAB is composed of the Speech Situation Checklist, the Behavior Checklist, and the Communication Attitude Test for Adults. These measures have been investigated internationally, have been shown to be reliable and valid, and can differentiate people who stutter from people who do not stutter. The Speech Situation Checklist (Bakker,

1995; Bakker & Brutton, 1982; Brutton, 1973, 1975; Brutton & Janssen, 1981) has two components. The Speech Situation Checklist - Emotional Reaction (SSC – ER) assesses negative emotional reaction, such as anxiety, concern, and worry, in speech situations (e.g., “talking on the telephone,” “giving directions,” “talking with teachers or supervisors”). The Speech Situation Checklist - Speech Disruption (SSC – SD) assesses speech disruption, described as getting stuck on, repeating, or prolonging sounds or words, in the same speech situations. In each component, the 38 speech situations are rated on a 5-point scale (1 = *not at all* to 5 = *very much*). The SSC has been shown to have high internal reliability ($r = .95$ and higher) and good content validity. The Behavior Checklist (BCL; Vanryckeghem, Brutton, Uddin, & Van Borsel, 2004) currently lists 60 behaviors (the original test had 95 items) that may be used as a means to escape or avoid a stutter (e.g., “touch or ruffle your hair,” “clear your throat,” “tap your foot/feet”). These behaviors are considered secondary to the stuttering. The rater is asked to indicate whether he or she engages in certain behaviors to help get sounds or words out, by indicating “yes” or “no” to each item. Items marked “yes” are rated on a 5-point scale relative to the frequency with which they are being used (1 = *very infrequently* to 5 = *very frequently*). The BCL has good internal reliability and validity, and it can reliably distinguish between people who stutter and people who do not stutter. The Communication Attitude Test for Adults (BigCAT; Vanryckeghem & Brutton, 2011, 2012; Vanryckeghem & Muir, 2016) is a 34-item true-false measure designed to assess speech-associated cognition (e.g., “There is something wrong with the way I speak,” “Speaking is no problem for me”). It has been shown to have good internal consistency for people who stutter ($\alpha = .84$) and can reliably distinguish between people who stutter and people who do not stutter (Vanryckeghem & Brutton, 2011, 2012). Additionally, it has demonstrated

good test-retest reliability ($r = .80$) (Vanryckeghem & Muir, 2016). The FSS-II (Geer, 1965) is a 51-item measure that lists objects and situations which may cause fear or discomfort (e.g., “sharp objects,” “worms,” “being criticized”). Internal consistency reliability has been found to be high. The FSS-II, which was originally on a 7-point scale, has been modified to be rated on a 5-point scale (from “not at all afraid” to “very much afraid”) to maintain consistency with SSC measures (Brutten, 1973). Participants completed the BAB and the FSS-II in this order: FSS-II, SSC - ER, BCL, BigCAT, SSC - SD.

2.4.2 Secondary

The Quality of Life Inventory (QOLI; Frisch, 1994) was administered to measure well-being and life satisfaction. The QOLI is a brief psychological assessment that presents 16 life areas and asks respondents to rate how important (3-point rating scale) and how satisfied (6-point rating scale) they are with each area. It has been extensively evaluated and has demonstrated sound psychometric properties (Frisch, Cornell, Villanueva, & Retzlaff, 1992). The QOLI was administered at BL and post-EXP.

The subjective and objective experience with EXP among the participants was an important exploratory area of interest in this research study. The credibility/expectancy questionnaire (Devilley & Borkovec, 2000) is a measure of treatment expectancy and rationale credibility specifically designed for use in outcome research. It has high internal consistency within each factor (credibility and expectancy) and good test-retest reliability. Participants completed this measure after two sessions of EXP. Between-sessions measures of anxiety and stuttering severity were assessed during the EXP phase. The Subjective Units of Distress (SUDs)

Scale is commonly used during exposure tasks in cognitive-behavioral therapy (CBT) for anxiety. Participants reported their SUDs on a 9-point scale (0 = *no anxiety* to 8 = *extreme anxiety*) at five-minute intervals. EXP sessions were transcribed and coded by research assistants trained to identify stuttering behaviors, so that %WS per five-minute interval could be calculated. Peak SUDs and peak %WS were evaluated for sessions 1, 5, and 10.

Raters blind to session number viewed recordings of the first 20 minutes of each EXP session and rated the speaker on three components: level of anxiety (1 = *none* to 5 = *very severe*), level of stuttering (1 = *none* to 5 = *very severe*), and overall effectiveness of the presentation (1 = *not at all* to 5 = *extremely*) (see Appendix B). Indices of low levels of anxiety included frequent eye contact, appropriate volume of speech, occasional spontaneous speech, relaxed posture, open body position, and natural body movement. Indices of high levels of anxiety included minimal eye contact, low voice, lack of spontaneous speech, tense/frozen posture, hiding behind furniture/props, and excessive gross motor movements (hand wringing, leg shaking, fidgeting). Indices of low levels of stuttering included minimal identifiable stutters and minimal disruption to speech. Indices of high levels of stuttering included frequent stuttering and very disruptive to speech. Indices of low levels of overall effectiveness included looks awkward, unengaging, and appears uncomfortable. Indices of high levels of overall effectiveness included looks natural, engaging, and appears to enjoy presenting. Twelve sessions (20% of the sessions) were selected to determine inter-rater reliability. Overall, there was moderate agreement on the ratings (ICC = .725). Further examination of agreement by component demonstrated moderate agreement for ratings of anxiety (ICC = .567) and effectiveness (ICC = .731), and good agreement for ratings of stuttering (ICC = .820).

2.5 Intervention

2.5.1 Progressive Muscle Relaxation Therapy (PMR)

Participants were randomly assigned to receive zero, two, or four sessions of PMR. The PMR sessions were conducted individually and in-person, and they consisted of a guided progressive muscle relaxation exercise. The participants were instructed to relax, close their eyes, and focus on their breathing. Then, they were asked to tense various muscles in their body as they breathed in deeply, and then gently release the muscles as they breathed out fully. The exercise progressed through the major muscles in the body, beginning with the feet and ending with the face muscles. The therapist provided the participants with an opportunity to ask questions and address concerns about their anxiety and speech. Each session lasted approximately 50 minutes.

2.5.2 Exposure Therapy (EXP)

The EXP sessions were also conducted individually and in-person. All participants engaged in ten EXP sessions. At the beginning of each session, participants were provided with the script of the speech they would be presenting that day. Participants were provided with a different script each session. All participants received the same scripts in the same order. Participants were given ten minutes to review and prepare, and then they presented the speech in front of an audience of between three and six adults. Participants were asked to introduce themselves and their topic, present the speech, and deliver an impromptu response to a prompt related to the speech topic. This process (provide introduction, deliver speech, answer prompt)

was repeated as many times as was necessary until the session was ended. A unique prompt was provided each time.

According to emotional processing theory, which aims to identify the mechanisms of action in EXP, an exposure task requires fear activation, within-session habituation, and between-session habituation in order to be successful in reducing fear and anxiety (Foa & Kozak, 1986). To achieve fear activation, common fears among people who stutter were incorporated into the exposure task. First and foremost, individuals who stutter are commonly anxious about speaking in front of others, thus the exposure task consisted of speaking in front of a small audience. Individuals who stutter are commonly fearful of pronouncing their name disfluently, thus the exposure task required the participants to introduce themselves at the beginning of each speech. Individuals who stutter often substitute or avoid certain sounds and words that are associated with their stuttering behavior, thus each script incorporated all potential anxiety-provoking sounds (i.e., each of the ten scripts contained at least one word that started with each letter of the English alphabet). Participants were instructed to state aloud all of the words from the script (although, they were free to elaborate). Individuals who stutter vary in their level of anxiety associated with reading aloud and extemporaneous speech production, thus the exposure task required participants to both read aloud from the provided script and deliver impromptu responses to prompts and questions. The audience members were encouraged to ask the participant questions throughout the exposure task. To ensure within-session habituation, the participants were asked to provide their SUDs at 5-minute intervals, and the exposure task was not ended until the participant reported that their SUDs was at least half that of their peak SUDs in that session, or overall distress was low (participant reported zeros or ones). (Between-session

habituation is not something that can be initially designed as part of the exposure, rather something that indicates progress over time.)

Rationale credibility and treatment expectancy for EXP were examined, based on ratings on the credibility/expectancy questionnaire (Deville & Borkovec, 2000). All participants found EXP to be highly logical ($M = 8.17$, $SD = 0.75$, range 7 to 9) and would be confident in recommending the treatment to a friend ($M = 8.00$, $SD = 0.89$, range 7 to 9). Participants were asked to rate how they *thought* and how they *felt* about EXP. All participants *thought* EXP would be successful in reducing their symptoms ($M = 7.17$, $SD = 1.17$, range 6 to 9). Four participants *thought* there would be 70% - 80% improvement and two participants *thought* there would be 30% - 40% improvement in symptoms ($M = 0.60$, $SD = 0.20$, range 30% to 80%). All participants reported that they *felt* that EXP would reduce their symptoms ($M = 6.50$, $SD = 1.05$, range 5 to 8). Three participants *felt* there would be 70% improvement and three participants *felt* there would be 30% - 60% improvement in symptoms ($M = 0.58$, $SD = 0.16$, range 30% to 70%). Overall, the participants reported high credibility and expectancy for EXP.

2.6 Data Analysis

Data analysis was conducted in a manner consistent with that of a multiple baseline design (Barlow et al., 2009). However, this study included a psychological placebo (PMR) to establish the staggered start, which is traditionally accomplished by manipulating the length of the baseline. Change due to common factors of therapy should be captured in the PMR phase, thus changes that are apparent only after the active intervention (EXP), can be more confidently attributed to the proposed active ingredients of EXP. Each participant recorded daily ratings of

social anxiety during each phase (BL, PMR, and EXP). The daily ratings of social anxiety were graphed over time, and the level and slope of the ratings for each phase were compared via visual inspection.

Descriptive statistics were calculated for all of the measures administered at major assessment points: BL, post-PMR, and post-EXP. These data provide additional information about the magnitude of change attributable to PMR and EXP. Data from EXP sessions (peak SUDS; peak %WS; and the blinded observer ratings of anxiety, stuttering, and overall effectiveness) provide information about the subjective and objective changes between sessions of EXP.

CHAPTER 3: RESULTS

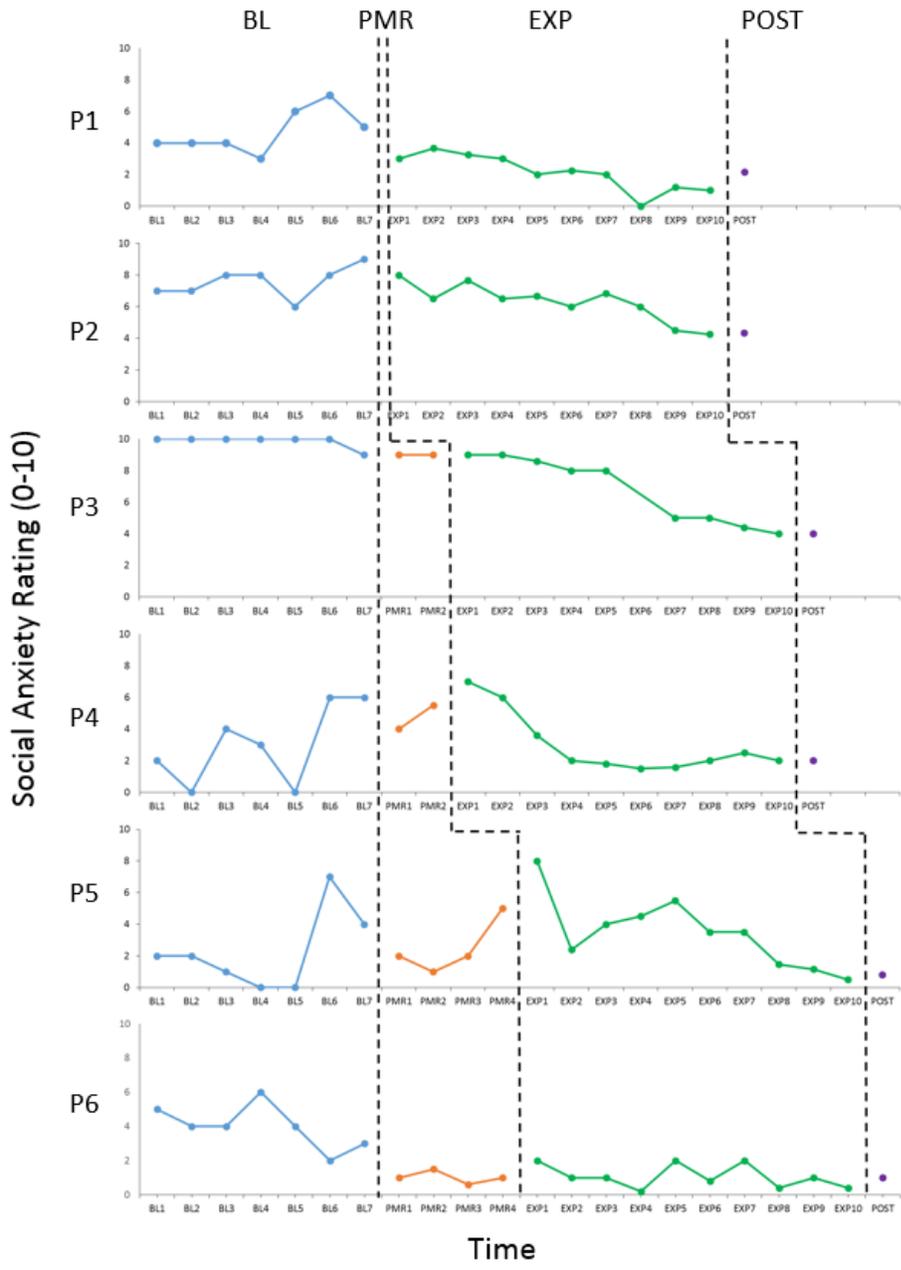
3.1 Primary

3.1.1 Anxiety

Figure 3-1 displays social anxiety ratings during baseline (BL), psychological placebo (progressive muscle relaxation therapy; PMR), active intervention (exposure therapy; EXP), and the post-assessment (POST). BL data points represent the first seven days that the participants began recording daily social anxiety. Data points in the subsequent phases represent the average daily rating from one session to the next. The first PMR data point represents the participant's social anxiety rating from that day, and the second PMR data point represents an average from the day after the first PMR session up to and including the second PMR session. Similarly, the first EXP data point represents the participant's social anxiety rating from that day, and the second EXP data point represents an average from the day after the first EXP session up to and including the second EXP session. The POST data point represents an average from the day following the last EXP session up to and including the day of the post-assessment. Figure 3-1 graphically displays the data for all six participants (P1 - P6).

Visual inspection of the baseline data in Figure 3-1 indicates that social anxiety was stable or increasing for all participants except for P6. P6's baseline ratings demonstrate a negative trend. During the PMR phase, social anxiety remained high for P3, initially reduced but demonstrated a positive trend for P4 and P5, and initially reduced and remained low for P6. During the EXP phase, social anxiety gradually and substantially decreased to below BL levels

for all participants except P6, whose social anxiety began reducing in BL and stayed low throughout PMR and EXP. At POST, all participants' social anxiety remained low.



Daily social anxiety ratings for all participants across baseline (BL), progressive muscle relaxation therapy (PMR), and exposure therapy (EXP) phases, and at the post-assessment (POST). BL data points represent seven consecutive daily ratings. PMR1 and EXP1 represent the rating from the day of the session. All subsequent PMR and EXP data points represent an average of the ratings between sessions. The POST data point represents an average of the ratings following the final day of the intervention, up to and including the day of the post-assessment.

Figure 3-1: Daily Social Anxiety Ratings

The SPAI and STAI were administered at major assessment points (BL, post-PMR, and post-EXP). Table 3-1 presents the SPAI and STAI scores for each participant and the average of all participants at each assessment point. (Note that P1 and P2 do not have data at post-PMR because they were randomly assigned to receive zero sessions of PMR. They are not included in the post-PMR mean calculation.)

SPAI scoring yields four qualitative categories: < 34 = Social Phobia Unlikely; $34 - 59$ = Possible Mild Social Phobia; $60 - 79$ = Possible Social Phobia; ≥ 80 = Probable Social Phobia. All SPAI scores were in the Probable Social Phobia range at BL (P1 = 117, P2 = 83, P3 = 137, P4 = 105, P5 = 108, P6 = 129) and remained there at post-PMR (P3 = 115, P4 = 109, P5 = 107, P6 = 111). At post-EXP, four participants reduced to the Possible Social Phobia range (P3 = 65, P4 = 61, P5 = 62, P6 = 70), one participant reduced to the Possible Mild Social Phobia range (P2 = 35), and one participant reduced to the Social Phobia Unlikely range (P1 = 14). On average, participants were in the Probable Social Phobia range at BL ($M = 113.17$, $SD = 19.17$) and post-PMR ($M = 110.50$, $SD = 3.42$) and reduced to the Possible Mild Social Phobia range at post-EXP ($M = 51.17$, $SD = 21.92$).

The STAI produces two distinct scores: State Anxiety and Trait Anxiety. For State Anxiety, the mean score at BL was 45.67 ($SD = 16.42$, range 27 to 76); the mean score at post-PMR was 46.00 ($SD = 16.51$, range 33 to 70); and the mean score at post-EXP was 27.83 ($SD = 5.27$, range 22 to 37). For Trait Anxiety, the mean score at BL was 55.33 ($SD = 15.28$, range 37 to 78); the mean score at post-PMR was 51.00 ($SD = 13.63$, range 41 to 71); and the mean score at post-EXP was 38.83 ($SD = 7.03$, range 30 to 51). In sum, SPAI and STAI scores were all elevated at BL and were not substantially different following PMR. However, SPAI and STAI

scores were all reduced following EXP. The SPAI scores, in particular, represented a reliable and clinically significant change.

Table 3-1: Anxiety at Major Assessment Points

	BL	Post-PMR	Post-EXP
P1			
<i>SPAI</i>	117	N/A	14
<i>STAI - State</i>	40	N/A	28
<i>STAI - Trait</i>	68	N/A	30
P2			
<i>SPAI</i>	83	N/A	35
<i>STAI - State</i>	45	N/A	22
<i>STAI - Trait</i>	50	N/A	39
P3			
<i>SPAI</i>	137	115	65
<i>STAI - State</i>	76	70	30
<i>STAI - Trait</i>	78	71	51
P4			
<i>SPAI</i>	105	109	61
<i>STAI - State</i>	39	43	25
<i>STAI - Trait</i>	44	44	36
P5			
<i>SPAI</i>	108	107	62
<i>STAI - State</i>	47	33	25
<i>STAI - Trait</i>	55	48	36
P6			
<i>SPAI</i>	129	111	70
<i>STAI - State</i>	27	38	37
<i>STAI - Trait</i>	37	41	41
	BL <i>M (SD)</i>	Post-PMR <i>M (SD)</i>	Post-EXP <i>M (SD)</i>
Mean			
<i>SPAI</i>	113.17 (19.17)	110.50 (3.42)	51.17 (21.92)
<i>STAI - State</i>	45.67 (16.42)	46.00 (16.51)	27.83 (5.27)
<i>STAI - Trait</i>	55.33 (15.28)	51.00 (13.63)	38.83 (7.03)

Note. P = Participant; SPAI = Social Phobia and Anxiety Inventory; STAI = State-Trait Anxiety Inventory; BL = baseline scores; Post-PMR = scores following PMR sessions; Post-EXP = scores following EXP sessions.

Table 3-2 presents the clinical diagnoses for each participant at the BL and post-EXP assessments. At BL, all participants met criteria for SAD. One participant also met diagnostic criteria for a depressive disorder; specifically, the participant met criteria for persistent depressive disorder with persistent major depressive episode. At the post-EXP, no participants met criteria for any clinical disorders, except for one participant (P3) who retained the SAD diagnosis. Despite reduced fear and anxiety related to social situations, P3 reported experiencing continuing moderate distress and impairment related to social anxiety.

Table 3-2: Clinical Diagnoses

	BL	Post-EXP
P1	SAD, Depression	None
P2	SAD	None
P3	SAD	SAD
P4	SAD	None
P5	SAD	None
P6	SAD	None

Note. Diagnoses were based on ADIS-5 administration. P = Participant; BL = baseline scores; Post-EXP = scores following EXP sessions; SAD = social anxiety disorder; Depression = persistent depressive disorder with persistent major depressive episode.

3.1.2 Stuttering Severity

Table 3-3 presents the %WS by each participant in each of the three contexts - reading, monologue, and conversation - at each major assessment point. Table 3-3 includes a Total for each participant, which is an aggregate of the reading, monologue, and conversation samples. On average, adults who stutter exhibit stuttering behaviors on about 10% of words during oral reading (Bloodstein & Bernstein Ratner, 2008). Thus, the stuttering frequency of this sample was

higher than the general population of people who stutter. Table 3-3 includes averages across participants at the BL and post-EXP assessment points. The average at the post-PMR assessment point was excluded from this table as the two participants with the highest levels of stuttering frequency happened to be randomly assigned to receive zero PMR sessions. Thus, the average %WS at post-PMR would have appeared dramatically lower than at BL, artificially.

P1's %WS reduced from BL to post-EXP across all contexts. P2's %WS increased from BL to post-EXP across all contexts. P3's %WS for reading remained relatively stable from BL to post-PMR, but increased slightly at post-EXP. The %WS for monologue and conversation decreased from BL to post-PMR, and then increased at post-EXP. P4's %WS for reading decreased from BL to post-PMR, and decreased further at post-EXP. The %WS for monologue remained relatively stable from BL to post-PMR, but decreased at post-EXP. The %WS for conversation reduced from BL to post-PMR, but increased slightly at post-EXP. P5's %WS for reading remained stable from BL to post-PMR, but increased dramatically at post-EXP. The %WS for monologue remained relatively stable from BL to post-PMR, and increased slightly at post-EXP. The %WS for conversation decreased from BL to post-PMR, and remained stable at post-EXP. P6's %WS for reading and monologue decreased from BL to post-PMR, but returned to approximately BL levels at post-EXP. The %WS for conversation remained relatively stable from BL to post-PMR, but increased at post-EXP. Taken together, EXP appears to have led to a reduction in stuttering frequency for P1 and an increase in stuttering frequency for P2; the combined interventions appear to have led to a slight reduction in stuttering frequency for P4; and the interventions did not appear to have a significant effect on stuttering frequency for the remaining participants.

Table 3-3: Stuttering Frequency at Major Assessment Points

	BL	Post-PMR	Post-EXP
P1			
<i>Reading</i>	14.15%	N/A	4.00%
<i>Monologue</i>	25.68%	N/A	19.47%
<i>Conversation</i>	28.22%	N/A	21.45%
Total	23.04%	N/A	15.53%
P2			
<i>Reading</i>	35.14%	N/A	45.34%
<i>Monologue</i>	20.75%	N/A	27.42%
<i>Conversation</i>	16.76%	N/A	20.67%
Total	24.12%	N/A	30.64%
P3			
<i>Reading</i>	5.36%	5.67%	7.97%
<i>Monologue</i>	4.45%	1.22%	7.01%
<i>Conversation</i>	5.31%	3.18%	4.11%
Total	5.03%	3.27%	6.19%
P4			
<i>Reading</i>	6.35%	3.24%	0.96%
<i>Monologue</i>	4.90%	5.56%	1.18%
<i>Conversation</i>	5.95%	2.32%	4.08%
Total	5.69%	3.78%	2.06%
P5			
<i>Reading</i>	9.43%	8.36%	25.49%
<i>Monologue</i>	13.79%	13.33%	17.43%
<i>Conversation</i>	20.18%	12.71%	11.44%
Total	14.53%	11.55%	17.29%
P6			
<i>Reading</i>	13.46%	10.00%	15.65%
<i>Monologue</i>	11.90%	8.61%	9.35%
<i>Conversation</i>	7.36%	8.16%	12.91%
Total	10.67%	8.90%	12.65%
Mean			
<i>Reading</i>	13.98%	N/A	16.57%
<i>Monologue</i>	13.58%	N/A	13.64%
<i>Conversation</i>	13.96%	N/A	12.44%
Total	13.85%	N/A	14.06%

Note. P = Participant; BL = baseline percentage; Post-PMR = percentage following PMR sessions; Post-EXP = percentage following EXP sessions.

The FSS-II and the BAB were administered at major assessment points (BL, post-PMR, and post-EXP). Table 3-4 presents the average of all participants at each assessment point. (Note that post-PMR does not include data from P1 and P2).

For the FSS-II, the mean score at BL was 134.50 ($SD = 30.31$, range 108 to 190); the mean score at post-PMR was 132.25 ($SD = 45.76$, range 95 to 199); and the mean score at post-EXP was 111.50 ($SD = 22.86$, range 90 to 149). The total change is indicative of a reduction of 0.60 SDs, according to established norms for people who stutter.

For the SSC - ER, the mean score at BL was 148.67 ($SD = 9.99$, range 133 to 163); the mean score at post-PMR was 151.25 ($SD = 20.90$, range 132 to 176); and the mean score at post-EXP was 86.50 ($SD = 30.92$, range 40 to 122). The total change is indicative of a reduction of 2.17 SDs, according to established norms for people who stutter.

For the SSC - SD the mean score at BL was 149.17 ($SD = 15.20$, range 135 to 169); the mean score at post-PMR was 148.00 ($SD = 21.31$, range 127 to 176); and the mean score at post-EXP was 95.17 ($SD = 34.72$, range 43 to 138). The total change is indicative of a reduction of 1.90 SDs, according to established norms for people who stutter.

For the BCL, the mean score at BL was 35.17 ($SD = 10.15$, range 26 to 52); the mean score at post-PMR was 30.50 ($SD = 10.08$, range 22 to 45); and the mean score at post-EXP was 22.50 ($SD = 16.05$, range 5 to 53). The total change is indicative of a reduction of 1.33 SDs, according to established norms for people who stutter.

For the BigCAT, the mean score at BL was 31.17 ($SD = 2.64$, range 27 to 34); the mean score at post-PMR was 31.75 ($SD = 1.71$, range 30 to 34); and the mean score at post-EXP was 25.33 ($SD = 7.99$, range 13 to 32). The total change is indicative of a reduction of 1.11 SDs, according to established norms for people who stutter.

Overall, the FSS-II and BAB scores remained relatively stable from BL to post-PMR, except for the BCL, which reduced slightly; and all scores reduced markedly from post-PMR to post-EXP.

Table 3-4: The Affective, Behavioral, and Cognitive Experiences of Stuttering at Major Assessment Points

	BL <i>M (SD)</i>	Post-PMR <i>M (SD)</i>	Post-EXP <i>M (SD)</i>
FSS-II	134.5 (30.31)	132.25 (45.76)	111.50 (22.86)
BAB			
<i>SSC – ER</i>	148.67 (9.99)	151.25 (20.90)	86.50 (30.92)
<i>SSC – SD</i>	149.17 (15.20)	148.00 (21.31)	95.17 (34.72)
<i>BCL</i>	35.17 (10.15)	30.50 (10.08)	22.50 (16.05)
<i>BigCAT</i>	31.17 (2.64)	31.75 (1.71)	25.33 (7.99)

Note. FSS-II = Fear Survey Schedule II; BAB = Behavioral Assessment Battery; SSC – ER = Speech Situation Checklist – Emotional Reaction; SSC – SD = Speech Situation Checklist – Speech Disruption; BCL = Behavior Checklist; BigCAT = Communication Attitude Test for Adults; BL = baseline scores; Post-PMR = scores following PMR sessions; Post-EXP = scores following EXP sessions.

3.2 Secondary

Table 3-5 presents the QOLI scores for each participant at BL and post-EXP and includes an average score across all participants. The QOLI yields four qualitative categories based on T Score: < 37 = very low; 37 - 43 = low; 43 - 58 = average; 58 - 77 = high. At BL, three QOLI scores were in the very low range (P1 = 24, P3 = 28, P5 = 32) and three QOLI scores were in the average range (P2 = 53, P4 = 57, P6 = 46). At post-EXP, four participants remained in the same category, but two participants in the very low range at BL moved up to the average range. On average, participants were in the low range at BL ($M = 40.00$, $SD = 13.84$), and they were in the average range at post-EXP ($M = 48.33$, $SD = 8.62$). In sum, two participants demonstrated some improvements in quality of life, but overall changes in quality of life were not substantial.

Table 3-5: Quality of Life

	BL	Post-EXP
	T-Score (Percentile)	T-Score (Percentile)
P1	24 (2%)	32 (5%)
P2	53 (61%)	46 (34%)
P3	28 (3%)	50 (49%)
P4	57 (78%)	54 (66%)
P5	32 (5%)	54 (66%)
P6	46 (34%)	54 (66%)
	BL	Post-EXP
	<i>M (SD)</i>	<i>M (SD)</i>
T-Score	40.00 (13.84)	48.33 (8.62)
Percentile	30.50 (32.92)	47.67 (24.57)

Note. BL = baseline scores; Post-EXP = scores following EXP sessions.

A table presenting the between-EXP-session changes on self-report of anxiety and stuttering frequency among participants can be found in Appendix C. The table presents the participants' peak SUDs and peak %WS at the beginning (Session 1), middle (Session 5), and end (Session 10) of EXP. The peak SUDs for each participant demonstrates a negative trend over time, which represents a reduction in peak anxiety between EXP sessions. The peak %WS for P1, P2, P4, and P5 demonstrates a negative trend over time, which represents a reduction in peak stuttering frequency between EXP sessions. The peak %WS for P3 increased from the beginning to the middle of EXP, and decreased slightly from the middle to the end. The peak %WS for P6 remained stable from the beginning to the middle of EXP, and increased from the middle to the end. Overall, the peak SUDs consistently reduced over time, and the peak %WS also reduced over time, although less consistently.

A table presenting the between-EXP-session changes on objective observer ratings can be found in Appendix D. The table presents the blinded observer ratings of level of anxiety (1 = *none* to 5 = *very severe*), level of stuttering (1 = *none* to 5 = *very severe*), and overall effectiveness of the presentation (1 = *not at all* to 5 = *extremely*). The table includes the mean ratings across participants for each session. An examination of the mean scores reveals a steady negative trend in level of anxiety, a lesser but still apparent negative trend in level of stuttering, and a positive trend in overall effectiveness of the presentation. Upon examination of individual scores, P6 stands out as an exception, as their anxiety, stuttering, and effectiveness ratings remain relatively stable over time.

CHAPTER 4: DISCUSSION

This study utilized a multiple baseline design to evaluate the efficacy of an exposure therapy protocol developed to reduce social anxiety among adults who stutter and have SAD. This study also sought to examine whether the hypothesized reduction in social anxiety was accompanied by a reduction in stuttering severity. The results indicated that, consistent with our hypotheses, there were no substantial decreases in social anxiety during the baseline or PMR phases, but five of the six participants demonstrated a gradual and substantial reduction in social anxiety throughout the EXP phase. One participant demonstrated a reduction in social anxiety during the baseline phase, and a small but apparent reduction in social anxiety during the PMR phase, which persisted throughout the EXP phase, suggesting a placebo effect (Wampold, Minami, Tierney, Baskin, & Bhati, 2005). These data suggest that the decrease in social anxiety is likely not due to repeated assessments, self-monitoring, time, chance, regression to the mean, or spontaneous recovery, but to EXP. The efficacy of EXP to reduce social anxiety was further supported in measures administered at major assessment points: following PMR, social anxiety was slightly, but not markedly improved compared to baseline, but social anxiety was substantially improved following EXP.

Although less robust than social anxiety, state anxiety displayed a similar pattern: minimal reduction following PMR, but moderate reduction following EXP. These findings add to the literature that PMR alone has minimal effects in reducing social anxiety (see Rodebaugh et al., 2004), but contradict the literature that PMR is effective in reducing general anxiety (see Conrad & Roth, 2007). However, it is important to note two caveats. First, the role of PMR in

this study was simply that of a psychological placebo and a small number of sessions were provided to the participants. The very brief duration of the PMR intervention likely limited its effectiveness. Second, the population for this study included only participants with social anxiety disorder, and none met criteria for generalized anxiety disorder. Participants with generalized anxiety disorder may have demonstrated a greater reduction in general anxiety following PMR.

Stuttering frequency did not demonstrate consistent change across participants. In at least three of the participants, the interventions did not appear to influence stuttering frequency in any consistent way. Perhaps the participants who demonstrated a reduction in anxiety, but no significant change in stuttering frequency, represent a portion of the population whose stutter is discrete from their anxiety.

These findings are consistent with other research reporting improvements in psychological functioning, but no predictable change in speech fluency, following a CBT intervention (see Helgadóttir et al., 2014; Menzies et al., 2016; Menzies et al., 2008). The outcome of this investigation differs from several other investigations that reported speech fluency improvement along with improved psychological functioning (see Gupta, 2016; Gupta et al., 2016; Reddy et al., 2010); however, those studies incorporated an unknown amount of speech therapy into their therapeutic programs, which could have accounted for the improvements in speech fluency. In his proof-of-concept conference paper presentation, Walkom (2016) reported psychological and fluency gains using virtual reality EXP. However, outcomes were not rigorously assessed and detailed outcome data was not provided. In regards to speech fluency outcomes, he simply stated, “the participants showed signs of speaking more fluently.”

EXP appeared to most strongly influence the stuttering frequency of the two participants with the highest levels of stuttering frequency. Perhaps anxiety plays a more significant role in more severe cases of stuttering (Craig, Blumgart, & Tran, 2009; Iverach, Lowe, et al., 2017). However, EXP influenced the stuttering frequency for these two participants in opposite directions. The unique effects of EXP on stuttering frequency hint at the possibility of subgroups among people who stutter and have SAD. While anxiety may have no role in stuttering frequency for some people who stutter, it may play a larger role for people with higher levels of stuttering frequency. Future research should consider this possibility.

Despite equivocal results regarding stuttering frequency, there were consistent improvements in the affective, behavioral, and cognitive experiences of stuttering. The affective, behavioral, and cognitive experiences of stuttering followed a similar pattern to anxiety – minor improvements following PMR and substantial improvements following EXP. Notably, participants reported a reduction in self-reported speech disruption. Thus, the participants reported improvements in their speech fluency in particular situations despite no consistent change in percentage of words stuttered. EXP may have its limits in reducing stuttering frequency among people who stutter and have SAD, but this study provides support for the effectiveness of EXP in improving their experience of stuttering.

The self-focused attention theory, which postulates that excessive self-focused attention plays a role in a variety of psychopathologies, may provide an explanation for these findings (see Ingram, 1990 for a review). Clark and Wells (1995) and Rapee and Heimberg (1997) integrated the concept into a model for social anxiety specifically, theorizing that excessive self-focused attention before, during, and after social interactions generates and maintains social anxiety (for

reviews, see Bögels & Mansell, 2004; Norton & Abbott, 2016; Spurr & Stopa, 2002).

Therapeutically, reductions in self-focused attention are associated with less anxiety and social fear and less self-criticism (Woody, Chambless, & Glass, 1997). It is possible that in the present study, as social anxiety reduced, so too did the focus on the self, including self-perceived speech disruption. Future research could examine self-focused attention as a possible mechanism of change.

Although four of the six participants showed no significant change in quality of life, two of the three participants whose quality of life was very low at baseline made substantial gains by the post-EXP assessment. Although this may have been due to regression to the mean, both of these participants experienced substantial reductions in social anxiety. The EXP intervention was brief (typically lasting four to five weeks), but improved functioning may translate to meaningful life changes that may boost overall quality of life, and participants' quality of life may improve over time. Longer-term follow-up may be needed to determine the full impact on quality of life.

The final aim of this study was to examine participants' experience of EXP. Without exception, participants reported high treatment expectancy and rationale credibility for EXP. They provided these ratings after two sessions of EXP, arguably the most difficult sessions. Additionally, zero participants began EXP and subsequently dropped out. Concerns that this population cannot handle the intensive format of this therapy are not warranted. It is clear that EXP is acceptable and efficacious for this population. Finally, the between-EXP-session variables were examined. All participants demonstrated between-EXP-session anxiety habituation demonstrated by their self-report and scores by observers. These data are consistent with emotional processing theory as the mechanism by which EXP works. The peak %WS also

reduced between sessions, although less consistently. It is unclear whether this trend is an accurate reflection of reduced stuttering frequency over time or whether it is due to sampling error. Although the hypothesis was that as anxiety reduced, so too would stuttering frequency, this was not the case in the speech samples collected at major assessment points. Future research should include participants with more variability in stuttering severity and a larger sample size, and those data should be analyzed using inferential statistical procedures to further examine this issue.

Interestingly, despite the lack of substantial change in stuttering frequency, the objective ratings of the blinded raters support a more consistent negative trend. Thus, even if the participants had no actual change in percentage of words stuttered, there was something about their presentations that led the raters to observe less disruption in their speech over time. It is a limitation of this study that stuttering frequency was coded dichotomously. It is possible that there was a change in the stuttering over time that was not captured in the dichotomous categorization of words as either stuttered or not stuttered. For example, “st-st-st-st-st-stop” and “st-stop” would both be considered a stuttered word, whereas the speech is clearly more disrupted in the former. Unfortunately, that was beyond the scope of this study, but would be worthy of future investigation.

The blinded raters also rated overall effectiveness of the presentations. These ratings demonstrated a positive trend, meaning that the raters perceived the participants as more natural, more engaging, and more comfortable during their speeches over time. A common concern among the participants entering the study was distress and avoidance of public speaking at school and work, which they saw as impeding their potential to succeed in these areas. No

coaching or training about public speaking was provided during the intervention, yet the participants made gains in this area. This finding represents a clinically significant positive outcome.

Overall, this study supports the use of intensive EXP for people who stutter and have SAD. Research on the use of CBT with this population is growing, but still limited. The mere mention of EXP is scant. For example, a recent review of therapies for stuttering included few references to CBT, and zero references to behavioral or exposure-based therapies (Humeniuk & Tarkowski, 2016). Nonetheless, people who stutter value treatment that targets psychological concerns, emphasizing that emotions and attitudes should be addressed in therapy for stuttering, regardless of the aim to improve speech fluency (Humeniuk & Tarkowski, 2016; Lindsay & Langevin, 2017). The results of the present study demonstrate the considerable gains that can occur in relatively few sessions of EXP. As researchers continue to refine treatments for people who stutter, the potential of EXP merits further use.

An area of research that would be worthwhile to explore is the use of virtual reality. Virtual reality has demonstrated effectiveness in the treatment of SAD (Anderson et al., 2013; Anderson, Rothbaum, & Hodges, 2003; Klinger et al., 2005). The EXP sessions in the present study required several people to be available to play the role of the audience, which may not be as feasible in community settings. Walkom (2016) reported that speaking to virtual audiences showed promise in reducing anxiety and stuttering severity among people who stutter. Future research should investigate this promising mode of exposure-based intervention with increased rigor. That said, any version of CBT for people who stutter should be developed in conjunction with speech-language pathologists, as they are the traditional service providers for people who

stutter and can offer knowledge and insight into the unique situations of people who stutter. Similarly, it would be beneficial to obtain feedback from actual people who stutter throughout the development process.

This study has several strengths. The multiple baseline design controlled for threats to internal validity. The inclusion of a psychological placebo controlled for change due to the common factors of therapy, which increased support for the unique effectiveness of EXP. The EXP protocol was developed specifically for a population that is comorbid for stuttering and SAD. Inclusion was limited to people who met clinical criteria for stuttering and other communication disorders were excluded, so this increases confidence that the effects found in this study will generalize to the population of people who stutter. Further, the effect was replicated across diverse individuals, which also increases generalizability. There was a substantial decrease in anxiety levels after a relatively brief intervention. Outcome measures included self-report, clinician-ratings, and objective observer ratings. None of the participants dropped-out of the study after starting EXP.

This study has limitations. A single therapist administered all of the treatment and most of the assessment; therefore, it is not possible to rule out the influence of therapist-specific effects, demand characteristics, and observer effects. Future research should evaluate the intervention administered by diverse therapists and incorporate a larger sample. While limiting inclusion to people who met clinical criteria for stuttering (and no other communication disorders) aids in the ability to generalize the finding to the population of people who stutter, this limits the ability to generalize the findings to people with other communication disorders. An

important future direction would be to evaluate the effectiveness of EXP for people with diverse communication disorders.

In summary, the findings from this study provide preliminary evidence of the effectiveness of exposure therapy in reducing anxiety and improving the affective, behavioral, and cognitive experiences of stuttering among people who stutter and have SAD. This finding is in line with other research in this area that supports the effectiveness of CBT with this population. The brief nature of the intervention makes it well suited as a stand-alone intervention, or as an adjunct to other treatments, such as speech therapy. Speech-language pathologists and clinical psychologists should work together to develop, evaluate, and disseminate the best care practices for this population.

APPENDIX A: DAILY BEHAVIORAL RATINGS FORM

Daily Behavioral Ratings

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Date:							
Social							
Overall Social Anxiety (0-10 scale)							
Additional Social Interactions (number)							
Additional Social Interactions (total mins)							
Avoided Social Interactions (number)							
Speaking							
Overall Speaking Anxiety (0-10 scale)							
Additional Speaking Situations (number)							
Additional Speaking Situations (total mins)							
Avoided Speaking Situations (number)							

Social

Overall Social Anxiety (0-10 scale): Think over your whole day. How would you rate your overall anxiety due to social interactions or the possibility of social interactions?

Additional Social Interactions (number): Did you engage in any social interactions that you would have normally avoided due to fear and/or anxiety? How many?

Additional Social Interactions (total mins): If you added all of the interactions you listed above, how many minutes does that amount to?

Avoided Social Interactions (number): Did you avoid any social interactions due to fear and/or anxiety? How many?

Speaking

Overall Speaking Anxiety (0-10 scale): Think over your whole day. How would you rate your overall anxiety due to speaking in front of people or the prospect of having to speak in front of others?

Additional Speaking Situations (number): Did you engage in any speaking situations that you would have normally avoided due to fear and/or anxiety? How many?

Additional Speaking Situations (total mins): If you added all of the speaking situations you listed above, how many minutes does that amount to?

Avoided Speaking Situations (number): Did you avoid any situations in which you would have to speak due to fear and/or anxiety? How many?

APPENDIX B: BLINDED OBSERVER RATINGS FORM

Participant ID: _____

Name of Speech: _____

Rater ID: _____

Directions: After viewing 20 minutes of the task, rate the speaker on the three items listed below.

1. What is the speaker's level of anxiety?

1-----2-----3-----4-----5
None Mild Moderate Severe Very Severe

Frequent eye contact ----- Minimal eye contact
Appropriate volume of speech ----- Low voice
Occasional spontaneous speech ----- Lack of spontaneous speech
Relaxed posture ----- Tense/ frozen posture
Open body position ----- Hiding behind furniture/props
Natural body movement ----- Excessive gross motor movements
(Hand wringing, leg shaking, fidgeting)

2. What is the speaker's level of stuttering?

1-----2-----3-----4-----5
None Mild Moderate Severe Very Severe

Minimal identifiable stutters ----- Frequent stuttering
Minimal disruption to speech ----- Very disruptive to speech

3. How would you rate the overall effectiveness of this person's presentation?

1-----2-----3-----4-----5
Not at all Mildly Moderately Very Extremely

Looks awkward ----- Looks natural
Unengaging ----- Engaging
Appears uncomfortable ----- Appears to enjoy presenting

**APPENDIX C: PEAK SUDS AND PEAK %WS AT THE BEGINNING,
MIDDLE, AND END OF EXPOSURE THERAPY**

Peak SUDs and Peak %WS at the Beginning, Middle, and End of Exposure Therapy

	Session 1	Session 5	Session 10
P1			
<i>Peak SUDS</i>	6	2	0
<i>Peak %WS</i>	23.91%	17.32%	16.27%
P2			
<i>Peak SUDS</i>	6	5	4
<i>Peak %WS</i>	19.57%	17.95%	12.50%
P3			
<i>Peak SUDS</i>	6	3	1
<i>Peak %WS</i>	3.21%	6.50%	4.16%
P4			
<i>Peak SUDS</i>	5	3	2
<i>Peak %WS</i>	5.35%	3.13%	3.59%
P5			
<i>Peak SUDS</i>	8	4	1
<i>Peak %WS</i>	30.77%	19.16%	20.52%
P6			
<i>Peak SUDS</i>	5	1	1
<i>Peak %WS</i>	9.33%	9.11%	12.40%
Mean			
<i>Peak SUDS</i>	6	3	1.5
<i>Peak %WS</i>	15.36%	12.20%	11.57%

Note. P = Participant.

**APPENDIX D: BLINDED OBSERVER RATINGS OF PARTICIPANTS'
ANXIETY, STUTTERING, AND THE OVERALL EFFECTIVENESS
OF THEIR PRESENTATION**

Blinded Observer Ratings of Participants' Anxiety, Stuttering, and the Overall Effectiveness of Their Presentation

	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
P1										
<i>Anxiety</i>	4	2	4	3	2	2	3	3	2	2
<i>Stuttering</i>	5	4	3	4	3	3	3	2	3	2
<i>Effectiveness</i>	3	2	3	3	3	4	2	2	2	3
P2										
<i>Anxiety</i>	3	5	4	2	2	3	4	2	1	2
<i>Stuttering</i>	3	3	4	3	4	3	4	3	2	3
<i>Effectiveness</i>	3	2	2	4	3	3	2	3	4	4
P3										
<i>Anxiety</i>	4	4	3	3	3	3	2	2	2	2
<i>Stuttering</i>	3	3	2	3	3	2	2	2	3	2
<i>Effectiveness</i>	2	2	3	2	2	2	3	4	3	3
P4										
<i>Anxiety</i>	3	3	3	2	1	1	2	2	1	1
<i>Stuttering</i>	3	4	2	1	1	2	2	2	2	1
<i>Effectiveness</i>	2	3	3	4	4	4	4	4	4	5
P5										
<i>Anxiety</i>	5	4	4	3	3	3	3	3	2	2
<i>Stuttering</i>	5	3	4	4	4	3	3	4	3	3
<i>Effectiveness</i>	2	2	2	2	3	3	3	3	3	4
P6										
<i>Anxiety</i>	2	2	3	2	3	2	2	2	2	2
<i>Stuttering</i>	2	2	2	2	4	2	3	2	3	2
<i>Effectiveness</i>	4	3	2	3	2	4	3	3	3	3
Mean										
<i>Anxiety</i>	3.50	3.33	3.50	2.50	2.33	2.33	2.67	2.33	1.67	1.83
<i>Stuttering</i>	3.50	3.17	2.83	2.83	3.17	2.50	2.83	2.50	2.67	2.17
<i>Effectiveness</i>	2.67	2.33	2.50	3.00	2.83	3.33	2.83	3.17	3.17	3.67

Note. P = Participant; S = Session

APPENDIX E: APPROVAL OF HUMAN RESEARCH



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Human Research

From: UCF Institutional Review Board #1
FWA00000351, IRB00001138

To: Jennifer A. Scheurich and Co-PI: Deborah Casamassa Beidel

Date: May 31, 2016

Dear Researcher:

On 05/31/2016, the IRB approved the following human participant research until 05/30/2017 inclusive:

Type of Review: UCF Initial Review Submission Form
Project Title: Exposure Therapy for Adults Who Stutter with Social Anxiety Disorder: A Multiple Baseline Design
Investigator: Jennifer A. Scheurich
IRB Number: SBE-16-12293
Funding Agency:
Grant Title:
Research ID: N/A

The scientific merit of the research was considered during the IRB review. The Continuing Review Application must be submitted 30 days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form cannot be used to extend the approval period of a study. All forms may be completed and submitted online at <https://iris.research.ucf.edu>.

If continuing review approval is not granted before the expiration date of 05/30/2017, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s).

All data, including signed consent forms if applicable, must be retained and secured per protocol for a minimum of five years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained and secured per protocol. Additional requirements may be imposed by your funding agency, your department, or other entities. Access to data is limited to authorized individuals listed as key study personnel.

In the conduct of this research, you are responsible to follow the requirements of the [Investigator Manual](#).

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

A handwritten signature in black ink that reads "Joanne Muratori". The signature is written in a cursive style with a small dot above the letter 'i' in "Muratori".

Signature applied by Joanne Muratori on 05/31/2016 07:59:58 AM EDT

IRB Manager

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