The Effects of a Brief Acceptance-based Behavior Therapy vs. Traditional Cognitive Behavior Therapy for Public Speaking Anxiety: Differential Effects on Performance and Verbal Working Memory

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Abstract

The Effects of a Brief Acceptance-based Behavior Therapy vs. Traditional Cognitive Behavior Therapy for Public Speaking Anxiety: Differential Effects on Performance and Verbal Working Memory
Lisa Hayley Glassman

Individuals with public speaking phobia experience fear and avoidance that can cause extreme distress, impaired speaking performance, and associated problems in psychosocial functioning. Most extant interventions for public speaking phobia focus on the reduction of anxiety and avoidance, but neglect performance. Additionally, very little is known about the relationship between verbal working memory and social performance under conditions of high anxiety. The current study compared the efficacy of two cognitive behavioral treatments, traditional Cognitive Behavioral Therapy (tCBT) and acceptance-based behavior therapy (ABBT), in enhancing public speaking performance via coping with anxiety. Verbal working memory performance, as measured by the backwards digit span (BDS), was measured to explore the relationships between treatment type, anxiety, performance, and verbal working memory. We randomized 30 individuals with high public speaking anxiety to a 90-minute ABBT or tCBT intervention. As this pilot study was underpowered, results are examined in terms of effect sizes as well as statistical significance. Assessments took place at pre and post-intervention and included self-rated and objective anxiety measurements, a behavioral assessment, ABBT and tCBT process measures, and backwards digit span verbal working memory tests. In order to examine verbal working memory during different levels of anxiety and performance pressure, we gave each participant a backwards digit span task three times during each assessment: once under calm conditions, then again while experiencing anticipatory anxiety, and finally under conditions of acute social performance anxiety in front of an audience. Participants were asked to give a video-recorded speech in front of the audience at pre- and post-intervention to examine speech performance. Results indicated that all participants experienced a very large and statistically significant decrease in anxiety (both during the speech and BDS), as well as an improvement in speech performance...
regardless of intervention received. While not statistically significant, participants who received an acceptance-based intervention exhibited larger improvements in observer-rated speech performance at post-treatment in comparison to tCBT ($F(1,21) = 1.91, p = .18, \eta_p^2 = .08$) such that individuals in the ABBT condition exhibited a considerably greater improvement in observer-rated speech performance than those in the tCBT condition. There was no differential impact of treatment condition on subjective speech anxiety or working memory task performance. Potential mediators and moderators of treatment were also examined. Results provide support for a brief 90-minute intervention for public speaking anxiety, but more research is needed in a study with a larger sample to fully understand the relationship between ABBT strategies and improvements in behavioral performance.
Chapter 1: Introduction

Although feeling anxious while speaking in public is a normal occurrence (Harris, Kemmerling, & North, 2002; Stein, Walker, & Forde, 1996), a subset of the population experiences severe and incapacitating anxiety in these situations (Grant et al., 2005). In fact, approximately 21% of individuals with social anxiety disorder (SAD; also referred to as social phobia) have clinically significant public speaking anxiety but do not experience marked anxiety in other social situations. These individuals have “public speaking anxiety.” Oftentimes cognition and speech performance are significantly impaired as a result of this extreme anxiety (Daly, Vangelisti, & Lawrence, 1989). As a result, these individuals tend to report social and occupational dysfunction and dissatisfaction (Stein, et al., 1996).

Furthermore, individuals with public speaking anxiety tend have poorer speech performances than controls (Hofmann, Gerlach, Wender, & Roth, 1997; Lewin, McNeil, & Lipson, 1996), which can impact educational and occupational success.

Public speaking anxiety is often researched in mixed SAD samples, which include individuals with generalized SAD or other specific social fears. However, the literature is mixed regarding whether public speaking phobia is qualitatively distinct from other SAD subtypes. While several researchers have found differences between generalized and non-generalized SAD symptom and physiological profiles (Eng, Heimberg, Coles, Schneier, & Liebowitz, 2000; Furmark, Tillfors, Stattin, Ekselius, & Fredrikson, 2000), others argue that subtypes fall on a continuum and are not qualitatively distinct (Jorstad-Stein & Heimberg, 2009; Vriends, Becker, Meyer, Michael, & Margraf, 2007). Despite the ongoing discourse, the prevalence of PSA and its associated dysfunction necessitates increased focus on the disorder and its treatment. We cannot assume that the current research on the phenomenology, psychopathology, and treatment response in SAD is applicable to individuals with clinically significant public speaking anxiety alone.

Verbal working memory is a critical component of speech production (Baddeley, 1984). Although there are well-documented links between verbal working memory and speech production, and anxiety and verbal working memory impairment, verbal working
memory has never been examined in a PSA population under conditions of anxiety. Given the established research, it is important to investigate verbal working memory in individuals with PSA as they give a speech, and to determine whether verbal working memory is related to performance deficits in order to clarify the relationship between these constructs in this population.

There are several effective CBT treatments for public speaking anxiety that incorporate both exposure and cognitively-oriented exercises. However, treatment outcome research in public speaking phobia has focused primarily on reducing subjective anxiety. The impact of current treatments on public speaking performance has not received significant attention, and protocols that do examine behavioral performance typically employ inadequate performance measurements. Because individuals with public speaking anxiety tend to give poorer speech performances than controls (Hofmann, et al., 1997; Lewin, et al., 1996) it is critical to determine whether currently available treatments improve speech performance. As such, this study aimed to investigate the performance-enhancing and anxiety-reduction capabilities of two distinct cognitive-behavioral interventions in a public speaking phobic sample.

In sum, in addition to examining performance and working memory functioning in individuals with public speaking anxiety, we also explored whether two putatively distinct cognitive-behavioral interventions (acceptance-based behavioral therapy and traditional cognitive behavioral therapy) have differential effects on verbal working memory, speech performance, or subjective anxiety.

1.1. Public speaking anxiety

Speaking in public is a critical component of many occupational and educational settings. Moreover, a significant percentage of the population (estimates range from 34% to 85%) experience anxiety during speech performance. This anxiety often interferes with cognitive functioning by impairing an individual’s ability to focus on their speech, think clearly, read notes, form sentences, and utter speech with proper volume and diction. Furthermore, this anxiety can be extremely difficult to manage (Motley, 1995; Stein, et al.,
Public speaking anxiety is often associated with unemployment and lower income (Motley, 1995). Although many cases of public speaking phobia are not debilitating, the associated fear and avoidance usually cause intense distress and significant disruption in social, academic, and occupational functioning. When speech anxiety is severe and clinically significant, and the individual does not experience anxiety in any other social situations, they are classified as having public speaking anxiety. In the DSM-5 (American Psychiatric Association, 2013), PSA is classified as a subtype of social anxiety disorder. Because public speaking anxiety can have such a significant impact on life satisfaction and functioning, continued research on this population is critical.

In comparison to individuals who experience mild anxiety when speaking in public, those with public speaking anxiety often experience cognitive, physiological, and emotional reactions that make it difficult to perform. Furthermore, this distress often leads to behavioral avoidance, which maintains the cycle of anxiety. In order to better elucidate the best treatments for reducing anxiety and improving performance in this population, we must examine the PSA construct and the cognitive and performance deficits that individuals with PSA experience when in front of an audience.

1.1.1. Public Speaking Anxiety as a Distinct Subtype of SAD

Recent research on social anxiety has investigated potential subtypes within the SAD spectrum. Some studies suggest that performance anxiety is a distinct subtype of SAD, identifying key physiological and behavioral characteristics unique to a performance anxiety subtype. Eng, et al. (2000) gave the Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987) to 382 individuals with SAD. Using a cluster analysis, the authors found three distinct symptom subtypes: Pervasive Social Anxiety (similar to a generalized subtype), Moderate Social Interaction Anxiety, and Dominant Public Speaking Anxiety. Furmark, et al. (2000) performed a hierarchical cluster analysis on 188 individuals who qualified for a diagnosis of SAD. Their analysis generated three factors that mirrored Eng’s research findings. These studies indicate that specific social anxieties, like public speaking anxiety, are distinct from generalized social phobia.
Multiple studies have also demonstrated that individuals with generalized SAD (who also fear public speaking) exhibit different physiological responses during a speech performance task than public speaking phobics. During a speech, individuals with generalized SAD experience a slow increase in heart rate at the beginning of a task and then steadily return to baseline. However, individuals who only fear public speaking experience a spike in heart rate at the beginning of the task and return to baseline more quickly (R. G. Heimberg, Hope, Dodge, & Becker, 1990; Hofmann, Ehlers, Newman, & Roth, 1995; Levin et al., 1993). Researchers hypothesize that these physiological differences may reflect disparities in the experience of anxiety between subtypes (e.g., generalized social phobics are more resigned to an impaired performance).

Conversely, findings from other studies indicate that subtypes are not qualitatively different and the field should adopt a continuum approach. For example, Vriends, et al. (2007) surveyed over 1800 German females. In this sample, the number of feared social situations was continuously distributed without a clear delineation between SAD subtypes. Furthermore, functional impairment, comorbidity, and dysfunctional attitudes were significantly associated with the number of feared situations. These authors asserted that a continuum based on the number of feared situations would be a better classification system than type of feared situation (Vriends, et al., 2007).

Additional research is needed to determine whether or not social anxiety disorder is best classified as a compilation of distinct subtypes or as a continuum. Research findings suggesting that a continuum perspective is warranted do not account for the physiological differences experienced during public speaking tasks, which may belie cognitive or affective differences between groups. We used a PSA-only sample in this study, as performance, anxiety and cognitive constructs were utilized as primary outcome variables. Furthermore, whether or not generalized SAD and PSA are qualitatively distinct, the vast majority of research has not attempted to examine PSA alone. Results of treatment outcome studies are of particular concern, as we cannot be sure that this research generalizes to PSA populations.
1.1.2. Performance Deficits

Although multiple studies have reported poor social performance in individuals with SAD in general (Beidel, Turner, & Dancu, 1985; Stopa & Clark, 1993; Twentyman & McFall, 1975) there is surprisingly little information on speech performance deficits in PSA per se and on the cognitive mediators of this relationship. Furthermore, the majority of speech performance data that does exist has been collected using self-report measures. As individuals are generally inaccurate in self-appraisals of performance (Campbell & Lee, 1988), the validity of these data is unclear. However, a small number of studies have used behavioral measurements and provide preliminary evidence of noteworthy speech performance deficits in speech phobia.

Hofmann, et al. (1997) examined speech performance in 14 individuals with public speaking anxiety. Compared to controls, participants with public speaking anxiety paused more frequently and for a longer duration. They also used a greater number of “ah”-like utterances as rated by objective observers. These results replicated those of a previous study (Lewin, et al., 1996). Furthermore, individuals with public speaking anxiety tended to avoid eye contact with the audience more than non-anxious participants during a speech task (Eves & Marks, 1991). Eye contact and speech fluency are both critical public speaking skills. A lack of eye contact and lengthy pauses can impair performance significantly (Daly, et al., 1989). While this research supports the relationship between public speaking anxiety and associated speech performance deficits, we don’t know the reasons this relationship exists. One potential explanation is that the cognitive processes triggered in response to perceived social threat utilize working memory resources and divert these resources away from speech-related activities, thus degrading performance. However, this hypothesis has yet to be examined.

1.2. Working Memory

Working memory describes the dynamic process of maintaining information in temporary storage while simultaneously applying that information toward goal-oriented tasks (Engle, Kane, & Tuholski, 1999). Working memory, particularly verbal working memory, is
a critical component of speaking logically and fluently, encoding and retrieving verbal information, and performing other complex cognitive tasks. Verbal working memory refers to the temporary maintenance and manipulation of verbal information, including the phonological and articulatory components of the working memory system (Baddeley, 1986). Given our interest in speech production and the cognitive (and often verbal) correlates of public speaking anxiety (e.g., self-focused attention and cognitive distortions), we are primarily interested in the role of verbal working memory in PSA and speech performance.

Current models of working memory describe three major components that accomplish these tasks, often referred to as the Tripartite Model of Working Memory or the Multiple-Component Model (Baddeley, 1986; Baddeley & Hitch, 1974). The first component of working memory, called the phonological loop, stores auditory information for short-term use. The visuospatial scratchpad is the second component of working memory, maintaining color, form, spatial and kinesthetic information. Finally, the central executive system controls the phonological loop and visuospatial scratchpad, and manages and directs attentional resources by focusing, dividing, and switching attention (Baddeley, 2002). Shifting allows attentional resources to switch between different components that are necessary to complete a more complex task (e.g., giving a speech). Shifting may also allow an individual to perform a new task despite significant interference (Wylie & Allport, 2000).

Working memory has a limited capacity for retaining and manipulating information (Pennington, 1994; Roberts Jr & Pennington, 1996). Sharing attention between irrelevant and goal-oriented stimuli consumes the cognitive resources necessary for peak working memory capacity (Stoltzfus, Hasher, & Zacks, 1996). Unsurprisingly, the dispersion of working memory in the presence of off-task demands taxes the cognitive resources necessary for on-task demands (Blackwood, MacHale, Power, Goodwin, & Lawrie, 1998). Off-task demands that compete for resources may include external (e.g., visual) or internal (e.g., thoughts, emotions) stimuli. As a result, working memory is particularly affected by acute stressors, which are associated with an increase in negative affect and anxiety. Individuals with public speaking anxiety may be particularly vulnerable, as they experience an increase in anxiety,
self-focused attention, and external cues (e.g., audience faces, social feedback) – all of which will compete with speech-related tasks for working memory resources.

As a limited capacity system, the external and internal stimuli associated with affective states can overwhelm and consume cognitive resources. In turn, this consumption of resources can affect an individual’s ability to perform any other tasks that require working memory, including the ability to speak logically, comprehend information, encode and retrieve memories, and to perform other complex cognitive tasks (Kniele, 2004). As such, the examination of the relationships between working memory, public speaking anxiety, and performance may help clarify the dynamics of PSA and its treatment.

1.2.1 Working memory and public speaking

Current models of speech production identify three levels of processing that are integral to the production of language (Dell, 1986; Kempen & Huijbers, 1983; Levelt, 1989). In the first stage, conceptualization, preverbal, non-linguistic messages are generated that specify the concepts that will be verbalized later (Levelt, 1989, 1999). Next, in the formulation phase, these preverbal messages are mapped onto the linguistic structure and an individual creates a phonetic and articulatory plan (Dell, 1986). Finally, in the articulation phase, the initiation and execution of a phonetic plan result in overt speech. Motor memories are retrieved from the syllabary, which stores articulatory movements that are associated with lexical information, in this phase as well (Cholin, Levelt, & Schiller, 2006). Speakers are constantly monitoring their articulations, feeding information back into both the speech production and speech comprehension systems (Levelt, 1989), and planning what to say while simultaneously executing the current speech plan (Clark & Clark, 1977; Ford & Holmes, 1978; Power, 1986)

Language production and organization rely heavily on the maintenance and successive production of linguistic information. Verbal working memory is integral to this system (Baddeley, 1984, 1986). This form of working memory stores information as individuals work through each level of speech production described above and allows them to string together the final vocal output by manipulating the stored data (Baddeley, 1984).
There is little research examining the relationship between verbal working memory and speech when the speaker is in front of an audience or in a similar state of heightened anxiety. However, when individuals speak in front of an audience, they are likely simultaneously engaging in two tasks: giving the speech and scanning the audience looking for, and responding to, perceived social threats. These two processes may compete for working memory resources and limit the cognitive energy available for speech-related processes. While all individuals may experience this competition of resources, this process is likely heightened in individuals with PSA.

In sum, verbal working memory allows an individual to retrieve and process verbal information while simultaneously expressing that information to an audience. During public speaking tasks, verbal working memory may be split between speech-related activity and social oriented processing, potentially impairing speech performance. Because verbal working memory is critical to speech production, it is an important construct to investigate as a potential influence on the relationship between public speaking anxiety and performance. Non-verbal behaviors (e.g., eye contact and gesticulations) are also a critical component of public speaking. As these activities are not automatic, individuals with PSA must often remind themselves to engage in these behaviors and monitor their use. These processes may further consume verbal working memory resources.

1.2.2 Working memory and PSA

Whereas speech production may operate without difficulty for a majority of individuals, those with PSA experience changes in mood and cognition when they speak in front of an audience. Cognitive models of public speaking anxiety generally focus on the role of attention and cognitive distortions in the development and maintenance of public speaking phobia. When an individual suffers from public speaking anxiety, his or her attention often becomes overly focused inward on internal experiences (i.e., self-focused attention) and the individual engages in more worry and rumination compared to non-anxious counterparts (Hope, Rapee, Heimberg, & Mattia, 1989; Rapee & Heimberg, 1997; Teasdale, Segal, &
Williams, 1995). Oftentimes this self-focused attention restricts an individual’s ability to attend to speech performance and other stimuli.

Distorted beliefs also play a large role in the cognitive model of PSA. Clark and Wells (1995) model suggests that when individuals with social anxiety encounter a social situation, they tend to have unrealistically high standards of performance and unrealistically negative assumptions about their social performance failures (Alden & Wallace, 1995; Rapee & Heimberg, 1997; Stopa & Clark, 1993). These cognitions are difficult to control (Hackmann, Surawy, & Clark, 1998). Distorted beliefs maintain and strengthen self-focused attention, and the individual often expends a significant amount of energy attempting to control or reduce anxiety to avoid social ostracizing and other negative consequences (Clark & Wells, 2005). These cognitive activities continue to divert attention away from the speech and towards an individual’s internal and emotional experience, and may further degrade performance.

Attentional control theory (Eysenck, Derakshan, Santos, & Calvo, 2007) seeks to explain this relationship between cognition, anxiety and performance. This theory asserts that the effects of anxiety on attentional processes are critical to performance deficits. Attention is regulated by a goal-directed attentional system and a stimulus-driven attention system. Anxiety inhibits goal-directed attention and diverts more resources to stimulus-driven attention, which processes more salient, potentially threatening stimuli (Eysenck, et al., 2007). Thus, anxious individuals may be allocating attentional resources to threat-related stimuli whether internal (e.g., worrisome thoughts) or external (e.g., threatening task-irrelevant distractors) at the expense of goal-oriented behaviors (Eysenck, et al., 2007).

The dysregulation between goal-directed and stimulus-driven attention is also hypothesized to interfere with inhibition and shifting components of working memory (Kane & Engle, 2003). In public speaking anxiety, this may manifest as a competition between “threatening” environmental and social cues and speech-related processes (Hopko, Ashcraft, Gute, Ruggiero, & Lewis, 1998). The speaker is unable to adequately inhibit social and internal stimuli that are perceived as threatening, and the working memory system is
overwhelmed and not able to process all of this added information. In turn, speech performance is degraded.

Taken together, there is evidence for differential cognitive functioning of verbal working memory and attention in individuals with public speaking anxiety when compared to non-anxious controls. These changes in cognition may degrade performance due to the diversion of attention and working memory resources from speech-related tasks to irrelevant and more salient external and internal environmental stimuli.

1.2.3. Anxiety and working memory

The relationship between anxiety and working memory-dependent task performance is well documented (see Zeidner & Matthews, 2005 for a review). Recent studies have largely focused on state and/or trait anxiety (often measured by the State-Trait Anxiety Inventory; Spielberger, 1983) or experimentally manipulated anxiety in non-clinical controls. Research on the relationship between working memory and social anxiety is much less developed. However, preliminary results indicate that high levels of psychosocial anxiety also impair performance on tests of verbal working memory.

Several studies have demonstrated a correlational relationship between trait anxiety and impaired performance on tests of working memory (Klein & Barnes, 1994; Rankin, Gilner, Gfeller, & Katz, 1994). Other research groups have experimentally manipulated anxiety in order to examine the effects of acute anxiety on working memory. Sorg and Whitney (1992) investigated the relationship between verbal working memory and anxiety by randomizing individuals to a high-anxiety condition (playing a stressful video game) or a control condition. Results indicated that individuals with high trait anxiety performed worse on tests of working memory, as measured by reading span, when under acute stress (Sorg & Whitney, 1992). These results have been replicated in an undergraduate population (Northern, 2010). Furthermore, in the later study, negative self-statements mediated the relationship between anxiety condition and performance on verbal working memory tasks, explaining 23% of the variance in the relationship (Northern, 2010).

There is some evidence that the relationship between anxiety and working memory
depends on the emotional context of the task being processed. Gray (2001) found that reward-seeking states impaired spatial performance, whereas these states improved verbal performance. Conversely, withdrawal states (e.g., tasks that increase anxiety) improved spatial performance and impaired verbal working memory (Gray, 2001). This effect indicates that there is a selective effect of emotion on different aspects of cognition, and supports current theories of emotion-cognition interaction between verbal working memory and anxiety (Ashby, Isen, & Turken, 1999; Heller & Nitscke, 1997; Tomarken & Keener, 1998).

Taken together, research points to a link between anxiety and impaired performance on tests of verbal working memory. Not only has anxiety been correlated with performance decline, but several experimental studies have manipulated anxiety levels and suggested that there may be a causal relationship between anxiety and verbal working memory functioning.

1.2.4. Social anxiety and working memory

A few studies have examined working memory in response to social stressors. Schoofs, Preuss, and Wolf (2008) gave non-psychiatric controls an n-back working memory test following the Trier Social Stress Test (TSST). During the n-back test, participants monitor a series of briefly presented verbal stimuli and must determine if the currently presented stimulus is the same as one presented several trials before. This task emphasizes monitoring and constantly updating verbal working memory (see Unsworth & Engle, 2007). The Trier Social Stress Test requires participants to perform a speech and a mental arithmetic task in front of a committee who pretend to evaluate performance and who do not provide any positive feedback. The TSST has been shown to increase anxiety and cortisol during and following administration in a variety of clinical and non-clinical populations (see Birkett, 2011 for a review). Schoofs, et al. (2008) observed that n-back scores were significantly lower following this intense social stressor, suggesting that psychosocial anxiety consumes working memory resources, resulting in degraded performance on working memory tasks. The relationship between decreased verbal working memory functioning and TSST-induced psychosocial anxiety has also been replicated using other measures of verbal working memory (Luethi, Meier, & Sandi, 2009; Oei, Everaerd, Elzinga, van Well, & Bermond,
Only one study examined verbal working memory in front of a TSST audience among non-psychiatric participants. Working memory performance was degraded on both forward and backward digit span tasks in individuals who completed these tasks in front of an audience, compared to a control condition that did not need to speak in front of an audience (Elzinga & Roelofs, 2005).

In sum, psychosocial anxiety appears to also be associated with increased demand on verbal working memory functioning. However, these studies have not been conducted in individuals with PSA. Given that verbal working memory has a limited capacity, negative emotional states and increases in self-focused attention may reduce verbal working memory resources available for delivering a speech and may degrade speech performance. We hypothesize that interventions that demand fewer verbal working memory resources may serve to improve speech performance, independent of whether or not anxiety is diminished. Thus, it is important to examine the utilization of verbal working memory resources rather than anxiety. Further research is needed to examine whether psychosocial anxiety diverts verbal working memory resources away from goal-directed processes (e.g., speech-related) in individuals with PSA, resulting in decreased performance on these tasks. If this relationship does exist, improvements on tests of verbal working memory may be an important predictor of performance improvement after PSA intervention.

1.3. Cognitive-Behavioral Treatments for Public Speaking Anxiety

Cognitive-behavioral treatments (CBT) are empirically established treatments for SAD. These treatments can be employed in both individual and group formats, as research indicates that methods produce equivalent results (Rodebaugh, Holaway, & Heimberg, 2004). A recent meta-analysis of 24 studies reported a large mean effect size ($d = .74$) of standard cognitive behavioral treatments for SAD, with exposure-alone and exposure combined with standard CBT as the most effective (Gould, Buckminster, Pollack, Otto, & Yap, 1997). CBT treatments have been shown to reduce cognitive dysfunction in social anxiety, reducing the
severity and frequency of distorted cognitions and self-focus in addition to reducing subjective anxiety (Feske & Chambless, 1995; Woody, Chambless, & Glass, 1997).

Despite this encouraging evidence for the efficacy of cognitive-behavioral treatments, these studies primarily used a mixed-SAD sample and most did not report observer-rated speech performance data or examine the role of working memory on outcomes. As a result, the benefits of these treatments for individuals with public speaking anxiety and their impact on speech performance and working memory remain unclear.

1.3.1 Traditional Cognitive-Behavioral Treatments for Public Speaking Anxiety

There are multiple cognitive-behavioral treatments available for SAD. CBT treatments typically employ both behavioral exposure and cognitive restructuring techniques. Although CBT is a broad term that encompasses a large number of therapeutic approaches (Forman & Herbert, 2009; Herbert & Forman, 2011), traditional Beckian Cognitive Behavioral Therapy (tCBT), which emphasizes the identification and restructuring of distorted or dysfunctional cognitions, has received the most attention for SAD. For example, individuals with public speaking anxiety are taught to identify thoughts and underlying beliefs that trigger emotional reactions (e.g., "I'll go blank in the middle of my speech and everyone will think I'm stupid"), and then replace these cognitions with more accurate, functional thoughts. Negative self-evaluative thoughts and overestimations of the probability of negative outcomes are also targets of reappraisal. Exposure methods are included to target behavioral avoidance, and are a means of testing the validity of dysfunctional and irrational cognitions. The goal of tCBT treatment is anxiety reduction through disputing thoughts and participating in exposure exercises.

1.3.1.1 Traditional Cognitive-Behavioral Therapy and Working Memory

tCBT for public speaking anxiety teaches individuals to dispute and restructure their maladaptive cognitions with the goal of reducing their anxiety. Reduction in anxiety often leads to decreased worry and self-focus (Feske & Chambless, 1995). However, tCBT strategies may also consume working memory resources. Given that a central goal of tCBT is anxiety reduction, a person attempting to carry out this goal seems likely to consume
working memory resources as he monitors his affective state and undertakes various strategies. One of the core strategies of tCBT is cognitive restructuring, which involves tuning in to one’s thoughts, evaluating these thoughts for accuracy and constructing more accurate alternative thoughts. Each of these efforts is likely to tax verbal working memory resources. Thus, tCBT strategies may lead to improvements in subjective anxiety compared to baseline, but speech performance may remain more impaired as a result of the relatively intense utilization of verbal working memory resources inherent in the techniques characteristic of tCBT.

Very few outcome studies have examined the impact of a tCBT intervention on working memory. One study randomized 52 individuals with schizophrenia to tCBT for psychosis or treatment-as-usual (TAU). At post-treatment, the tCBT group had significantly better n-back scores than the TAU group (Kumari et al., 2009). However, the fact that working memory was measured at in isolation rather than in a circumstance demanding the utilization of CBT skills prevents any conclusions from being drawn about the impact of tCBT on the consumption of working memory.

1.3.1.2 Empirical Support for Cognitive-Behavioral Treatments

A large body of research supports the efficacy of tCBT for mood and anxiety disorders, and for SAD in particular (Beck, 2005; Richard G. Heimberg et al., 1990; Herbert, Gershkovich, & Forman, 2012; Jorstad-Stein & Heimberg, 2009; Liebowitz et al., 1999; Mortberg, Clark, Sundin, & Wistedt, 2007; Stangier, Heidenreich, Peitz, Lauterbach, & Clark, 2003). tCBT is currently considered the gold standard psychotherapeutic treatment for mood and anxiety disorders. Current treatment techniques do not generally distinguish between the generalized and non-generalized subtypes, and most treatment outcome studies have incorporated samples that either include mixed generalized and speech-phobic individuals or generalized-only.

Several versions of tCBT have emerged in the literature and have demonstrated effectiveness in treating SAD. Cognitive-behavioral group therapy (CBGT; R. G. Heimberg, 1991; R. G. Heimberg & Becker, 2002) in particular has received significant attention. A
large randomized controlled clinical trial reported that 75% of CBGT completers with SAD responded to treatment (R. G. Heimberg et al., 1998). Other studies have replicated these results (R. G. Heimberg, et al., 1998; R. G. Heimberg, Salzman, Holt, & Blendell, 1993; Herbert et al., 2005; Liebowitz, et al., 1999). One variation of CBGT, which added social skills training to the protocol, produced greater effects than the standard CBGT program (Herbert, et al., 2005).

Newer CBT protocols have focused on utilizing an individual treatment designs. For example, Clark and colleagues (2003) developed an individual tCBT SAD protocol. One randomized and controlled trial indicated that an individual tCBT protocol was more effective than CBGT in reducing anxiety (Stangier, et al., 2003). Although tCBT is successful in reducing anxiety in social situations, there are concerns about the specific efficacy of the cognitive component of this intervention. tCBT for SAD holds anxiety reduction as a primary aim, and cognitive restructuring focuses on controlling and altering anxious thoughts and beliefs. However, recent research suggests that these goals could be problematic. In fact, direct efforts to control anxiety can often paradoxically increase its intensity (Barlow, Allen, & Choate, 2004). Moreover, many “relaxation” strategies have the opposite effect, and can actually increase subjective levels of anxiety (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). In addition, strategies that aim to control anxiety (including cognitive restructuring) can tax cognitive resources to the point that they may reduce an individual’s ability to maximally attend to and perform at other tasks (Hayes, et al., 1996). For example, Eifert and Heffner (2003) exposed 60 anxious females to 10% carbon dioxide enriched air, which often induced severe anxiety symptoms. Participants were randomized to an acceptance-based or control-based training procedure to examine deferential cognitive and behavioral outcomes between the two conditions. Individuals in the acceptance condition reported reduced catastrophic thoughts and reported fewer and less severe cognitive and fear symptoms overall. Interestingly, it appears as though attempts to control physiological and cognitive arousal during a highly anxious state may have exacerbated anxiety and distress (Eifert & Heffner, 2003).
Hayes et al. (1999) also randomized participants to a control versus acceptance-based 90-minute protocol focused on coping with cold-pressor pain. Results indicated that participants in the acceptance condition kept their hands in the cold water longer despite no differences in pain intensity. Similar results have been found in other studies of cold pressor pain (Hayes, Bissett, et al., 1999; Masedo & Rosa Esteve, 2007; Takahashi, Muto, Tada, & Sugiyama, 2002), panic disorder (Levitt, Brown, Orsillo, & Barlow, 2004), and electric shock (Gutierrez, Luciano, Rodriguez, & Fink, 2004).

Furthermore, although a few older studies have reported that tCBT with exposure yields greater benefits than exposure alone (Butler, Cullington, Munby, Amies, & Gelder, 1984), more recent studies in SAD indicate that there is no difference between treatment outcomes in these two conditions (Hofmann, 2004; Salaberria & Echeburua, 1998; Scholing & Emmelkamp, 1996). Mediation analyses have also failed to support the added benefit of tCBT techniques for mood and anxiety disorders (Longmore & Worrell, 2007).

In sum, tCBT appears to moderately improve speech anxiety in individuals diagnosed with SAD. However, tCBT techniques may also consume resources that would ideally be available for speech-related activity. As a result, speech performance may not improve as much as desired. Overall, additional research is needed to elucidate the relationship between tCBT, verbal working memory, and speech performance in individuals with PSA.

1.3.2 Acceptance-Based Behavioral Treatments for Public Speaking Anxiety

In part because effectiveness ceilings appear to have been reached for many tCBT protocols and in part for theoretical reasons, a number of new varieties of CBT have been developed. Of these new treatments, acceptance-based behavior therapies (ABBT) show particular promise (Herbert & Forman, 2011). A mounting base of evidence supports the utility of these approaches in the treatment of many psychiatric conditions, with especially good outcomes for anxiety disorders (Eifert, Forsyth, & Hayes, 2005; Herbert, et al., 2012).

Although ABBT and tCBT are treatment models that fall under the broad CBT umbrella, they have both overlapping and distinctive qualities. The primary distinction between ABBT and tCBT is that whereas the latter uses cognitive disputation and exposure
to achieve symptom relief, ABBT promotes mindful acceptance of whatever thoughts or feelings arise, while continuing to pursue specific behavioral aims. There are multiple types of ABBTs, including dialectical behavior therapy (DBT; Linehan, 1993), mindfulness-based cognitive therapy (MBCT; Segal, Teasdale, & Williams, 2002), and mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1990). However, the most researched ABBT is Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999). ACT, like tCBT, is both cognitive and behavioral in nature. Although tCBT is effective for treating anxiety disorders, there are many individuals who do not respond to this therapeutic intervention. As there is evidence that ACT may be more effective than tCBT for anxiety (Dalrymple & Herbert, 2007), it is logical to continue studies on the efficacy of this treatment to determine how it can enhance the battery of treatment options currently available. A key aim of this study is to compare a brief ACT-based treatment to tCBT for the treatment of public speaking anxiety.

As with ABBTs in general, anxiety reduction is not a goal of ACT. Instead, ACT emphasizes engagement in desired behaviors while mindfully accepting distressing thoughts and sensations (Hayes, Bissett, et al., 1999). ACT incorporates interventions to promote cognitive defusion (the ability to observe one’s subjective experiences, particularly cognitive or verbal components, from a distance and as distinct from the self), psychological acceptance (being willing to tolerate internal experiences without struggling with them), and values clarification (articulating what is most important to an individual; see Hayes, Bissett, et al., 1999). Exposure techniques, complemented by practice in the mindfulness-enhancing strategies of defusion and psychological acceptance, may help the patient view anxiety as less threatening and can diminish the relationship between thoughts and behavior.

Patients are also taught strategies to help them give up their attempts to control, suppress or avoid their anxiety, and instead to focus their attention on engaging in valued behavior (for example, giving an important speech). Through “creative hopelessness” exercises, patients are encouraged to examine the success of the control-based methods they have used to cope with their anxiety in the past. Oftentimes, individuals realize that these attempts have been ineffective, despite significant effort. Patients are asked to challenge their
belief that anxiety must be controlled or eliminated in order to successfully engage with their environment. In other words, if they allow their internal sensations (e.g., thoughts/feelings) to exist without struggle or attempts to control and reframe, they may be more capable of behaving in a manner that is consistent with their values. Gentle refocusing exercises allow patients to practice sitting with their anxious thoughts, feelings, and sensations without attempts to control or reframe them. These techniques stand in stark contrast to tCBT techniques, which focus on paying close attention to thoughts in order to practice controlling and reframing them (Forman & Herbert, 2009).

1.3.2.1 Acceptance-Based Behavioral Treatments and Working Memory

Acceptance-based behavior therapy (ABBT) for public speaking anxiety teaches individuals to mindfully accept whatever thoughts or feelings arise, while continuing to pursue specific behavioral aims. Through practice in accepting unpleasant thoughts and sensations without struggle, individuals are able to gently refocus their attention to valued behaviors (e.g., giving a good speech). Encouraging individuals to accept and co-exist with their distressing internal experiences is a contrast to tCBT’s focus on controlling and reframing anxious thoughts in order to reduce anxiety. ABBT does not use restructuring or disputation techniques, and may free up the verbal working memory resources that are often used to monitor anxiety or to restructure cognitions. These resources may improve an individual’s ability to attend to the processes necessary for delivering a speech. Thus, individuals who undergo an ABBT-based intervention may exhibit increased working memory and speech performance in comparison to tCBT.

There is limited research available to examine this theoretical framework. To our knowledge, no studies have directly examined the effects of ABBT on working memory. However, several studies have examined the effects of mindfulness, an important component of acceptance-based behavior therapies, on verbal working memory. Jha, Stanley, Kiyonaga, Wong, and Gelfand (2010) used mindfulness practice to counteract verbal working memory overstimulation prior to exposure to stressful events. This study utilized the Operation Span paradigm (OSPan; Turner & Engle, 1989), where participants try to remember sequentially
presented words while simultaneously solving simple math equations, to measure verbal working memory. Results indicated that individuals in the meditator group experienced greater improvement on tests of working memory under normal conditions following ten days of mindfulness meditation training when compared to non-meditating controls. However, these results were only statistically significant at a trend level (Jha, et al., 2010).

Other studies have found that mindfulness retreats yield significant improvements in working memory performance, as measured by both forward and backward digit span (Chambers, Lo, & Allen, 2008). These results were replicated with a four-day mindfulness retreat (Zeidan, Johnson, Diamond, David, & Goolkasian, 2010). While these studies measured the effect of mindfulness on working memory under non-anxious conditions, they provide preliminary evidence that increased mindfulness can free-up working memory resources that can be used for goal-oriented task performance. Thus, it's possible that, under anxious conditions, increased mindfulness would also help an individual devote more resources to task performance.

Glassman et al. (under review) hypothesized that the utilization of ABBT, versus tCBT, would consume fewer verbal working memory resources during a speech. The difference in working memory consumption was further hypothesized to be evidenced in ABBT producing better speech performance and decreased activity in the dorsolateral prefrontal cortex (DLPFC), an area of the brain that has been repeatedly linked to working memory utilization (Awh et al., 1996; Cabeza & Nyberg, 2000; Jonides et al., 1997; Paulesu, Frith, & Frackowiak, 1993). To test their hypotheses, Glassman and colleagues randomized individuals with PSA to a brief ABBT or tCBT intervention and measured brain activation using functional near-infrared spectroscopy (fNIRS). Results generally supported the hypothesis suggesting that ABBT strategies consume less verbal working memory resources and resulted in better performance under conditions where such strategies are utilized. These results are preliminary, as this is the first study to examine these relationships.

As the studies reviewed above are preliminary, more research is needed to examine the effect of both ABBT and tCBT on working memory to examine whether working
memory is a mechanism of change in CBT treatments for PSA.

1.3.2.2 Empirical Support for Acceptance-Based Behavioral Treatments

The scientific literature on ABABT has expanded rapidly over the past decade, with recent research indicating that ACT is at least as effective as tCBT, and that ACT appears to operate through distinctive treatment mechanisms (Forman, Herbert, Moitra, Yeomans, & Geller, 2007; Hayes, 2008; Powers, Zum Vörde Sive Vörding, & Emmelkamp, 2009). Recent meta-analyses indicate that ACT is either comparable or more effective than tCBT for a variety of psychological conditions (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). They found a large effect after treatment ($d = 0.99$) and a moderate effect at follow-up ($d = .72$) when ACT was compared to wait list, placebo, or treatment as usual. Other reviews have reached similar conclusions (Gaudiano, 2009; Ost, 2008).

Several studies have examined ACT for generalized SAD. Dalrymple and Herbert (2007) reported an effect size of $d = 1.00$ for pre- to post-ACT treatment improvement in a socially anxious sample, and an effect size of $d = 1.20$ from pre-ACT treatment to follow-up in the same sample. These effect sizes are larger than most reported for tCBT treatment in socially anxious populations (Herbert, et al., 2012). These results have been replicated in other studies examining in-person acceptance-based treatments for SAD (Goldin, Ramel, & Gross, 2009; Ossman, Wilson, Storaasli, & McNeill, 2006). Niles et al. (2014) also randomized twenty-five individuals with a primary diagnosis of SAD to either 12-weeks of ACT or tCBT. At post-treatment, ACT and tCBT were equally effective, but at the 6-month follow up assessment, individuals in the ACT condition exhibited greater improvements on clinical severity ratings and measures of psychological flexibility.

Kocovski, Fleming, and Antony (2012) conducted a randomized controlled trial comparing a group-based mindfulness and acceptance based group therapy for SAD with CBGT and wait-list controls. Results indicated that both ABABT and CBGT were superior to controls, but that both active conditions did not differ from one another (Kocovski, Fleming,
& Antony, 2012).

Only a few studies have investigated ACT outcomes in public speaking phobics. Block and Wulfert (2000) quasi-randomly assigned speech anxious undergraduates \(n=11\) to ACT group therapy, CBGT, or waitlist control for 4 weeks of treatment. Anxiety decreased and willingness increased equivalently in both active conditions when compared to placebo. A follow-up study recruited a somewhat larger sample of undergraduates \(n=39\) and also found equivalent decreases in anxiety in both the ACT and CBGT groups (Block, 2003). When compared to CBGT, ACT participants endured a post-treatment behavioral exposure task for a longer period of time, indicating that the ACT group experienced a significantly greater decrease in avoidance of public speaking relative to the tCBT condition. However, small sample sizes make it difficult to draw reliable conclusions.

England et al. (2012) compared group exposure therapy using an acceptance and defusion context to group exposure therapy with a habituation-based rationale for the treatment of public speaking anxiety. After 6 weekly sessions, there were no differences found between the treatment groups, indicating that the ACT context was as effective as habituation. While participants improved on outcome measures of public speaking anxiety and speech performance, individuals in the ACT condition were more likely to reach diagnostic remission at a 6-week follow-up assessment (England, et al., 2012)

As noted earlier, Glassman et al., (under review) randomized 21 individuals with PSA to a brief 90-minute ABBT or tCBT intervention. Participants gave speeches to a small audience pre- and post-intervention. Results indicated that individuals in both conditions experienced improvements in observer-rated performance, but those who had received an ABBT intervention exhibited significantly larger improvements than those in the tCBT condition. All participants also experienced decreases in their subjective anxiety level post-intervention, but the tCBT condition experienced larger reductions (at trend level).

While the data are preliminary, there are indications of a pattern across studies that ABBTs are better than tCBT. Continued examination of the efficacy of ABBT, and ACT in
particular, for the treatment of public speaking anxiety is needed to explore the value of these approaches in treating public speaking phobia.

1.4 Current Study

As described above, a large proportion of the population experiences intense and debilitating anxiety with concomitant impairment of public speaking performance (Motley, 1995; Stein, et al., 1996). These symptoms can be intense enough to elicit significant distress and can significantly disrupt social, academic, and occupational functioning. Of special relevance, many sufferers experience impairments in speaking performance that may be related to diminished verbal working memory functioning.

A number of interventions have been designed to improve public speaking anxiety. These interventions generally employ tCBT techniques and focus on reducing anxiety through (a) changing (i.e., “restructuring”) cognitive factors (e.g., negative thoughts and beliefs about one’s ability to perform) that are believed to generate social performance anxiety, and (b) exposure to the feared situation in order to facilitate habituation (Jorstad-Stein & Heimberg, 2009). Although moderately successful in reducing subjectively-reported fear, extant interventions have largely ignored public speaking performance and, not surprisingly, relatively little data is available to support efficacy in this domain.

ABBT is a newer behavioral therapy that does not seek to lower anxiety or alter anxiety-provoking cognitions. Instead it teaches patients skills to be more “willing” to experience aversive thoughts and feelings in the service of valued behavior. Very few empirical evaluations of ABBT for social performance enhancement have been conducted. However, theoretically ABBT may hold an advantage over tCBT. Whereas tCBT demands resources to monitor and dispute thoughts and to monitor and control anxiety, ABBT focuses on accepting anxious affect and cognition in the service of goal-directed behavior (for example, giving a good speech). Thus, ABBT patients, compared to tCBT patients, may have greater working memory capacity available to be focused on speech performance.

This study compared the relative efficacy of brief ABBT and tCBT programs in improving public speaking anxiety and performance while also examining verbal working
memory before and after intervention. Participants were randomized to a 90-minute, one-session ABBT or tCBT intervention and assessed at pre- and post-treatment. These assessments included a Behavioral Assessment Test (BAT) modeled after the Trier Social Stress Test (TSST), working memory tasks, and the completion of anxiety scales and treatment mechanism surveys.

Administration of the BAT allowed us to elicit psychosocial anxiety within the lab, and to examine working memory and speech performance under relatively naturalistic conditions. Participants took the backwards digit span task to measure verbal working memory performance at three separate time-points during both the pre- and post-intervention assessments. Including three backwards digit span administrations allowed us to examine verbal working memory at varying levels of anxiety and performance pressure. We hypothesized that, if we detected differences in backwards digit span performance between the three administration points of the pre-intervention assessment, we would be able to determine which aspects of public speaking phobia are associated with degraded performance on tests of verbal working memory. In order to examine verbal working memory during different levels of anxiety and performance pressure, we gave each participant a backwards digit span task under calm conditions, then again once we warned them of an upcoming speech (to elicit anticipatory anxiety), and finally under conditions of acute social performance anxiety in front of the BAT audience.

We hope that study findings may be useful in developing improvements to current interventions available for public speaking anxiety and to enhance our overall understanding of the relationship between anxiety, performance, and verbal working memory, and the effect of ABBT and tCBT interventions on all three constructs.

1.4.1 Study Hypotheses

Preliminary Hypotheses –

1. We expected that all individuals would experience a reduction in anxiety and an improvement in performance following the ABBT and tCBT interventions, regardless of condition.
2. We hypothesized that performance on verbal working memory tasks would follow a specific pattern during the pre-treatment assessment: Performance would be highest during the first administration (no anxiety/no audience), would significantly decline at second administration (anticipatory anxiety/no audience), and would decline again at third administration (performance anxiety/audience).

Primary Hypotheses –

3. We anticipated that speech performance would improve more in the ABBT condition than in the tCBT condition.

4. We expected that there will be a differential effect of treatment on verbal working memory performance, as measured by the backwards digit span test, with greater improvements in verbal working memory in the ABBT condition.

5. We hypothesized that pre- to post-treatment improvements in working memory performance in front of the audience, as measured by the backwards digit span test, would correspond to pre- to post-treatment improvements in speech performance.

Exploratory Hypotheses –

6. If ABBT demonstrated a superior performance effect, we hypothesized that this effect would be mediated by improvements in performance on the backwards digit span verbal working memory test.

7. If ABBT demonstrated a superior performance effect, we hypothesized that this effect would be mediated by changes in acceptance and defusion levels.

Chapter 2: Method

2.1 Participants

Our final sample consisted of thirty individuals from the greater Philadelphia community (see Figure 1 for Consort Flow Diagram). Participants ranged in age from 18 to 47 years old ($M = 23.83, SD = 7.19$). The majority of participants were female (73%). Half of the participants were Caucasian, while the remainder identified as African-American (10%), Asian-American (27%), Asian (6%) and multi-racial (6%). Each participant qualified for a
diagnosis of SAD using both (a) DSM-IV-TR criteria (American Psychiatric Association, 2000) and (b) the social anxiety disorder subsection of the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID). Participants qualified for a public speaking subtype of SAD per the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown, DiNardo, & Barlow, 1994), which allows the clinician rater to assess for individual fears within the SAD spectrum. An individual met all three of these conditions to participate in the study protocol.

2.1.1. Recruitment. The study recruited participants by advertising in multiple media outlets, and through flyers posted throughout the community. Study announcements were posted on the Drexel University Acceptance-Based Behavior Therapy Program’s website and the Drexel University Digest (a weekly email university-wide newsletter). Other community resources (e.g., Craigslist) were also utilized.

2.1.2. Inclusion and Exclusion Criteria. Individuals were all able to sign consent and willing to participate in a study session lasting 4 hours. They were required to be between the ages of 18 and 65 and currently living in the greater Philadelphia area. Sixty-five was selected as the cut-off to minimize age-related changes in cognitive capacity in the sample. Public speaking anxiety was judged to be primary and of greater severity than any other comorbid Axis I disorders (such as depression or another anxiety disorder).

All participants in our clinical sample met full diagnostic criteria for SAD, including significant distress and impairment in functioning. This was chosen in order to maximize performance impairment in the sample. Eligible participants resided in the greater Philadelphia area and were fluent in English. Potential participants who report any of the following were excluded from the study:

- History of neurological abnormalities (e.g., stroke, seizures, migraines)
- History of or current severe psychiatric illness (e.g., bipolar disorder, schizophrenia)
- Unstable or serious medical illness or neurodegenerative diseases
- History of alcohol or drug dependence, current diagnosis of substance abuse
- Currently experiencing depressed mood or acute suicide potential
• Currently taking certain medications (e.g., psychotropic medication, blood-pressure medications, “pain killers,” investigational medications, any medication use associated with central nervous system effects e.g., neuroleptic medications, narcotic medications, opiates)
• Use of marijuana or any another illegal drug (e.g., cocaine, heroin, ecstasy) during the week before the study visit
• Mental retardation or any other pervasive developmental disorder
• Positive human immunodeficiency virus (HIV) diagnosis (because AIDS-related dementia compromises brain function, patients with positive HIV status/AIDS will be excluded from this study)
• History of brain or head injury
• History of heart abnormalities

2.2 Procedure

Upon calling or emailing the Social Anxiety Treatment Program in response to study announcements, a staff member fully explained the nature of ABBT and tCBT treatments and the procedures for the study. Participants were also informed that they could cease participation at any time. Should the individual decide to participate, he/she was invited to our study office for screening and potential participation.

After arriving for the study session, all participants were fully consented and study staff obtained contact information. Following consent procedures, a member of the study staff conducted a brief structured interview to confirm eligibility for inclusion into the study. The ADIS-IV, SCID (social phobia section) and the DSM-IV-TR (2000) were used to confirm a primary diagnosis of SAD and public speaking anxiety. We also administered the Clinical Global Impressions Scale (CGI) to assess severity and asked about current psychotropic medication use and history of neurological and psychiatric illness, including drug and alcohol use. See figure 2 for detailed study procedures diagram.

This study utilized a mixed factorial design, with both within and between-subjects factors. Participants were randomly assigned to either an ABBT or tCBT intervention,
blocked by age and handedness, and all underwent two study assessments over the course of study participation:

Participants were paid $10 for completing the initial assessment and screening and an additional $20 if they were eligible for the study and elect to complete it. A maximum total of $30 was given to participants who complete all study procedures. The first was administered prior to the intervention and the second assessment was administered directly following it. Participants were fed a snack containing approximately 150 calories prior to each assessment.

Each study assessment included a Behavioral Assessment Test (BAT) with a video-recorded speech, the completion of a questionnaire packet, and three verbal working memory tasks. One verbal working memory test was given at the beginning of the assessment and under relatively calm conditions without an audience. The second administration was given after the participant is told about the BAT and is notified that he or she will be delivering a difficult speech very shortly. This administration also did not have an audience. The final verbal working memory test administration was in front of the BAT panel during conditions of acute psychosocial anxiety. Thus, verbal working memory was measured at three different levels of psychosocial anxiety and with/without social performance pressure. All three were administered pre- and post-intervention (for a total of six administrations) and pre- and post-intervention assessments were identical (though there will be six different backwards digit span versions and they will not be repeated).

Graduate students in the clinical psychology doctoral program at Drexel University conducted all data collection and treatment interventions under the supervision of Ph.D.-level psychologists, who are recognized experts in both tCBT and ABBT treatments for anxiety disorders. All sessions in both conditions were audio-recorded and systematically monitored for treatment adherence by these supervisors. Questionnaires were completed via Qualtrics on a computer in the treatment room. All data was entered into a password protected computerized database.

A control group was not included because we are investigating how two active interventions compare against each other. There is ample evidence that both are superior to
control conditions (e.g., no treatment wait lists, treatment as usual) for public speaking anxiety.

Practice effects were partially controlled by using a different speech topic for each BAT (topics will be counterbalanced across pre- and post-treatment assessments). Each participant completed the same version of the verbal working memory task at each assessment time-point. More importantly, we are looking at the effects of the intervention beyond practice effects, and we expect both groups to be equally affected by them.

Participants were fully debriefed following the conclusions of study procedures. This debriefing also determined the extent to which each individual reported using the cognitive strategies learned during the intervention in the post-treatment speech exposure (aided by a brief questionnaire). Each participant was allowed as much time as necessary to ask questions, and clinical backup will be provided by a senior staff member, if necessary. After debriefing, the participant was asked to complete a feedback questionnaire. A sheet of referral information for social anxiety treatment was offered to participants.

2.2.1 Interventions. Graduate students delivered the ABBT and tCBT treatment sessions. Participants were randomly assigned to intervention condition, and a therapist was assigned to each participant based on availability and time of consent. All therapists treated an equal number of participants in each condition to preclude confounding therapist effects.

Both treatments included a rationale for the intervention and how to apply it to the upcoming speech exposure. In addition, participants used practice exercises to rehearse their new coping techniques prior to the second public speaking task. Each intervention spent an equal number of time practicing exposure exercises to minimize variation between groups.

**Traditional Cognitive Behavioral Intervention (tCBT):** The individual tCBT intervention was 90-minutes long, and focused on topics such as symptom management and relaxation to help participants enhance their adaptive coping skills. This intervention taught individuals how to confront underlying issues related to their anxiety, and how to test the validity of dysfunctional and irrational cognitions. These techniques were rehearsed during
practice exposures as part of the intervention. See Appendix A for the tCBT treatment manual developed and used for this study.

**Acceptance-Based Behavioral Therapy (ABBT):** The treatment delivered in this condition utilized concepts derived from Acceptance and Commitment Therapy (Hayes, Strosahl, & Wilson, 2011). Treatment started by addressing the ineffectiveness of participants’ past attempts to control or reduce their anxiety in public speaking situations. As an alternative to these control attempts, the notion of acceptance of one’s private experiences (thoughts, feelings, sensations) was introduced. Treatment also focused on a “willingness” to experience unwanted thoughts and feelings while simultaneously engaging in valued activities, especially those related to public speaking. Another key concept, cognitive defusion, taught participants to view themselves as separate from their internal experiences, thereby allowing the private experiences to occur without preventing the participant’s engagement in exposure exercises. One example of a defusion exercise that was used in session is “Picking Up The Pen.” In this exercise, each group member held a pen in the palm of his or her hand, and repeated the words “I can’t pick up the pen” several times while lifting the pen with the opposite hand, thus demonstrating that thoughts are not always true, and need not determine behavior. Techniques designed to foster psychological acceptance and defusion were rehearsed during practice exposures as part of the intervention. See Appendix A for the ABBT treatment manual developed and used for this study.

**2.3 Measures**

Table 1 contains a list of study measures and their average time for completion.

**2.3.1 Clinician-Rated Measures.**

**2.3.1.1. Diagnostic Interviews.**

*Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV):* A member of the study staff completed the social anxiety portion of the ADIS- IV (Brown, et al., 1994) with each individual following the consenting process. The ADIS-IV is a diagnostic interview that assesses a variety of anxiety disorders using DSM-IV-TR criteria. Only the social phobia and depression portions of the ADIS-IV were used in this study in addition to a DSM-IV-TR
diagnosis. Inter-rater reliability for diagnosing SAD using the ADIS-IV is high (Brown, Di Nardo, Lehman, & Campbell, 2001). The ADIS-IV is often used to improve diagnostic accuracy in research studies (Dalrymple & Herbert, 2007). The ADIS-IV also helps to distinguish between generalized SAD and public-speaking phobia and identify any significant mood symptoms.

*Structured Clinical Interview for DSM-IV Axis I Disorders (SCID) – Social Anxiety Disorder Subsection:* The SCID (First, Spitzer, Gibbon, & Williams, 1996) is an extensively utilized structured diagnostic interview based on DSM-IV (American Psychiatric Association, 1994) criteria. Estimates of inter-rater reliability are moderate to high for SAD (e.g., Williams et al., 1992; Zanarini & Frankenburg, 2001). The SCID has also demonstrated superior diagnostic validity over other structured clinical interviews at intake (Fennig, Craig, Lavelle, Kovasznay, & Bromet, 1994; Kranzler, Kadden, Babor, Tennen, & Rounsaville, 1996; Kranzler et al., 1995). Dalrymple and Herbert (2007) successfully utilized the SCID to identify individuals with generalized SAD. All participants qualified for a diagnosis of social phobia on the SAD section of the SCID before participating in the study.

*Clinical Global Impression – Severity Scale (CGI-S):* The CGI (National Institutes of Mental Health, 1985) is a clinician-rated measure of global symptom severity and improvement. The CGI-Severity (CGI-S) will be used for this study, and requires the clinician to rate symptom severity on a 7-point scale, ranging from 1 (normal/not at all ill) to 7 (among the most extremely ill patients). The CGI-S demonstrates good convergent validity with self-report measures of quality of life and with self-report and clinician-administered measures of social anxiety (Zaider, Heimberg, Fresco, Schneier, & Liebowitz, 2003).

*Mini International Neuropsychiatric Interview (M.I.N.I.; version 5.0):* The MINI is a structured clinical interview that includes the DSM-IV diagnostic criteria of the most common Axis I disorders (Sheehan et al., 1998). The MINI also assesses suicidality, and questions are in yes/no format. The reliability and validity of the MINI is acceptable across all Axis-I disorders that are evaluated by the interview (Sheehan et al., 1997; Sheehan, et al., 1998). According to standard MINI procedure, potential participants in the current study
were given the initial screening portion of the interview, and only the relevant diagnostic modules as indicated by the screening measure were administered thereafter.

### 2.3.1.2 Outcome Assessments

**Behavioral Assessment Test (BAT):** The BAT used for this study was based on the Trier Social Stress Test (TSST), which is a behavioral procedure that produces moderate psychosocial stress in laboratory settings (Kirschbaum, Pirke, & Hellhammer, 1993). At the start of the assessment, participants were informed that they would be delivering a speech in front of an audience of individuals trained in nonverbal behavior while being audio- and video-recorded. The 5-minute speech was delivered in front of a panel of two confederates. They were instructed not to show any emotion during the speech. The participant was then instructed to either speak about “things to do in the Philadelphia area” or “a vacation you’ve gone on or would like to go on”. Tests similar to this BAT consistently induce increases in cortisol levels and subjective anxiety levels in non-psychiatric control populations (Kirschbaum, et al., 1993; Kudielka, Hellhammer, & Kirschbaum, 2007).

The entire speech was videotaped and rated by study assessors who are masked to study time-point and intervention condition.

**Speech Performance Scale (SPS).** The video-recorded BAT was evaluated for performance by independent observers using the SPS (Rapee & Lim, 1992). Raters, masked to condition and time-point, rated each participant’s performance using this 17-item measure. The SPS evaluates both specific (e.g., kept eye contact with audience, had a clear voice) and global (e.g., kept audience interested, generally spoke well) elements. Each item is rated on a 5-point scale ranging from 0 (not at all) to 4 (very much), and higher scores signify better performance. Some items are reversed to avoid response biases. This scale has good internal consistency (Rapee & Lim, 1992). A primary rater (a different assessor from the individual who scored anxiety and performance) evaluated all of the recordings. A second assessor rated 30% of the SPS speeches for reliability purposes. Intraclass correlation coefficients between the two observers were trained to .80.
The assessors provided ratings of perceived anxiety using a 0-100 scale. For performance, assessors rated social skills on three dimensions: verbal content, nonverbal skills, and paralinguistic skills. We have used these coding methods in several clinical studies (see Herbert, Rheingold, & Brandsma, 2010). The length of speech was recorded as a measure of behavioral avoidance. There is support for the use of social skills ratings in role-play tests, including speech tasks (Herbert, et al., 2010).

**Backward Digit Span (BDS):** The Backwards Digit Span task is a part of the Wechsler Adult Intelligence Scale (WAIS-IV; Wechsler, 2008). This task requires an individual to temporarily store several numbers, and then to verbally recite back the numbers in reverse. For instance, if the examiner says, 2-6-8, then the correct response is 8-6-2. Participants started with two digits and worked up to seven digits. Once a participant answered three trials incorrectly the task was discontinued.

BDS has content validity as a working memory test as the backward task requires participants to listen to digits, maintain them in a short-term memory store, and reverse (manipulate) the digits to produce a new output. Test-retest reliability ranges from .66 to .89, depending on interval length (Matarazzo & Herman, 1984; Snow, Tierney, Zorzitto, Fisher, & Reid, 1989). BDS is strongly correlated with other validated measures of verbal working memory, including the Operation Span Task (OSPAN; Trick, Mutreja, & Hunt, 2012) and Reading Span tasks (de Jonge & de Jong, 1996).

Different versions of the BDS were given three times over the course of each assessment, for a total of six times during the course of the study. Each BDS task was different but equally challenging. The BDS has been shown to reliably measure working memory performance even during repeated administration (Bartels, Wegrzyn, Wiedl, Ackermann, & Ehrenreich, 2010).

**Subjective Units of Discomfort Scale (SUDS):** Participants were taught how to rate their anxiety on the Subjective Units of Discomfort Scale (SUDS; Wolpe & Lazarus, 1966), which ranges from 0-100, upon completing screening procedures. SUDS ratings were
obtained throughout participation in the study and are the primary subjective anxiety outcome measure.

*Controlled Oral Word Association Test:* Participants were given the Controlled Oral Word Association Test, FAS version, as a measure of verbal fluency abilities at baseline to rule out potential differences between groups. This test is shown to be intact in anxiety disorders (Beaudreau & O'Hara, 2009) and has outstanding test-retest reliability (Ruff, Light, Parker, & Levin, 1996). This test was given during the pre-intervention assessment.

2.3.2. Self Report Measures

2.3.2.1. Demographic Forms

*Demographics and Medical History Form:* This form is a self-report measure created by the investigators that includes questions regarding sex, age, handedness, ethnicity, occupation, marital status, first language, education level, treatment history, smoking history, benzodiazepine and antihistamine use, alcohol and drug consumption, and significant medical, and neurological and psychological events or disorders.

*Sleep Questionnaire:* This form assessed the amount of sleep the participant obtained the night before their study visit. This brief questionnaire asked about the quality and quantity of the previous night’s sleep, and whether this was different than their normal sleep pattern.

2.3.2.2. Outcome measures

*State-Trait Anxiety Inventory – State and Trait Scales:* The STAI (Spielberger, 1983; Spielberger, Gorsuch, & Lushene, 1970) is a 40-question self-report scale. It is divided into two sections – one measuring state-anxiety and one measuring trait-anxiety. Individuals are asked to rate how they feel at the present moment (state) and identify personal characteristics on a 4-point Likert scale (“not at all” to “very much so,“). Sample items include “I feel tense” and “I feel nervous.” Both STAI scales have high internal consistency (Spielberger, 1989) and adequate convergent and discriminant validity (Spielberger, 1983). The state-anxiety scale has also shown sensitivity to anxiety changes over time (Spielberger, 1983), supporting its use as a measure of transitory and situational anxiety.
Personal Report of Confidence as a Speaker (PRCS)—Short Form: The PRCS (Hook, Smith, & Valentiner, 2008) is a 12-item self-report measure of confidence in public speaking situations. All questions are in true/false format. It has significant internal consistency and construct validity, as well as convergent validity with measures of anxiety, social performance anxiety, shyness, and self-consciousness.

Self-Statements During Public Speaking (SSPS): The SSPS (Hofmann & DiBartolo, 2000) is a 10-item self-report measure designed to assess cognitions in public speaking situations. The SSPS contains two 5-item subscales: Positive Self-Statements (SSPS-P) and Negative Self-Statements (SSPS-N). Items are rated on a 6-point Likert scale ranging from 0 (do not agree at all) to 5 (agree extremely). Both subscales of the SSPS have good internal consistency (Hofmann & DiBartolo, 2000; Hofmann, Moscovitch, Kim, & Taylor, 2004), test-retest reliability, and convergent and discriminant validity (Hofmann & DiBartolo, 2000).

Personal Report of Communication Apprehension (PRCA-24): The PRCA-24 (McCroskey, 1982) is a shortened version of the original 25-item PRCA (McCroskey, 1970). The PRCA-24 consists of 24 self-report items assessing communication apprehension in four contexts: group discussions, meetings, interpersonal conversations, and public speaking. Items consist of statements to be rated on a 5-point Likert-type scale ranging from “Strongly Agree” to “Strongly Disagree.” The PRCA-24 has high internal consistency, criterion validity, content validity (McCroskey, Beatty, Kearney, & Plax, 1985), construct validity (Keaten, Kelly, Begnal, Heller, & Walker, 1994) and convergent validity (Keaten & Kelly, 1994). Test-retest reliability is also high (Rubin, Graham, & Mignerey, 1990), supporting the use of the PRCA-24 as a trait measure of communication apprehension.

2.3.2.2. Treatment process measures

Philadelphia Mindfulness Scale: The PHLMS (Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008) is a 20-item self-report measure that assesses moment-to-moment experiential awareness and non-judgmental psychological acceptance – two key constituents of mindfulness. Items are rated on a 5-point Likert scale ranging from “never” to “very often”
according to how often that item was experienced within the past week. Factor analyses support a two-factor structure including an awareness and acceptance subscale. These subscales are not correlated with one another. Good internal consistency (Cronbach’s alpha = .85 and .87 for Awareness and Acceptance, respectively) has been demonstrated in both clinical and non-clinical samples. The PHLMS has adequate concurrent validity with other measures of mindfulness (Cardaciotto, et al., 2008).

Acceptance and Action Questionnaire-II (AAQ-II): The AAQ-II (Bond, 2005) is a 10-item self-report measure of emotional avoidance and inaction. Items are scored on a 7-point Likert scale ranging from “never true” to “always true.” The AAQ-2 is a slightly revised version of the original AAQ, which had adequate convergent, discriminant, and concurrent validity (Hayes et al., 2004; Roemer & Orsillo, 2001). The AAQ-II has adequate concurrent, predictive, convergent, discriminative, and incremental validities and test-retest reliability (Bond, 2005).

Drexel Defusion Scale (DDS): The DDS (Forman, Herbert, Moitra, & England, 2012) is a 10-item self-report measure of cognitive defusion. Using a on a 6-point Likert scale ranging from “not at all” to “very much”, participants answer questions about their ability to defuse from thoughts or feelings in 10 different domains. Internal reliability, inter-item correlations, and internal consistency (Cronbach’s alpha = .80 for the clinical and .83 for the nonclinical sample) are high. Furthermore, the DDS has a high convergent validity with measures of psychological acceptance and quality of life.

Reaction to Treatment Questionnaire (RTQ): The RTQ (Holt & Heimberg, 1990) is a 17-question self-report measure that evaluates treatment credibility and outcome expectancy. The RTQ has demonstrated high internal consistency and convergent validity (Safren, Heimberg, & Juster, 1997).

2.4 Ethical Issues

Informed consent was obtained from all participants prior to any data collection. Study staff ensured that all participants understand that they can refuse to continue participation at any time. Each participant was fully informed of the potential risks of all
study procedures during the consenting process. Should a participant have had an adverse reaction that could not be readily be resolved during sessions, it would have been immediately reported to Drexel University’s Office of Research Compliance. However, no adverse events were reported to study staff.

All study data was kept in a secure, password-protected computer in a locked research office. Data was stored without identifying information, and separately from the informed consent forms. All study data was double-coded for confidentiality. A participant number was used to identify participant data. Only the project coordinator and faculty advisors had access to the key that linked ID number and identifying information. All data and informed consent forms will be stored for at least three years following completion of the study, in accordance with Drexel University’s IRB guidelines.

2.5 Data Analysis

Data was managed and analyzed using SPSS 20.0 for Mac.

2.5.1. Preliminary analyses. Baseline data from participants in the two treatment conditions was compared on demographic, outcome, and process variables using t-tests to confirm that there were no pre-existing differences between groups. Data was also inspected and tested to ensure that they meet the assumptions of an analysis of variance (ANOVA; e.g., normal distribution, homogeneity of variance and covariance). Data was plotted for visual examination and inspected for outliers and normal distribution, and tested for skewness and kurtosis. Data was also tested using Levine’s test for homogeneity of variance. Any baseline factors found to differ between the groups will be included as covariates in all subsequent analyses.

2.5.2. Statistical analyses.

Preliminary Hypothesis 1: In order to evaluate whether individuals would experience a reduction in anxiety and an improvement in performance following the ABBT and tCBT interventions, a series of 2 (treatment condition) x 2 (assessment occasion) mixed factorial ANOVAs using assessment point (pre-treatment and post-treatment) as the within-participants variable and treatment condition (ABBT versus tCBT) as the between-
participants variable were executed. Dependent variables for the ANOVAs were (1) anxiety using the highest SUDS ratings during the speech exposure, (2) anxiety using the highest SUDS rating during the BDS delivered in front of an audience, (3) observer-rated speech performance ratings derived from the BAT and (4) audience BDS speech scores. The main effect of time (i.e., assessment point) evaluated the hypothesis that individuals will experience a reduction in anxiety and an improvement in performance following the ABBT and tCBT interventions, regardless of condition.

*Preliminary Hypothesis 2:* We hypothesized that performance on the verbal working memory tasks would decline as anxiety and social performance pressure increased during the pre-intervention assessment (i.e., performance declined steadily from backwards digit span administration #1 and #4 through backwards digit span administration #3 and #6, respectively). To examine this hypothesis, we ran a one-way repeated-measures ANOVA to examine the working-memory performance across time-points within the pre-intervention assessment.

*Hypothesis 3:* We anticipated that pre- to post-intervention speech performance would improve more in the ABBT condition relative to the tCBT condition. The interaction terms of the 2x2 ANOVAs from hypothesis 1 were used to examine the interaction of time and treatment group on speech performance.

*Hypothesis 4:* We expected that there would be a differential effect of treatment on verbal working memory performance during each working memory task administration, with greater improvements in verbal working memory in the ABBT condition. We used the interaction terms from a series of repeated-measures 2x2 ANOVAs to examine the interaction of treatment condition and assessment point on backwards digit span scores.

*Hypothesis 5:* We hypothesized that pre- to post-treatment improvements in backwards digit span working memory performance would correspond to pre- to post-treatment improvements in observer-rated performance and reductions in subjective anxiety. A correlation matrix was used to determine the relationship between working memory and performance.
Hypothesis 6: Hypothesis two examined whether performance on the verbal working memory tasks would decline as anxiety and social performance pressure increased during the pre-intervention assessment. In the event of a significant relationship between treatment condition and performance, we hypothesized that the relationship between treatment condition and improvements in speech performance (via residualized gain scores) would be mediated by backwards digit span scores.

Mediation can be tested through a variety of statistical methods. One method, bootstrapping, is a resampling method that deals with the common problem of the lack of normality of indirect effects (Preacher & Hayes, 2008; Shrout & Bolger, 2002). Resampling refers to a complex statistical procedure wherein a sample size of \( n \) cases is taken, with replacement, from the original sample and all paths are re-estimated and the indirect effect is re-calculated. This process is repeated \( k \) times with \( k \) being preferably at least 1,000. Thus, the statistical method yields \( k \) estimates of the total (c path) and indirect effects (ab paths) of the independent variable (treatment condition) on the dependent variable (performance). This creates new distributions, which serve as empirical, nonparametric approximations of the sampling distributions of the indirect effect (i.e., the effect of treatment condition on speech performance through verbal working memory scores).

Bootstrap confidence intervals are created by ordering the \( k \) values of the indirect effect (i.e., ab paths) from low to high. Researchers have argued that bias corrected bootstrap confidence intervals should be used because they provide more accurate estimates of the confidence interval and thus better prevent errors in hypothesis testing (Efron, 2003; Preacher & Hayes, 2008; Shrout & Bolger, 2002).

Bootstrapping with bias corrected confidence intervals is superior to other tests of mediation such as causal steps approaches (Baron & Kenny, 1986) and product-of-coefficients approaches (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002) in terms of power and Type I error rates, especially in smaller samples with smaller effects (Preacher & Hayes, 2008; Shrout & Bolger, 2002). Of note, this method does not require that the “a” path (e.g., the relationship between treatment condition and change in verbal working
memory) or the “b” path (e.g., the relationship between verbal working memory and performance) be significant. To measure if verbal working memory performance, as measured by the backwards digit span test, mediated the relationship between performance improvements and treatment condition, we used a bootstrapping method with bias corrected confidence intervals based on the macros created by Preacher and Hayes (Preacher & Hayes, 2008).

Coefficients and p values will be examined in regard to the total effect of treatment condition on performance (c path) and the direct effect of treatment condition on performance (c’ path). The indirect effect of treatment condition on speech performance through verbal working memory score (ab paths) will be examined based on the difference between the total and direct effect (i.e., c – c’ = ab). The significance of the indirect effect will be examined based on the critical ratio (i.e., the indirect effect divided by the standard error), which yields a Z value on the macro output. Additionally, significance was examined via the bias corrected confidence intervals provided for the indirect effect, which is also included on the macro output. It should be noted that although mediation is a causal model, the current study’s research design does not permit one to draw firm causal conclusions. Future, longitudinal-based studies that analyze these data with sophisticated statistical methods (e.g., hierarchical linear modeling) over long-term treatment interventions would be more suited to drawing conclusions regarding the temporal relationship between these constructs.

Hypothesis 7: In the event of a relationship between treatment condition and performance (hypothesis 2), we hypothesized that the relationship between treatment condition and improvements in performance would be mediated by acceptance and defusion. Mediational analyses examining psychological acceptance and defusion as mediators of the relationship between treatment condition and improvements in performance were performed in the same way as hypothesis 6.

2.5.3. Power analysis. The primary aim of this pilot study is to test the hypothesis that the interventions decrease anxiety and increase performance, with greater improvements in
the ABBT condition. Thus, a power analysis was performed for the interactions between intervention and time on outcome variables. Prior studies investigating tCBT (R. G. Heimberg, et al., 1998) and ABBT (Dalrymple & Herbert, 2007) for the treatment of SAD have found large pre- to-post effect sizes in outcome measures. Glassman and colleagues (under review), who utilized a brief intervention in a PSA population, reported large effect sizes for their treatment by time interaction analyses. Given this prior research, we expected to see large effects for our analyses.

A power analysis program G*Power 3 (Faul, Erdfelder, Buchner, & Lang, 2009; Faul, Erdfelder, Lang, & Buchner, 2007) recommended 54 participants (27 per group) to achieve a power of .80 for a large effect size (f = 0.4) at α = .05 for a 2-group, 2-repetition ANOVA. Because this is a single-session study, we did not anticipate significant attrition rates, though the potential for participant dropout does exist. As a result, a final sample size of 54 will be targeted.

Given the pilot nature of the study and the corresponding concern with balancing type 1 and type 2 errors, we did not perform corrections for multiple comparisons (e.g., Bonferroni), and have described our findings appropriately in the discussion section.

Chapter 3: Results

3.1 Descriptive Statistics

The two treatment conditions were compared on demographic, outcome, and process variables at baseline using t-tests (see table 2). Differences between groups were small and statistically insignificant and there were no extreme outliers on any variables of interest. Primary variables were tested for skewness, kurtosis, and homogeneity of variance to verify all of the assumptions were met for the Analysis of Variance model. We did not find any violations to these assumptions.
The following analyses are exploratory given the low sample size of this pilot study, and are in need of replication. As such, we have interpreted patterns that have emerged on the basis of effect sizes as well as statistical significance. These interpretations must be considered with appropriate caution and tentativeness.

3.2 Preliminary Analyses

*Preliminary Hypothesis 1:* To examine whether participants across both treatment conditions experienced a reduction in anxiety and an improvement in performance from pre- to post-treatment, we ran a series of 2 (treatment condition) x 2 (assessment occasion) mixed factorial ANOVAs. Dependent variables for the ANOVAs were (1) anxiety using the highest SUDS ratings during the speech exposure, (2) anxiety using the highest SUDS rating during the Backwards Digit Span task (BDS) delivered in front of an audience, (3) observer-rated speech performance ratings derived from the BAT, and (4) scores for the BDS trials delivered in front of the audience to measure socially-mediated performance. For this hypothesis, the main effect of time was examined. As predicted, individuals experienced a very large and statistically significant decrease in anxiety (both during the speech and BDS), as well as an improvement in speech performance, following the 90-minute interventions (Table 3). There was a moderate, non-significant effect for BDS audience score, indicating that scores on the BDS delivered in front of an audience improved from pre- to post-intervention.

*Preliminary Hypothesis 2:* We hypothesized that performance on the verbal working memory tasks would decline as social performance pressure increased during the pre-intervention assessment. To examine this hypothesis, we ran a one-way repeated-measures ANOVA to examine the working-memory performance across time-points within the pre-intervention assessment (see Figure 3). Our results indicated that there was large effect of time on BDS performance, though this effect was not significant $F(2, 24) = 2.00, p = .16, \eta^2_p$.
Post-hoc comparison analyses indicated that there was a small and non-significant decrease between the first BDS score (resting) and the second BDS score (anticipation) during the pre-speech assessment ($p = .90$, $\eta^2_p = .00$). However, there was a large decrease in scores between the second BDS score and the third BDS score (in front of an audience; $p = .05$, $\eta^2_p = .15$).

3.3 Primary Analyses

*Hypothesis 3:* Our data suggests that performance improved more in the ABBT condition relative to the tCBT condition. We used the interaction term from the 2 (treatment condition) x 2 (assessment point) ANOVA described above to examine the interaction of time and treatment group on speech performance. The significant effect of time on objectively-rated speech performance (described above) was moderated by treatment condition such that individuals in the ABBT condition exhibited a considerably larger improvement in observer-rated performance than those in the tCBT condition (Figure 4). The moderation effect was sizable, but not statistically significant ($F(1,21) = 1.91, p = .18, \eta^2_p = .08$). There was no interaction effect of time x condition on subjectively rated speech anxiety (SUDS; $F(1,24) = .21, p = .65, \eta^2_p = .01$; figure 5).

*Hypothesis 4:* We expected that there would be a differential effect of treatment on verbal working memory performance during each working memory task administration, with greater improvements in verbal working memory in the ABBT condition. We used the interaction terms from a series of 2 x 2 repeated-measures ANOVAs to examine the interaction of treatment condition and assessment point on the first, second and third backwards digit span scores.

There was no interaction between time and treatment condition on the first digit span tasks ($F(1,23) = .11, p = .75, \eta^2_p < .01$) or on anxiety level self-reported during this BDS administration ($F(1,23) = 1.23, p = .28, \eta^2_p = .05$; figures 6 and 7 respectively). We also did
not see an interaction effect for the second, anticipatory digit span tasks \((F(1,23) = .40, p = .54, \eta^2_p = .02)\) or on anxiety levels during this BDS administration \((F(1,23) < .01, p = .98, \eta^2_p < .01; \text{figures 8 and 9 respectively})\). Similarly, the interaction effect for time x treatment condition on BDS scores that occurred in front of an audience was small and non-significant \((F(1,23) = .82, p = .37, \eta^2_p = .04; \text{Figure 10})\). There was also no time by condition effect on subjectively rated BDS anxiety in front of the audience \((F(1,23) = .06, p = .81, \eta^2_p < .01; \text{figure 11})\).

**Hypothesis 5:** To test the hypothesis that pre- to post-treatment improvements in working memory performance in front of the audience would correspond to pre- to post-treatment improvements in objectively-rated speech performance and subjective anxiety during the speech, residualized gain scores were calculated for BDS audience scores, SUDS scores and SPS performance scores.

A zero-order correlation matrix \((n = 25)\) indicated that improvements in BDS scores while in front of an audience were strongly associated with decreases in self-reported anxiety during the speech \((r = -.39, p = .06)\). Speech performance change was not associated with changes in BDS score \((r = .07, p = .76)\) or self-reported speech anxiety \((r = -.10, p = .64)\).

### 3.4 Secondary Exploratory Analyses

**Mediational hypotheses 6 and 7:** Despite our small sample size, we ran exploratory mediational analyses using the method outlined by Preacher and Hayes (Preacher & Hayes, 2008) to examine whether changes in BDS score, acceptance, or defusion mediated the relationship between treatment condition and change in objectively-rated speech performance (via residualized gain scores). We ran four separate mediational analyses with treatment condition as the independent variable and pre- to post- changes in speech performance (residualized gain scores) as the dependent variable. We utilized different mediation variables for each analysis: 1) BDS residualized gain scores when completed without an audience in a
“resting” state, 2) BDS residualized gain scores when completed in front of an audience, 3) Acceptance and Action Questionnaire-II (AAQ-II) residualized gain scores, and 4) Drexel Defusion Scale (DDS) residualized gain scores. BDS score, acceptance, and defusion mediation results indicated that mediation did not occur. The small relationships between the mediator variables and the dependent variables suggest that the relationships are not present (see table 4 for correlations between mediator variables and the dependent variable).

*Post-Hoc Moderation Analyses:* Following the completion of the study, we decided to examine the four variables of interest from our mediational models as potential moderators of performance outcomes. We also examined baseline COWAT verbal fluency scores, BDS #1 scores (resting state, no audience), and a composite score for COWAT + BDS #1 scores (as a rough estimate of general intelligence) as possible moderators. We decided to run these analyses to further explore the differential relationship between treatment condition and change in objective performance found in our prior analyses.

To test the hypothesis that baseline working memory ability (performance with audience trial) moderated the relationship between treatment condition and change in speech performance score, a hierarchical multiple regression analysis was conducted. In the first step, two variables were included: treatment condition and baseline BDS score (working memory) in front of the audience. This model was not significant in predicting speech performance change ($R^2 = .11$, $F(2, 27) = 1.11$, $p = .35$). To avoid high multicollinearity with the interaction term, the variables were centered and an interaction term between treatment condition and BDS score was created (Aiken & West, 1991). Next, the interaction term between treatment condition and BDS score was added to the regression model, which was significant ($\Delta R^2 = .29$, $\Delta F(1, 26) = 8.52$, $p < .01$, $b = .53$, $t(26) = 2.15$, $p = .01$). Examination of the interaction plot confirmed the moderation effect (see figure 12). For individuals with low baseline BDS scores / working memory when in front of an audience, there was a slight
benefit of tCBT for speech performance outcome. In other words, individuals with low baseline BDS who went through the tCBT condition experienced slightly greater gains in speech performance over time in comparison to the ABBT condition. This difference was small. However, for average and high average baseline BDS scores / working memory in front of an audience, individuals in the ABBT condition experienced greater improvements in speech performance while individuals in the tCBT condition experienced decreases in speech performance following the intervention.

To test the hypothesis that baseline acceptance moderates the relationship between treatment condition and change in speech performance score, we used the same method as described above. A model that included treatment condition and AAQ score was not significant in predicting speech performance change ($R^2 = .11, F (2, 27) = 1.23, p = .31$). The interaction term between treatment condition and AAQ score was added to the regression model, which was also not significant ($\Delta R^2 = .01, \Delta F (1, 26) = .14, p = .71, b = .02, t(26) = .27, p = .79$). Examination of the interaction plot indicates that moderation did not occur (see figure 13).

To test the hypothesis that baseline defusion moderates the relationship between treatment condition and change in speech performance score, we used the same method as described above. A model incorporating treatment condition and DDS score was not significant in predicting speech performance change ($R^2 = .09, F (2, 27) = 1.02, p = .38$). The interaction term between treatment condition and DDS score was not significant either ($\Delta R^2 = .01, \Delta F (1, 26) = .16, p = .70, b = .02, t(26) = .29, p = .77$). Examination of the interaction plot indicates that moderation did not occur (see figure 14).

To test the hypothesis that baseline COWAT score moderates the relationship between treatment condition and change in speech performance score, we used the same method as described above. A model that included treatment condition and COWAT score
was not significant in predicting speech performance change ($R^2 = .09, F (2, 27) = 1.03, p = .38$). The interaction term between treatment condition and COWAT score was added to the regression model, which was also non-significant with a small effect ($\Delta R^2 < .01, \Delta F (1, 26) = .08, p = .78, b = -.02, t(26) = .26, p = .80$). Examination of the plot indicates that moderation did not occur (see figure 15); individuals in the ABBT condition did better than those in the tCBT condition at all levels of verbal fluency. Low, medium and high COWAT scores in our sample roughly match population estimates (e.g., Tombaugh, Kozak, & Rees, 1999).

To test the hypothesis that baseline BDS #1 score (resting state, no audience) moderates the relationship between treatment condition and change in speech performance score, we used the same method as described above. A model that included treatment condition and BDS #1 score was not significant in predicting speech performance change ($R^2 = .31, F (2, 27) = 1.02, p = .38$). Next, the interaction term between treatment condition and BDS score was added to the regression model, which was significant ($\Delta R^2 = .22, \Delta F (1, 26) = 6.57, p = .02, b = .44, t(26) = .15, p = .01$). Examination of the interaction plot confirmed the moderation effect (see figure 16). Similar to our other BDS moderation analysis, individuals with low baseline resting BDS scores / working memory seem to experience a slight benefit when they receive tCBT for speech performance outcome. In other words, individuals with low baseline BDS who went through the tCBT condition experienced slightly greater gains in speech performance over time in comparison to the ABBT condition. This difference was small. However, for average and high average baseline BDS scores / working memory, ABBT intervention resulted in greater improvements in speech performance while individuals in the tCBT condition experienced decreases in speech performance following the intervention. Our sample’s raw scores on the BDS #1 (BDS low average = 6.43; BDS medium average = 6.29; BDS high average = 5.91) were roughly equivalent to those found in the general population (Botwinick & Storandt, 1974).
To test the hypothesis that general intelligence moderates the relationship between treatment condition and change in speech performance score, we created a composite score that combined baseline BDS #1 and COWAT scores for each participant using z-scores. A model that included treatment condition and the composite score was not significant in predicting speech performance change ($R^2 = .31, F (2, 27) = .09, p = .37$). The interaction term between treatment condition and the composite score was added to the regression model, which was significant at trend level ($\Delta R^2 = .12, \Delta F (1, 26) = .2.79, p = .11, b = .52, t(26) = 1.76, p = .09$). Examination of the interaction plot indicates that moderation did occur (see figure 17). Results were similar to both BDS moderation analyses: individuals with low verbal fluency / verbal working memory composite scores benefited slightly from tCBT in regards to performance improvement, though this difference was small. For average and high average general intelligence composite scores, individuals in the ABBT condition experienced greater improvements in speech performance while individuals in the tCBT condition experienced decreases in speech performance following the intervention.

Chapter 4: Discussion

Public speaking anxiety is a distressing condition that can be professionally, educationally, and personally debilitating. Although cognitive-behavioral treatments have been shown to be effective in reducing the anxiety associated with PSA, the effect of treatment on cognition and speech performance remains unclear (Hoffman, et al., 1997).

Our study had two major aims. The first was to examine the differential impact of a 90-minute ABBT vs. tCBT intervention on anxiety and performance. Our second aim was to examine the impact of ABBT and tCBT on verbal working memory performance in individuals with PSA to determine whether scores on verbal working memory tasks were related to changes in anxiety and performance following these interventions.
4.1 Preliminary Findings

Our results indicated that the 90-minute interventions reduced speech anxiety and improved speech performance, regardless of treatment condition. Furthermore, individuals reported that they enjoyed their participation and felt that the strategies they learned would continue to be useful in the future.

Interestingly, Backwards Digit Span scores (BDS, a measure of verbal working memory) did not decrease between the first trial (resting/no audience) and the second trial (anticipatory anxiety/no audience) during the pre-treatment assessment. However, there was a large decrease between the second trial scores and the third trial scores (performance anxiety/audience). Given that SUDS scores were nearly equivalent between the first and second BDS administrations and then increased dramatically during the audience trial, anxiety levels during the “anticipation” phase appear not have been high enough to impact BDS score. Participants may have also started anticipating the speech during the first BDS trial (consenting procedures indicated that speeches would occur), and thus did not experience an increase in anxiety once we formally introduced the speech task prior to the second BDS administration. Our results suggest that anticipatory anxiety and in vivo performance anxiety are qualitatively different and may have differential effects on anxiety and verbal working memory performance.

4.2 Differential Treatment Outcomes Between Conditions

Our primary analyses examined the differential effects of treatment condition on speech performance, anxiety, and verbal working memory. Individuals in both groups experienced a decrease in objective anxiety as rated by masked observers and there was no differential impact of treatment condition on subjective speech anxiety. Participants in both conditions reported moderate to high levels of anxiety during the pre-treatment speech and, on average, dropped to mild levels of anxiety on average at post-treatment. Those
participants who received an acceptance-based intervention exhibited larger improvements in observer-rated speech performance at post-treatment in comparison to tCBT. As our results were found in an underpowered study, they await replication in a larger sample. Nevertheless, this finding also replicates prior research suggesting that ABBT strategies may be more effective than tCBT strategies at improving social performance (Glassman et al., under review) and test performance (Brown et al., 2011) during high anxiety situations. Whereas tCBT techniques (e.g., cognitive restructuring) require self-focus, ABBT-based strategies may free resources for engaging in behaviors related to enhancing performance (e.g., concentrating on one’s speech volume, diction, vocabulary, or clarity). Given the potential social and occupational ramifications of poor performance in public speaking situations, these results suggest that ABBT may be a preferable intervention to tCBT when performance outcomes are important. Replication of this differential treatment response also suggests that ABBT and traditional tCBT are distinct interventions.

Given the greater impact that the ABBT intervention appears to have on speech performance, we anticipated that individuals who received an ABBT intervention would perform better on tests of verbal working memory as well, as measured by the backwards digit span test. We hypothesized that verbal working memory improvement would be a key factor in the differential impact of treatment on speech performance, but our data did not support the hypothesis that verbal working memory performance would be differentially impacted by treatment condition. Although individuals who received either intervention experienced an improvement BDS scores on all three administrations at post-treatment, there were no differences between groups. We also did not find a difference between groups on subjectively reported anxiety level during any of the BDS administrations at post-treatment. Although we did not detect any differences in cognitive resource utilization with the BDS between groups, it remains possible that ABBT strategies, relative to tCBT, free up other
unmeasured cognitive factors that are used to regulate internal processes, which allowed for
greater improvements in behavioral performance.

Increases in BDS scores during the audience trials were strongly associated with
decreases in self-reported anxiety during the speech. These results suggest that lower
performance anxiety was related to improvements in working memory task scores.

While our analyses indicated that mediation did not occur, our moderation analysis
for working memory suggested that individuals with average and high baseline levels of
working memory (as measured by BDS scores both in front of an audience and during resting
states) experienced greater improvements in speech performance when they received an
ABBT intervention in comparison to the tCBT condition. This effect did not hold for
individuals with lower scores on the BDS. Interestingly, we found a similar pattern of results
with a crude estimate of general intelligence created by combining scores from a resting/non-
anxious BDS trial and verbal fluency test (COWAT). This pattern of results may suggest that
higher cognitive abilities or general intelligence allows for greater benefit from an ABBT
intervention or that there is a broader relationship between positive cognitive and
psychological functioning and ABBT efficacy. Acceptance-based interventions often require
individuals to “think outside the box” and go against cultural anxiety-reduction control-based
norms. Furthermore, ABBT protocols often use metaphors, experiential exercises, and
paradoxical suggestion. This content may be more suited to more intelligent individuals or
those who have average or above average cognitive functioning. More research is needed to
determine whether there is a unique relationship between ABBT treatment outcome and
cognitive or intellectual functioning.

Taken together, our results indicate that ABBT and tCBT are distinctive
interventions. They also provide continued support for the assertion that acceptance-based
treatments have a greater positive impact on performance in anxiety relevant situations when
compared to tCBT strategies. Although our findings indicate that verbal working memory resource utilization may not drive ABBT’s performance advantage, it is possible that there are differential impacts of treatment on cognitive performance in other domains (e.g., attention) may explain why individuals who receive an ABBT intervention experience greater improvements in behavioral performance in comparison to tCBT. Further research is needed in this area using other cognitive and neuropsychological assessments to elucidate which pathways are affected by CBT interventions for anxiety.

4.3 Strengths and Limitations

This study examines behavioral performance and subjective anxiety as outcome measures in a study comparing ABBT and tCBT for the treatment of PSA. Individuals with PSA often experience deficits in speech performance that can impact professional and personal success. Thus, accurately assessing treatment effects on social performance is an important component of public speaking anxiety interventions (Leserman & Koch, 1993). Utilizing both objective and subjective measures in the same protocol can provide more information regarding the impact of treatment on outcomes of interest (e.g., performance and distress) for both clients and clinicians.

This study is also one of the first to investigate cognitive changes associated with public speaking anxiety and performance, and to examine differential changes between these two treatments. These aims reflect the current cutting-edge research in the field, which is beginning to address cognitive and neuropsychological moderators of treatment outcome. Although we did not find differences in verbal working memory performance between conditions, this study represents the first effort to examine what cognitive factors may be driving treatment outcomes in this population. Future research is needed to identify other potential cognitive predictors of change that may explain the differential performance outcomes observed in this study. Possible predictors for further investigation may include
attention-related functioning (e.g., attention shifting, attention capacity), length of time between intervention and assessment, or physiological activation.

Although this study found noteworthy differences between ABBT and tCBT after a brief intervention, there are several limitations to consider when interpreting the results. Because the study was developed as a pilot investigation, we had a relatively small number of participants and were underpowered in many of our analyses. Additionally, this study utilized a single-session design without a no-treatment experimental control condition. This precludes interpretations regarding how performance, anxiety and cognition would have changed in a group with PSA with no formal intervention. The effects of treatments may differ once elongated. As a result, we cannot make conclusions about the long-term efficacy of either treatment.

Finally, due to cost and pragmatic considerations, we did not include a physiological measure of anxiety. The lack of physiological data requires us to rely on self-report methods of reporting anxiety which are often unreliable sources of data (Leserman & Koch, 1993).

**4.4 Clinical Implications and Future Directions**

Continued investigation into the correlates of public speaking anxiety and its treatment may help explain why some individuals experience significant anxiety in public speaking situations, and help us to tailor treatments that target an individual’s unique needs. Our results suggest that a brief 90-minute cognitive intervention can reduce anxiety and improve performance in clinically significant PSA. Future research may benefit from examining the long-term efficacy and utility of brief interventions for PSA, as a condensed treatment package would greatly improve treatment dissemination and palatability for a greater number of individuals.
List of References


Northern, J. J. (2010). *Anxiety and Cognitive Performance: A test of predictions made by cognitive inference theory and attentional control theory*, Bowling Green State University Bowling Green, OH.


## Appendix A: Tables and Figures

*Table 1. List of study measures and estimated time to complete.*

<table>
<thead>
<tr>
<th>Measure</th>
<th># of Items</th>
<th>Estimated Time</th>
<th>Screen</th>
<th>Pre-Tx Assesment</th>
<th>Post-Tx Assesment</th>
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<tbody>
<tr>
<td>Demographics Form</td>
<td></td>
<td>5 minutes</td>
<td>X</td>
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<td>SCID – Social Anxiety Disorder Section</td>
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<td>10 minutes</td>
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<td>ADIS – Social Phobia Section</td>
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<td>15 minutes</td>
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<tr>
<td>Mini Neuropsychiatric Inventory (MINI) screener</td>
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<td>Clinical Global Impression – Severity Scale (CGI-S)</td>
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<td>Controlled Oral Word Association Test</td>
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<td>5 minutes</td>
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<td>Behavioral Assessment Test (BAT)</td>
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<td>Subjective Units of Discomfort Scale (SUDS)</td>
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<td>Backwards Digit Span – Versions 1-6</td>
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<td>Speech Performance Scale (SPS)</td>
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<td>3 – 5 minutes</td>
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<tr>
<td>State-Trait Anxiety Inventory – State Scale (STAI-S)</td>
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<td>3 – 5 minutes</td>
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<td>Personal Report of Confidence as a Speaker (PRCS)</td>
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<td>3 – 5 minutes</td>
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<td>X</td>
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<td>Self-Statements During Public Speaking (SSPS)</td>
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<td>3 – 5 minutes</td>
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<td>Personal Report of Communication Apprehension (PRCA-24)</td>
<td>24</td>
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<td>Drexel Defusion Scale</td>
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<td>Philadelphia Mindfulness Scale</td>
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<td>3 – 5 minutes</td>
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<tr>
<td>Acceptance and Action Questionnaire-II (AAQ-II)</td>
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<td>Reaction to Treatment Questionnaire (RTQ)</td>
<td>17</td>
<td>3 – 5 minutes</td>
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Table 2: Descriptive Statistics for Outcome Measures at Pre-Treatment

<table>
<thead>
<tr>
<th>Measure</th>
<th>Standard Cognitive Behavioral Intervention</th>
<th>Acceptance-Based Behavioral Intervention</th>
<th>T-Tests</th>
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</thead>
<tbody>
<tr>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Age</td>
<td>23.67 8.41</td>
<td>24.62 7.48</td>
<td>- .41</td>
</tr>
<tr>
<td>Pre-Treatment Backwards Digit Span Score (resting, no audience)</td>
<td>6.64 2.84</td>
<td>7.00 2.49</td>
<td>- .59</td>
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<tr>
<td>Pre-Treatment Backwards Digit Span Anxiety (resting, no audience)</td>
<td>35.91 19.85</td>
<td>38.00 27.20</td>
<td>- .34</td>
</tr>
<tr>
<td>Pre-Treatment Backwards Digit Span Score (anticipation, no audience)</td>
<td>7.50 1.65</td>
<td>8.30 1.95</td>
<td>- .36</td>
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<tr>
<td>Pre-Treatment Backwards Digit Span Anxiety (anticipation, no audience)</td>
<td>34.64 20.47</td>
<td>43.70 26.17</td>
<td>-1.40</td>
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<tr>
<td>Pre-Treatment Backwards Digit Span Score (performance with audience)</td>
<td>7.40 1.90</td>
<td>7.40 1.84</td>
<td>.59</td>
</tr>
<tr>
<td>Pre-Treatment Backwards Digit Span Anxiety (performance with audience)</td>
<td>56.09 24.10</td>
<td>61.92 21.14</td>
<td>-1.02</td>
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<tr>
<td>Pre-Treatment Speech Anxiety</td>
<td>68.55 24.69</td>
<td>68.90 20.63</td>
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<tr>
<td>Pre-Treatment Speech Performance (SPS)</td>
<td>30.60 4.93</td>
<td>32.67 5.66</td>
<td>-.20</td>
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<tr>
<td>PRCA-24 Public Speaking Anxiety Subscale</td>
<td>25.45 3.48</td>
<td>26.40 2.68</td>
<td>-.30</td>
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</table>
Table 3: Repeated-Measures ANOVA Examining Pre- to Post-Treatment Changes in Self-Reported Anxiety (Measured by Subjective Units of Discomfort, or SUDS) and Observer-Rated Anxiety (Measured by Speech Performance Scale, or SPS)

<table>
<thead>
<tr>
<th>Repeated-Measures ANOVA</th>
<th>Self-reported Speech Anxiety (SUDS)</th>
<th>Objectively Rated Speech Performance Scale (SPS)</th>
<th>Self-reported Anxiety during Backwards Digit Span Task (In Front of Audience)</th>
<th>Backwards Digit Span Score (Audience)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Treatment Means (Standard Deviations)</td>
<td>67.72 (20.80)</td>
<td>31.70 (5.31)</td>
<td>57.68 (21.63)</td>
<td>8.13 (2.17)</td>
</tr>
<tr>
<td>Post-Treatment Means (Standard Deviations)</td>
<td>37.36 (19.27)</td>
<td>34.75 (6.61)</td>
<td>28.79 (16.73)</td>
<td>9.00 (2.50)</td>
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<tr>
<td>F values</td>
<td>45.31</td>
<td>6.83</td>
<td>54.63</td>
<td>2.52</td>
</tr>
<tr>
<td>Significance (p)</td>
<td>&lt;.01</td>
<td>.02</td>
<td>&lt;.01</td>
<td>.13</td>
</tr>
<tr>
<td>Effect Size ($\eta^2_p$)</td>
<td>.66</td>
<td>.25</td>
<td>.71</td>
<td>.10</td>
</tr>
</tbody>
</table>
Table 4: Zero-order correlation coefficients for the relationships between the dependent variable and mediational variables for our mediational analyses.

<table>
<thead>
<tr>
<th></th>
<th>Objectively-rated Speech Performance (Residualized Gain Scores)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resting, No Audience</td>
<td></td>
</tr>
<tr>
<td>Backwards Digit Span</td>
<td>$r = .12$</td>
</tr>
<tr>
<td>Score (Residualized Gain</td>
<td>$p = .59$</td>
</tr>
<tr>
<td>Score)</td>
<td></td>
</tr>
<tr>
<td>Audience Backwards Digit</td>
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</tr>
<tr>
<td>Span Score</td>
<td>$r = .07$</td>
</tr>
<tr>
<td>(Residualized Gain Scores)</td>
<td>$p = .76$</td>
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<tr>
<td>Psychological Acceptance</td>
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<tr>
<td>(Residualized Gain Scores)</td>
<td>$r = .13$</td>
</tr>
<tr>
<td>Psychological Defusion</td>
<td>$r &lt; .01$</td>
</tr>
<tr>
<td>(Residualized Gain Scores)</td>
<td>$p = .99$</td>
</tr>
</tbody>
</table>
Figure 1. CONSORT Flow Diagram
Figure 2: Study Design identifying study time points for backwards digit span tasks, Behavioral Assessment Test (BAT) and acceptance-based (ABBT) or traditional cognitive behavioral therapy (tCBT) interventions.
Figure 3: Pre-treatment Backwards Digit Span scores given under three conditions: 1) alone in a room, 2) alone in a room, just after picking a speech topic, 3) in front of a small audience just prior to delivering a speech.
Figure 4: Interaction of treatment condition (standard Cognitive Behavior Therapy (tCBT) vs. Acceptance-Based Behavior Therapy (ABBT)) and time (pre- to post-treatment) on speech performance.
Figure 5: Interaction of treatment condition (standard Cognitive Behavior Therapy (tCBT) vs. Acceptance-Based Behavior Therapy (ABBT)) and time (pre- to post-treatment) on subjectively reported speech anxiety
Figure 6: Interaction of treatment condition (standard Cognitive Behavior Therapy (tCBT) vs. Acceptance-Based Behavior Therapy (ABBT)) and time (pre- to post-treatment) on verbal working memory under calm conditions (measured by Backwards Digit Span score).
Figure 7: Interaction of treatment condition (standard Cognitive Behavior Therapy (tCBT) vs. Acceptance-Based Behavior Therapy (ABBT)) and time (pre- to post-treatment) on anxiety during Backwards Digit Span tasks when delivered in a resting state.
Figure 8: Interaction of treatment condition (standard Cognitive Behavior Therapy (tCBT) vs. Acceptance-Based Behavior Therapy (ABBT)) and time (pre- to post-treatment) on verbal working memory under conditions of anticipatory anxiety (measured by Backwards Digit Span score when delivered in anticipation of being in front of an audience).
Figure 9: Interaction of treatment condition (standard Cognitive Behavior Therapy (tCBT) vs. Acceptance-Based Behavior Therapy (ABBT)) and time (pre- to post-treatment) on anxiety during Backwards Digit Span tasks when delivered in anticipation of being in front of an audience.
Figure 10: Interaction of treatment condition (standard Cognitive Behavior Therapy (tCBT) vs. Acceptance-Based Behavior Therapy (ABBT)) and time (pre- to post-treatment) on verbal working memory under conditions of performance anxiety (measured by Backwards Digit Span score when delivered in front of an audience).
Figure 11: Interaction of treatment condition (standard Cognitive Behavior Therapy (tCBT) vs. Acceptance-Based Behavior Therapy (ABBT)) and time (pre- to post-treatment) on anxiety during Backwards Digit Span tasks when delivered in front of an audience.
Figure 12: Interaction of baseline verbal working memory under conditions of performance anxiety (measured by Backwards Digit Span taken in front of an audience) and treatment condition in predicting change in observer-rated speech performance following traditional Cognitive Behavior Therapy or Acceptance-Based Behavior Therapy.
Figure 13: Interaction of baseline experiential acceptance (measured by AAQ-II) and treatment condition in predicting change in observer-rated speech performance following traditional Cognitive Behavior Therapy or Acceptance-Based Behavior Therapy.
Figure 14: Interaction of baseline defusion (measured by DDS) and treatment condition in predicting change in observer-rated speech performance following traditional Cognitive Behavior Therapy or Acceptance-Based Behavior Therapy.
Figure 15: Interaction of baseline verbal fluency (measured by COWAT) and treatment condition in predicting change in observer-rated speech performance following traditional Cognitive Behavior Therapy or Acceptance-Based Behavior Therapy.
Figure 16: Interaction of baseline resting working memory (measured by Backwards Digit Span) and treatment condition in predicting change in observer-rated speech performance following traditional Cognitive Behavior Therapy or Acceptance-Based Behavior Therapy.
Figure 17: Interaction of general intelligence (measured by a resting Backwards Digit Span and COWAT composite score) and treatment condition in predicting change in observer-rated speech performance following traditional Cognitive Behavior Therapy or Acceptance-Based Behavior Therapy.
Appendix B: Intervention Manuals

Traditional Cognitive Behavior Therapy Condition – 90 Minutes

Introduction to Procedure (3 minutes)

• “You have just completed a public speaking exercise for the first time. You are going to be asked to perform this exercise once more today about 90 minutes from now. During the next hour and a half we will discuss and practice some specific anxiety management strategies for you to use when you do the public speaking task again.

• “These strategies focus on exploring how different behaviors, thoughts, and feelings interact. The goal is to investigate which particular thoughts and beliefs are maintaining or increasing your anxiety, because the way we feel and behave is defined by the way we think. When your thoughts are out of line with reality (for example, when they exaggerate the likelihood or the importance of a negative outcome), they can make you anxious and influence the decisions you make and ultimately your behavior. We’re going to evaluate the way you think, and try to bring your thoughts more in line with reality. Past research indicates that individuals who become highly anxious in public speaking situations tend to believe that they are in social danger. The mind and body perceive this danger in the same way as actual life-or-death danger, and they react in a similar way. If we can test the validity of these anxious thoughts and restructure them based on valid evidence, your feelings and physical reactions should change as well, resulting in you being less anxious.

• “The ability to evaluate and adjust thinking is particularly important since people with anxiety typically think in ways that actually maintain their anxiety in public speaking situations, and maintains their distress over time. Specifically, people with high anxiety tend to overestimate the likelihood of experiencing negative outcomes, like getting up to speak and not having anything to say. Even more importantly, these individuals tend to see these negative outcomes as having a much greater cost than do people with low anxiety. So for example, you may think that people who see you as nervous during a speech will think you are unprepared or incompetent. We will discuss some of these beliefs directly, but the best way to test out their validity is through experience. As you begin to put yourself in public speaking situations, we want to help you shift in your beliefs about how likely your feared outcomes are and also in your ability to handle them if they were to occur.”

• “As we work together over the next 90 minutes, please ask me any questions you may have about anything we discuss, okay?”

• “Once we go through all of the information about the strategy you are about to learn, I will distribute a short quiz to ensure that you understand what we have discussed.

Psychoeducation regarding public speaking anxiety (2 min)

• “Anxiety is a “fight or flight” response. This makes total sense in the context of actual physical danger. Our ancestors survived because they were able to become
anxious when confronted with danger (e.g., a hungry tiger), which motivated them to fight or to get out of the situation.”

- “If you were to walk across the street and a bus were coming at you, you would experience a strong surge of anxiety that would motivate you to get out of the situation, and this would be seen as completely normal.”

- “The problem is that our brains sometimes have trouble separating social danger from physical danger. In public speaking situations, even though we are not in physical danger and therefore don’t need to fight or flee, the fight-or-flight response sometimes gets activated anyway. The response is reflected in a whole range of reactions, including increased physical arousal such as increased heart rate, faster breathing, sweating, etc. We also tend to become hyper-aware of these bodily reactions.”

- “It is our beliefs, and the thoughts associated with those beliefs, that trigger the fight or flight response. If we didn’t perceive a public speaking situation as somehow dangerous, our brain wouldn’t generate the fight-or-flight response, and we wouldn’t feel anxious. So the key to controlling anxiety is to make sure that you do not exaggerate the danger of the situation; that your thoughts remain realistic.”

**Introduce concept of exposure (5 minutes)**

- “Exposure’ refers to confronting situations that you fear (in this case, public speaking situations).”

- **ASK:** “Why do you think exposure is important?” – elicit from participant
  - “Help you challenge your thoughts and beliefs about yourself”
    - *(this is the most important point)*
    - “By putting yourself in a public speaking situation, we can determine the way your mind is thinking, which will then allow us to distinguish inaccurate from accurate thoughts, and work to bring the inaccurate ones more in line with reality.”
    - “Thus, exposures help us activate these thoughts so that we can evaluate their accuracy and correct them if needed.”
  - “Exposures also afford the opportunity to practice talking and giving a speech while using the anxiety reducing skills that you will learn today.”
  - “Exposures allow us to practice public speaking in a safe environment. This will serve to improve your skills while making it easier to speak while others are watching.”

**Treatment – Intro to the cognitive model (5 min)**

- “Before we start these exposure exercises and the process of examining your thoughts, I’d like to take some time to explain some of the theory behind the anxiety reduction strategies we’ll be discussing.”

- “In any given situation you find yourself in – driving a car, having a conversation, watching TV, etc. – you are responding to the situation somehow. You may be happy, mad, indifferent, interested, bored, or critical; there are an infinite number of ways to respond. However, the situation itself isn’t directly causing your response. Rather, how you think about the situation is what determines how you respond. So if
two people have two different thoughts about the same situation, they will respond with different emotions.”

- “For example, if one person is driving out West and sees a tumbleweed pass over the road, he or she may think, “oh, a tumbleweed can’t hurt me”, and his or her response would be to keep on driving through the minor roadblock. On the other hand, another person may see the same tumbleweed and think, “that thing is going to kill me!” and therefore become overwhelmed with anxiety, perhaps even swerving off the road to miss the object.”

- “Another example may be standing up in a room full of people to give a toast. One individual might think, “I don’t have much to say, and I’m not the best speaker in the world but I can at least express how happy I am to be here.” That person would probably be able to give a toast without much trouble. However, a different person in the same situation may think, “I don’t have much to say and everybody is going to wonder why I’m even trying to give this toast. I’m going to make a fool of myself.” That individual would clearly become quite anxious, and would have a much harder time giving the speech. So, the thoughts we have about specific situations, rather than the situations themselves, elicit our emotional and behavioral response.”

- “We are always going to have these so-called “automatic thoughts” in response to all situations – our mind is constantly running. However, just because we have these thoughts doesn’t make them true. In fact, we have biases preprogrammed in our mind such that we often tend to see danger even when there isn’t any.”

- “If we can take some of these biased, inaccurate thoughts, and restructure them to be more accurate, your emotional response will change as well.”

**15-minute time check**

1. Finding Automatic Thoughts (10 minutes)

- “Let’s take some time to discuss what these automatic thoughts look like.”
- “Automatic thoughts are discrete, specific thoughts that occur in reaction to specific situations. It’s sort of like your mind giving a running commentary on your ongoing experience. For example, if you’re walking down a city street, you may have random thoughts such as “It’s cold out today. That creepy person is staring at me. I need to buy milk on the way home. That person looks like my neighbor Cindy.”
- “There are two important things to appreciate about automatic thoughts. First, they typically occur just outside of awareness. That is, we are typically unaware of them until we start paying close attention. Because they are typically outside of our conscious awareness, our mind generally treats them as facts, rather than as hypotheses (guesses) that may or may not be true.”
- “Second, although not all automatic thoughts are negative, the ones that cause anxiety are quite negative. As we discussed before, these thoughts typically exaggerate both the probability and cost of negative outcomes.”

- **ASK:** “Can you give me an example of an automatic thought you had in the last 30 seconds” *(doesn’t have to be about anxiety; and you can refine and re-explain as necessary)*

- **ASK:** “Now, imagine you are about to give a speech to a large group of people. There are about 40 people sitting in chairs a small room. You are at the front of the room, and the center of attention. They are all looking at you, expecting you
to explain something to them. Can you give me an example of an automatic thought you would have when you find yourself about to speak?” (examples: everyone will think I’m stupid, everyone will talk about me)

- Elicit one AT -
  - “This is a major part of the rationale for this treatment – thoughts are happening all of the time, we’re not even capable of paying attention to them all – but they still affect the way we feel and the way we respond whether or not we’re aware of them.”
  - “So we’re going to pay attention more systematically to your automatic thoughts during the next hour, and then learn how to evaluate if they are distorted, and to correct them.”

- “For public speaking anxiety, the negative automatic thoughts tend to be about how groups of people may evaluate us when we are the center of attention. Think back to a speech you remember clearly – it could be the one you did a few minutes ago here, or another one. It’s up to you – but pick one you remember well” – (Use the situations thoughts reactions flowchart)
  - **ASK:** “Let’s start by factually recording this situation. Tell me about what happened.”
    - Record under “situation”
    - May have to teach how to define situation without emotion, separate from responses and thoughts.
  - **ASK:** “How did you react to this situation?”
    - Record under “response.” Make sure to highlight emotions, although can also note behaviors.
    - Help with questions like “when was your reaction the strongest?” “What was your physical state?” “What was your emotional state?”
  - **ASK:** “Why do you think this situation produced these reactions?”
    - Try to foster acknowledgement that the thoughts they were having drive the response - “What was going through you mind?”
    - Elicit responses like “I was worried my mind would go blank.” “I thought everyone was looking at me.” “I’m humiliating myself.” “Things will end badly,” etc.
    - Use downward arrow technique as needed to elicit the core cognition(s) driving the emotional reaction – what’s the worst thing about this? If this is true, what does it mean?
    - Record under “thoughts”
    - Note: If having trouble finding thoughts – can work backwards “so you thought you were doing a great job?” no? why not?

2 Exposures – Two, 2-minute behavior experiments (10 minutes)

- “I’m going to ask you to stand up and give a two-minute speech on your favorite foods. I will let you know when to stop”
- **Both exposures will be on this same topic**
- **Pick a single behavioral AT on which to focus** (ideally – “I won’t have anything to say,” but also “I will turn red,” “I will look nervous,” etc.). For this exercise, try to avoid thoughts that hinge on others’ subjective reactions (e.g., “They’ll think I look/sound stupid”), as these are harder to challenge with the data generated via this exercise. Note the AT on a blackboard, notepad, etc.
• Did the feared outcome really happen? Discuss with participant
• Repeat with a different AT
• The “take-way” point of the exercise is that the negative, catastrophic thoughts were not accurate predictions of what would happen during the speech. Instead, it simply led to anxiety. So, we need to “restructure” the negative thought to something more realistic.

**35 minute time-check**

2. Restructuring Cognitive Distortions (15-20 minutes)

• “As the exercise we just did illustrated, just because someone has a thought does not make it true.”
  o “Example: Just because you have the thought that that “everyone in this room thinks I’m incompetent,” doesn’t make it the truth”
• “Therefore, we cannot just assume our thoughts are true, especially because they are so programmed to find danger and are heavily influenced by our past experiences and past thoughts. We must look for evidence.”
• “There are several specific ways in which automatic thoughts might be biased or distorted. These are called “cognitive distortions, and they are fairly common among all individuals – whether or not they have anxiety in public speaking situations”
  o Hand individual list of cognitive distortions and discuss (e.g., have them identify which ones seem to be the most common for them)
• SUMMARY: “Automatic thoughts are automatically occurring thoughts that pop up on an ongoing basis in response to the immediate external or internal environment. Although they are often distorted (at least the ones associated with anxiety), they are not necessarily distorted. Cognitive distortions are specific ways in which ATs are distorted and can help us to determine if certain thoughts are in fact distorted and how we can help make them less distorted.”
• “Let’s take one of the thoughts that we listed earlier and examine the evidence based on our understanding of automatic thoughts and typical cognitive distortions”
  o **ASK:** “Which one would you like to start with?” – be sure to make the thought as specific as possible – e.g. “my face will be red” – how red? – notice extremes.
  o Help the client evaluate the evidence for/against the thought, with an eye toward showing how it involves exaggerated probability and/or cost of negative outcomes. As much as possible, assume a “neutral” stance through this process, using Socratic questioning to allow the client to draw his/her own conclusions based on his/her own experiences. For example, “OK, so what’s so awful about turning red? Are there other reasons you could be red? What do you think the likelihood is that someone notices you are red? And if someone did notice you were red, what conclusions do you think they would draw from that? When you notice someone blushing in a public speaking situation, what conclusions do you draw? Do you think they’re ‘stupid’ or ‘incompetent?’ Or do you simply see it as a natural reaction when speaking in front of others?”
• “Now that we see how the thought is distorted, the next step is to correct the distortion by coming up with a “rational” thought that better reflects reality. Once we
have identified this new thought, you can then focus on it while actually in the public speaking situation.”
  o “For example, if you have the thought “I’m turning red! Everyone will notice”, what is a more rational or accurate view of reality?” (Allow them to respond, help if necessary – elicit something like: “Even if I do blush, and even if some people notice, it’s really not a big deal. Blushing is completely normal when speaking in front of a group, and it’s unlikely that anyone would judge me negatively for it. And besides, even if someone did, that’s their problem.”)
  o “What if you have the thought “When they notice, they’ll think I’m an idiot”?” (similarly, wait for them/help to elicit a more rational and realistic response)

** Exposure – Two, 2-minute speeches practicing focusing on a corrected AT – both times for this restructured AT (10 Minutes)
  • Use the central AT restructured per above; write it down on a blackboard, dry-erase board, etc.
  • “Please stand up and give a two-minute speech on what you would do if you won the lottery. Every 30 seconds, I’m going to ask for a SUDS rating and ask you to read the rational response written on this dry erase board. Then, immediately continue your speech again from where you left off” –
  • Repeat this exposure and instructions TWICE, with the second speech on a current political/controversial issue of their choice.
  • Immediately following the exercise, the therapist and patient discuss the evidence gathered during the exercise – be sure to include both evidence for the AT and evidence that contradicts the AT.

** Exposure – Two, 2-minute speeches practicing focusing on another corrected AT – both times for this restructured AT (10 Minutes)
  • Take time to restructure another thought, and repeat exposure activity as described above.
  • “Please stand up and give another two-minute speech on your favorite book or TV show. Again, every 30 seconds, I’m going to ask for a SUDS rating and ask you to read this new rational response written on this dry erase board. Then, immediately continue your speech again from where you left off” –
  • Repeat this exposure and instructions TWICE, with the second speech on a description of their immediate family.
  • Immediately following the exercise, the therapist and patient conduct a brief “postmortem” of the exercise, discussing topics such as the evidence gathered during the exercise that supports and contradicts the AT, etc.

Take home messages to review (2 minutes)
  • “Anxiety is a natural reaction to danger”
  • “Our thoughts and beliefs about the dangerousness of situations that really aren’t dangerous cause anxiety. Situations themselves don’t cause anxiety; our thoughts about them do.”
  • “Our mind is constantly making a running commentary on the world, which we call “automatic thoughts.” We are typically unaware of these thoughts, but we can become aware of them by paying close attention.”
• “Automatic thoughts are not necessarily true, and in fact are often distorted. Just because we have a thought in no way means that it is a valid reflection of reality,”
• “Anxiety related automatic thoughts tend to reflect two themes (or “biases”): the exaggerated likelihood of a negative outcome, and the exaggerated cost/consequences should that outcome actually happen.”
• “To reduce anxiety, we need to become aware of our ATs, and correct them so that they are more realistic. It’s often helpful to do this before giving a speech, anticipating the type of thought you’re likely to have.”
• “During a speech it’s helpful to focus on the corrected, rational thought. This will help control excessive anxiety, thereby making it easier to give the speech.”

** 2 Exposures – Two final 2-minute speeches incorporating all of the learned skills. (10 minutes
• “Please stand up and give another two-minute speech on your favorite holiday. Try to incorporate the strategies we’ve discussed today – when you notice yourself having anxious and negative thoughts, remember the corrected, rational thought and continue your speech.” –
• *Repeat this exposure and instructions TWICE, with the second speech on their favorite job and/or class in school*
Acceptance-Based Behavior Therapy Condition – 90 Minutes

Introduction to Procedure (2 minutes)
- “You have just completed a public speaking exercise for the first time. You are going to be asked to perform this exercise once more today in about 90 minutes. During the next hour and a half, we will discuss and practice some specific anxiety management strategies for you to use when you perform your speech again. These strategies are based on a principle known as “psychological acceptance,” meaning you will learn to notice, but not fight, your anxiety sensations and any thoughts that go along with them. What psychologists have learned is that by noticing and accepting anxious thoughts and feelings, you will be able to cope better than you would by fighting them. One result is that you have more mental resources to devote to focusing on what it is you want to say and your speaking performance improves.”
- “We have used this strategy for people with public speaking anxiety in the past, and it has worked very well. We’ve found that individuals who use these strategies are more likely to accept the uncomfortable sensations associated with speaking in public, tend to focus more on their speech performance and less on their anxiety, and have been able to do things that used to be avoided.”
- “As I’m going through these ideas and strategies, make sure to ask me any questions you may have about anything we discuss, okay?”
- “Once we go through all of the information about the strategy you are about to learn, I will distribute a short quiz to ensure that you understand what we have discussed.”

Rationale for treatment: exposure in the context of acceptance/defusion (3 minutes)
- “There are 4 main points that we’re going to discuss and practice in this session that will teach you how to cope with public speaking anxiety. These points are all tied together, and we will talk about them in more detail in a few minutes”
  o “1 – Acceptance that anxiety is a natural and harmless reaction that often occurs in situations such as public speaking. Although anxiety is harmless, we have a natural instinct to try to control it or get rid of it. However, attempts to do so usually backfire. For the most part, humans do not have the ability to control their emotions, including anxiety. So, trying to control anxiety only draws out attention to it, reinforces the notion that it is awful, and prevents us from fully engaging in life, achieving our aims and performing to the best of our ability. By the way, “acceptance” does not mean “resignation” but a much more active process of welcoming and being open to your internal experiences. Do you see the difference? How would you explain, in your words?” [Refine, as necessary.]
  o “2 – Gentle Refocusing your attention. This involves noticing when you’re focusing your attention on your anxious thoughts and emotions, or on how you are coming across, and gently redirecting your attention to the most relevant aspects of whatever it is you are trying to accomplish. Refocusing happens continuously. So, when you’re giving a speech, you might continuously refocus on what it is you want to say and an important public speaking skill like making eye contact.”
  o “3 – Willingness to focus outwardly on speaking, rather than internally on anxiety and uncomfortable sensations”
"4 – Defusion – bringing some distance between yourself and your thoughts, allowing you to recognize thoughts as just thoughts, and not necessarily as reflections of the way things really are."

“Ultimately, this is about learning how to engage fully in the behaviors that matter most to you, instead of being forced to expend energy trying to control your anxiety or avoiding experiences altogether.”

**Introduce concept of exposure (3 minutes)**

- “Exposure’ refers to confronting situations that you fear (in this case, public speaking situations).”
- **ASK:** “Why do you think exposure is important?” – elicit from participant
  - “Opportunity to practice behaviors and strategies in a safe environment. This includes identifying aspects of public speaking that need extra attention. For example, if you are whispering when you speak, we would be able to help you practice speaking at a more audible volume”
  - “Practice accepting internal experiences without struggling with them, trying to suppress them, or otherwise change or get rid of them.”
  - “Redirecting attention. When your mind starts focusing on your how you’re feeling, you can learn to gently refocus your attention on the speech. This doesn’t mean you’re getting rid of the anxiety symptoms. Rather, you’re just paying less attention to them, and instead focusing your attention on the task at hand.”

- “Exposure often does produce “habituation” which means that your body and mind learn that nothing awful happens when you are engaged in the feared activity and so you gradually react less anxiously. However, there is no way to know how much anxiety reduction you will experience, or when it will happen, or when it might come back. So, making anxiety reduction a goal turns out to be a bad idea. Plus, depending on anxiety reduction and hoping for it leads to the troubles were just discussing: you’ll dislike your anxiety, you’ll focus on trying to control it, and you won’t be able to perform as well or be as engaged in your life. These are the reasons we emphasize the importance of accepting whatever thoughts, feelings, sensations, etc. your mind and body happen to generate at any given time. We will discuss all this more later, but I’m interested to hear what you’re getting from what we’ve talked about so far.”

[Solicit a summary of main points covered so far. Prompt and then fill in as needed.]

1. **“Creative hopelessness”** (3 minutes)
   - “What have you tried to do in the past to get rid of your anxiety when you give a speech?” Examples of typical strategies, use as needed:
     - Avoidance
     - Trying to distract/calm self
     - Trying to suppress anxiety-related thoughts/feelings/sensations
     - Trying “popular” strategies (e.g., imagining the audience naked)
   - Emphasize strategies that focus on experiential control. Ask the patient to evaluate how well these have or have not worked. Point out that these control-oriented strategies have not consistently worked (otherwise the participant would not be seeking help).
Control as the Problem: (5 minutes)

- “Try this: I’m going to be watching you very closely, but I want you to close your eyes. You can think about anything you want right now, but just don’t think at all about how I’m watching you. You can think about anything you want, I’ll let you know when you can stop” (wait 15-30 seconds). “Suppose I offered a 1 million dollar reward to anyone who could do this, and I wired you up to a mind-reading machine to verify if you could control your thoughts enough not to think about me watching you. What do you think would happen?”
  - “What do you think these examples are meant to illustrate?” As much as possible the therapist should gently guide the client toward the conclusion.
  - “This example shows that we cannot control our thoughts even when we have the most intense motivation to do so”
  - “We are taught from a young age that we can control our mind. However, psychologists now realize that attempts to control our thoughts are most likely not going to be successful and may even make things worse, especially in stressful situations. Can you think of an example where an attempt to control a distressing thought or feeling made it even worse?
  - Here is another example (if needed): “Imagine you are hooked up to a machine that can measure your anxiety. It’s the world’s best polygraph machine, and it is impossible to fool; if you’re feeling anxious, it will know. Now, imagine that if your anxiety reaches a 7 out of 10, the machine will automatically shoot you. Do you think you would be able to keep your anxiety from reaching a 7?”
  - “In the same way that we generally can’t control negative thoughts, we also can’t directly control our feelings. This applies to thoughts and feelings that you will experience when giving a speech in front of other people. In fact, trying to control your thoughts about the anxiety and performance will actually interfere with our ability to give a good speech. The acceptance strategies I am about to teach you will give you another way to deal with the anxiety without struggling with your thoughts and feelings.”

** 15 minute time-check**

2. Alternative to control (8 minutes) “So, if controlling anxiety is not the answer, you’re probably wondering what a possible alternative strategy looks like… “

- Tug-of-war with a monster: “The struggle between you and your anxiety in public speaking situations is like being in a tug-of-war with a monster. Imagine that you are standing on one side of a cliff, and across from you is a monster—a big, hairy, scary monster that represents all of your anxiety. In between you and the monster is a bottomless ravine. You and the monster each hold one end of the rope and are pulling back and forth, each trying to pull the other into the ravine, but you never can quite pull the monster in (i.e., you can’t get rid of the anxiety). In fact, the harder you pull, the harder the monster pulls, and you feel yourself slipping ever closer to the edge of the cliff.”
  - ASK: “What is the alternative?”
  - “The alternative to controlling anxiety is to “drop the rope” and allow the monster (anxiety) to exist, which frees you up to act in accordance with your values and goals, like being able to speak in a public situation” (speak at the wedding, apply for the promotion – use examples specific to
“What happens to the monster when you drop the rope? Does he go away?”
  - Point out how he can be on the edge of the ravine and make himself very noticeable by shouting and gesturing. Connect to anxiety.

“Does he change in any way?” …
  - Perhaps he gets louder at first, like a child having a tantrum? Different people will have different answers.

“Does your sense of him change?” …
  - Point out that most likely you will find him less threatening, and pay less attention to him. There may be more times that you barely notice him. Then he’ll unexpectedly seem louder again. Connect to anxiety.

“How does dropping the rope affect the rest of your life?” …
  - Point out how you now have hands free! And your mind free! You can do so many more things, and can do them more mindfully.

“If you decide to drop the rope, how long will you stay in this mindset?”
  - Point out that dropping the rope is not a single act, but rather a process that must be repeated on an ongoing basis.

You may have to drop the rope hundreds of times a day, especially at first.

**ASK:** “So how does this relate to public speaking anxiety?
  - This metaphor is equivalent to being able to notice that you’re having anxious thoughts and feelings, and accept the fact that you can have these feelings without engaging in a struggle with them. You are spending so much time and energy struggling with these anxious thoughts and feelings that you cannot change, suppress or avoid (you’ve tried so hard to control them!). While engaged in this struggle you are so focused inwardly that you lose the ability to make choices and decisions about your life and move towards your goals/values (speaking in public/at weddings, etc.)."

*Can use soldiers metaphor – brain attention is 100 soldiers… if 90 of your soldiers are monitoring your anxiety, thoughts, etc. then you only have 10 soldiers working on your speech. Goal is to get more of those soldiers concerned about the speech, and fewer monitoring your internal experiences.*

**Acceptance:** “So going back to what we were speaking about before…if we don’t try to control or suppress our anxiety what can we do? Perhaps it could help us to accept that we are going to have this anxiety no matter what; we can’t stop our mind and body from getting anxious. That’s not a viable choice. However, there are two things we *do* have a choice about. First, we can choose whether we have a controlling and judgmental mindset towards our anxiety, or an open, accepting stance. Second, we can choose our *behavior*. For example, you can choose to speak aloud and make eye contact at the same time you have anxious feelings and thoughts that push you not to do so. The more you just notice and accept the thoughts and sensations the easier it will be to keep going, perform well, and not to spend so much time focusing on your these internal sensations.”

“What do I mean by internal experiences? Things like your thoughts: “They
I think I’m stupid.” “They can tell that I’m anxious.” “I did so badly.” Another type of internal experience is feelings, including emotions like sadness, anxiety and excitement. Thoughts and feelings about giving a speech are internal experiences. So are physical feelings like a racing heart, sweaty palms, or a reddened face.

- “If you are non-accepting of your anxiety and internal experiences (i.e., you are struggling with them rather than accepting them), you are essentially unwilling to choose the behaviors that are in line with your goals without first neutralizing your anxiety. As we have seen, this actually reduces your control over your behavior and the choices that you make, and you expend all of your mental energy focusing inward on this fight with your emotions.”
- “The important point is that we don’t need to get rid of anxiety in order to behave however we want to (i.e., give a speech). Anxiety only stops us if we let it. As we learn to let the anxiety be there and give up the struggle with it, we are free to behave however we want. You take charge of your behavior, rather than letting anxiety be in the driver’s seat. Although this idea may seem counterintuitive, it really does work!”
- “So, what are you getting out of our conversation so far?”

3. **Willingness:** (8 minutes) “So how do we move towards this attitude of acceptance towards our distressing thoughts and feelings when they are so stressful and so real?

- “The idea of dropping the rope in the tug-of-war with the anxiety monster means that you are accepting that your anxiety as a natural response. When you drop the rope, it means that you are WILLING to feel uncomfortable and change your behavior. Willingness implies flexibility to behave however you want to, not only in those narrow ways that supposedly protect us from uncomfortable thoughts and feelings.

- **Two dials metaphor:** “Imagine that there are two dials, like the volume and balance settings on your stereo, which are an important part of your discomfort experience. One dial, with a 0-10 range, is the anxiety associated with speaking in public. You came in here mainly because you wanted help dealing with that dial. But as we’ve seen, you actually have limited (if any) direct control over that dial, and the more you focus on it the more you are bothered by the anxiety. It’s as if the dial on your stereo looked like it was functional, but was really broken. But there is another dial that is the more important of the two. In fact, it is the only one you can control. This one is called Willingness. It refers to how open you are to internal experiences, without trying to manipulate them, escape them, or change them. When the difficult part of standing in front of a group and speaking is at a 10, and you’re trying hard to make that difficulty go away, your willingness is a 0. That is a really bad combination, because you become so bothered by all of that difficulty – by thoughts of failure, embarrassment, and anxiety. Trying to find ways around that discomfort just doesn’t work, which is why you’re here today. So we aren’t going to focus on the agenda of how to make speaking in public anxiety-free, because that agenda won’t get us very far.”

- “Instead, we are going to focus on the Willingness dial. If we set your Willingness high, then your discomfort isn’t necessarily going to go away, but you are free to choose the behaviors that you want to engage in and not be limited by avoiding anxiety.”
(Be careful to attend to the patient’s natural tendency to view willingness within the context of the control agenda. “So if I’m willing to have the anxiety it will go away.”)

“True willingness instead means that the anxiety is not only free to occur, but in fact is welcome – and will not change the behaviors that you decide to engage in”

• **Cards Exercise:** Throw cards at the individual while trying to engage them in conversation having them 1. Trying to catch all cards (control) 2. Trying to bat away all cards (avoid) 3. Ignoring cards (acceptance). Discuss this as the exercise unfolds, and ask them for their reaction afterwards

**Values (4 minutes)**

• **Core metaphor:** “Values are like compass points. They indicate a direction in which to move, but are not destinations. One can move “east,” but no matter how far one travels, one never gets to “East.” Goals, on the other hand, are potentially attainable destinations (like mile markers) along the path in the direction of values. The important thing is that one’s goals be consistent with one’s values.”

• “Given that you’re here today, speaking in public is important to you. What are some of your personal values that explain why public speaking is important to you, and why it is worth it to you to work towards a goal of being able to more often and more completely express yourself publicly?”

• *[Help as necessary connect top-level values with the goal of being a better and more frequent public speaker.]*

**** Exposure Activity (10 minutes) – Two, 2-minute speeches

• “I’m going to ask you to stand up and give a two-minute speech on your favorite foods. I will let you know when to stop. As you anticipate and then start your speech, try, as best as you can, to *welcome* the anxious thoughts you have about what your audience is thinking or how your body is responding rather than hating them and wanting them to go away.” –

• **Both exposures will be on this same topic**

• **Briefly debrief with them about this experience, how difficult it was, how the participant thought their performance was. Encourage them to keep working on this through all exposures, and reinforce how hard this is.**

**35 minute time-check**

4. **Defusion/Distancing:** (10 minutes) –

• “A huge part of learning how to focus your attention outwardly is practicing techniques that help you direct your attention away from your internal experiences”

• “Try to just sit back and notice whatever internal experiences you are having right this second. What do you see, hear, smell, feel? What are you thinking? How about when you’re in a public speaking situation?”

• “One reason is can be so difficult to accept our anxious thoughts and feelings is that we experience them as if they were part of us and as if they were a literal truth rather than as an experience we just happen to be having in a particular moment. Psychologists call this being “fused” with thoughts and feelings. This means that
when the thought “I am making a fool of myself!” comes into mind, we view it as literally true, rather than just a thought that our mind happened to create in that second.”

• “A very important way to decrease the distress you have about these thoughts and feelings is to achieve DE-fusion, or to distance yourself psychologically, from them. When we achieve distance from our emotions, feelings, and concerns we can take a step back from ourselves. We can actually see ourselves experiencing the anxiety from a psychological distance. When we are distanced we can experience anxiety (or any thought or feeling) as just a thought and/or feeling our mind is having at that moment. It can help to think of your anxiety as a sensation - nothing more than chemical and electrical activity in our brain. When we have this kind of distance from our thoughts and feelings we can choose not to do what those thoughts and feelings are ‘telling’ us to do. In other words, we can say: ‘I can see myself experiencing anxiety right now. It’s is a really intense sensation. Hmm, that’s interesting. I’m going to let that feeling just be and choose not to fight it.’ In the same way, we can step back and see ourselves thinking a thought like “I am making a fool of myself!” and can say to ourselves, “Right now I’m having the thought ‘I am making a fool of myself.’”

 o Using a couple of little verbal conventions will help to undermine the tendency for words/thoughts to pull us into a struggle.”

 o “Name the type of language being used by saying “I’m having the (thought/feeling/evaluation/bodily sensation) that....” If you name the process, it’s easier to see what it really is, rather than what it just says it is. It’s also an important step in starting to be AWARE of your thoughts and feelings, and just notice them.”

 o Give an example of a thought related to public speaking and how to reformulate it. Examples: “I’m going to mess up. Everyone can tell that I am sweating and shaking. I am so terrible at speaking to a group.”

 ▪ Reformulate: “I’m having the thought that I will mess up. My body is experiencing sweating and trembling sensations, and I have the belief that others are aware of this. I am evaluating my public speaking skills as terrible. Hmm. Those are interesting thoughts. Hello thoughts; welcome aboard. You guys just do your thing, and I’m going to focus on my speech now.”

• ASK: participant to explain defusion in his own words. Ask him/her to give examples of thoughts he has had regarding public speaking, and to reformulate them.

**** Exposure Activity (10 minutes) – Two, 2-minute speeches, giving speech despite therapist verbalizing anxious thoughts every 20 seconds.

• ““Please stand up and give a two-minute speech on your favorite foods. I am going to act like your mind, saying the anxious thoughts that you have out loud while you are talking. Try your best to practice defusion techniques. Keep trying to maintain your attention outwardly on your speech, even as I speak your thoughts while you’re giving your speech. Keep going until I tell you to stop.” –

• Repeat this exposure and instructions TWICE, with the second speech on a current political/controversial issue of their choice.

• Debrief, discussing both moments when the client was able to achieve defusion, acceptance, and willingness, as well as times when he/she “picked up the rope” and
struggled with thoughts and feelings.

Gentle Refocusing (5 minutes)

- “What do you do if you catch myself paying too much attention to trying to control your anxiety or thinking about what other people are thinking?”
- “A helpful strategy can be gentle refocusing. When your attention has moved from a conversation to yourself/your performance (which, of course, will inevitably happen), you can gently redirect it back to the conversation. You can do this as many times as necessary; it doesn’t matter whether it is 10 or 20 or 100 times. The keys are:
  1. to become aware that you have lost your focus so that you can gently refocus your attention back to the task at hand;
  2. not to be judgmental or distressed that you have lost focus;
  3. not to get caught up in arguing with/changing/suppressing any of the ideas related to your performance/how others are viewing you. Instead just let them be, and gently refocus;
  4. Gentle refocusing is different from thought suppression (e.g., trying not to think about me watching you);
  5. Acknowledge that you don’t have complete control over where you direct your attention (one reason not to be angry at yourself when attention is not where you want it to be), and just do the best you can to move your focus back to the conversation as soon as you realize it has shifted.”

- If necessary: review, expand on acceptance-based model for why participant tends to focus inwardly & how this doesn’t work

  o Practice 1: Standing on Chair. “The more your mind is concerned with how you are being perceived by others, the more difficult the refocusing can be. So, let’s try a quick practice. Most people feel awkward standing on a chair in the presence of another person, so hopefully you will too! See what it’s like to experience the natural pull towards concerns about how you seem to another person, yet still redirecting your attention. Are you ready?”  

****Exposure Activity (10 minutes) – Two, 2 minute speeches practicing gentle refocusing of attention from anxiety back to speech – acceptance of feelings of anxiety, doesn’t have to control behavior/speech – done while standing on a chair

- “Please stand up and give a two-minute speech on your favorite book or TV show. Try to keep your attention focused outwardly on your speech, the words you choose, the volume and tone of your voice, and other aspects of your performance. If you notice that you’re starting to focus inward, on your internal sensations and thoughts, gently notice this and refocus your attention back on your performance. Keep trying to maintain your attention outwardly on your speech, even if you need to keep redirecting your attention. Keep going until I tell you to stop.”

- Repeat this exposure and instructions TWICE, with the second speech on a description of their immediate family.

Review key concepts (acceptance, defusion, willingness) (2 min)

- “As a way to help you remember what we just talked about, we have come up with a
memory aid. Use the word **DRAW**.

**D:** **Defusion/Distancing.** Step back from your thoughts and feelings about public speaking. See them from a distance. “I see myself having a feeling of anxiety right now.”

**R:** **Refocusing.** Gently directing attention towards a speech and lessening self-focused attention

**A:** **Acceptance.** Whatever thoughts or feelings your mind creates are okay. You can just accept them as they are and let them be there while you focus on the task at hand.

**W:** **Willingness.** Be willing to have what your mind gives you and to behave how you want. No matter how high your anxiety level is, you can let it be while you go ahead and give a speech. You don’t have to make it go away.

**** 2 Exposure Activities (10 minutes) – practicing all strategies used with time for discussion.

- “Please stand up and give another two-minute speech on your favorite holiday. Try to incorporate all of the strategies we’ve discussed today – acceptance, willingness, defusion, and gentle refocusing. Use these skills to try and keep your attention focused on your speech performance, not on your internal experiences. I’ll let you know when to stop” –

- Repeat this exposure and instructions TWICE, with the second speech on their favorite job and/or class in school
## Vita

### EDUCATION

<table>
<thead>
<tr>
<th>Institution and Program</th>
<th>Years</th>
<th>Location</th>
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<tbody>
<tr>
<td>UCSD/SDVA Psychology Internship Training Program</td>
<td>2013 – present</td>
<td>San Diego, California</td>
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<td>Clinical Intern, Co-Chief Intern</td>
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<tr>
<td>Drexel University, Department of Psychology</td>
<td>2009 – present</td>
<td>Philadelphia, Pennsylvania</td>
</tr>
<tr>
<td>Ph.D. Candidate, Clinical Psychology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M.S. Awarded: June, 2012; Anticipated date of Ph.D.: June, 2014</td>
<td></td>
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<tr>
<td>Concentration in Cognitive Behavioral Therapy (CBT)</td>
<td></td>
<td></td>
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<tr>
<td>Dartmouth College</td>
<td>2001 – 2005</td>
<td>Hanover, New Hampshire</td>
</tr>
<tr>
<td>B.A., Psychological and Brain Sciences, with honors</td>
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</tr>
</tbody>
</table>

### RESEARCH GRANTS

<table>
<thead>
<tr>
<th>Grant Description</th>
<th>Years</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Cognition Enhancement Program, Drexel University</td>
<td>March 2010 – Present</td>
<td></td>
</tr>
<tr>
<td>Pre-doctoral Fellowship Award: Total Award: $7500</td>
<td></td>
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</tbody>
</table>

### PUBLICATIONS

- Glassman, L. H., Forman, E. M., Herbert, J. D., Bradley, L. B., Izzetoglu, M., Ruocco, A. C., 


### SELECTED HONORS

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013-14</td>
<td>Selected as co-chief intern of the UCSD/San Diego VA predoctoral intern class</td>
</tr>
<tr>
<td>2012</td>
<td>Graduate student representative to the Dean of Arts and Sciences’ review committee</td>
</tr>
<tr>
<td>2011-12</td>
<td>Graduate Assistant to the Director of Clinical Training, Drexel University</td>
</tr>
<tr>
<td>2010</td>
<td>Awarded pre-doctoral fellowship from the Human Cognition Enhancement Program</td>
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<tr>
<td>2009-11</td>
<td>Awarded Provost Fellowship, Drexel University</td>
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<tr>
<td>2005</td>
<td>Awarded honors status in the Dept. of Psychological and Brain Sciences by faculty</td>
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