A Preliminary Investigation of Continuous and Intermittent Exposures in the Treatment of Public Speaking Anxiety

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ABSTRACT

It is often argued that exposure-based treatments for anxiety disorders are only effective if the exposures are presented continuously until a marked decrement in anxiety is achieved (e.g. Foa & Kozak, 1986). However, the data supporting this conclusion is limited. This study compared two treatments for public speaking anxiety: one requiring participants to give one long speech on 3-5 topics (i.e. prolonged exposure) and another treatment which required participants to give a series of 30 s speeches divided by 30 s breaks (i.e. dosed exposures). Results indicated that the series of brief exposures was equally efficacious to the prolonged exposure in reducing subjective feelings of anxiety, and it produced greater reductions in public speaking anxiety, physiological arousal (i.e. heart rate), and behavioral avoidance. In addition, fewer behavioral indices of distress, on average, were incurred by this treatment. If shown to be effective across a larger sample and a wider range of anxiety disorders, this method of exposure therapy may provide a less aversive alternative to traditional exposure-based interventions.
Keywords: Public speaking anxiety, dosed exposure, exposure durations

INTRODUCTION

Since the nascence of exposure-based interventions for the treatment of anxiety disorders in the mid 20th century, much research has been devoted to dismantling these interventions, investigating the manipulation of different parameters of the exposure, and determining which parameters are most essential. Numerous parameters have been investigated, such as the targeted modality of the exposure (i.e. imaginal vs. in vivo vs. analog stimuli), the presentation of these stimuli (i.e. graduated vs. immediate presentations), and the length of time between exposures (i.e. massed vs. spaced exposures). One variable that has been under-studied, however, is the optimal duration of exposure trials. It is commonly assumed that exposures must be delivered in a protracted, continuous fashion until a decrement in anxiety is achieved (Foa & Kozak, 1986). However, empirical findings to support this notion have been mixed.

Extinction of Conditioned Avoidance

The earliest work on the optimal duration of exposure trials came from research using animal models of anxiety using the conditioned avoidance paradigm. This design involves an avoidance-training phase, where subjects learn to run or jump to another area of a chamber in the presence of a conditioned stimulus (CS) (i.e. a light, a tone, or a buzzer) which has been paired with an unconditioned stimulus (US) (i.e. a footshock) until they become proficient at avoiding the US by responding in the presence of the CS alone. The avoidance-training phase is then followed by an extinction phase, involving the presentation of the CS in the absence of the US until the CS no longer elicits the avoidance response.

Several studies have investigated the efficacy of differing exposure lengths on the extinction of conditioned avoidance, using this paradigm. Research by Polin (1959) found that one 100 sec trial of exposure produced more rapid extinction than twenty 5 sec exposures with response prevention. Though this provided evidence for prolonged trials over brief trials, the interpretation was confounded by the use of response prevention in only the brief exposure condition. To control for response prevention, Shearman (1970) compared 100 sec presentations of a CS with and without response prevention against twenty 5 sec trials, with and without response prevention. Shearman found no differences between the lengths of the exposure trials and concluded that response prevention, not CS duration, was the critical variable. A follow-up study by Berman and Katsev (1972) which replicated the methodology of Shearman (1970) found that shorter durations were actually more effective than one prolonged duration. And further

research by Schiff, Smith, and Prochaska (1972) and Martasian, Smith, Neil, and Reig (1992), found that total duration time to the CS was the crucial variable in the extinction of conditioned avoidance, regardless of whether the individual exposures lasted 5 sec or 24 min in length.

Extinction of Conditioned Fear

While the conditioned avoidance paradigm offers a directly observable method for studying the reduction in physical avoidance, it does not permit an examination of extinction of the affective components of anxiety. When avoidance behaviors decrease in the presence of the CS after exposure training, it is assumed that the CS no longer elicits fear and no longer acts as a reflexive conditioned establishing operation (CEO-R) (see Michael, 1993) for the avoidance response. However, as Lang (1979) has argued, anxiety comprises three individual response systems (i.e. physiological, behavioral, and cognitive/affective) that are not always concordant. It has further been argued that fear in the presence of the CS often persists, despite the suppression of overt avoidance (Shipley, 1974).

In order to examine the extinction of the private events/affective components of anxiety, the conditioned fear paradigm was developed. In this animal model, acquisition of the CR is similar to the procedure used in the conditioned avoidance paradigm. The target response in the conditioned fear paradigm, however, is licking behavior in water-deprived subjects, and suppression of this behavior is an indication of a covert fear response.

Two studies on the extinction of conditioned fear using continuous and interrupted exposures have yielded conflicting findings. Shipley (1974) found that a series of trials of 100 s presentations of a CS produced more rapid extinction than a series of trials of 25 s durations. Conversely, Baum, Andrus, and Jacobs (1990) found that CS presentations of 10 s and 30 s produce more rapid extinction of conditioned fear than one presentation of 180 s.

Thus, in non-humans, the extinction of fear, whether using conditioned fear or conditioned avoidance analog paradigms, is a highly variable process. Evidence is inconsistent as to whether shorter or longer exposure trials produce the most rapid extinction. It appears that a number of procedural variables may interact with dose duration to produce differential outcomes. What is clear, however, is that under the right circumstances exposure trials can be delivered in either a continuous or intermittent manner to achieve successful extinction.

While these comparative analog studies provide a preliminary analysis of the temporal variables related to the extinction of fear, they are unlikely to adequately capture the etiological mechanisms underlying complex human anxiety disorders. In particular, these models cannot account for the focal role of verbal behavior in human suffering and its impact on extinction. Also, the conditioning history is always known in these analog studies, whereas in human anxiety the conditioning history is often unknown.

Human Studies

One of the first studies to examine the role of exposure durations was conducted by Ramsay, Barends, Breuker, and Kruseman (1966). This study compared the effects of 20 min periods of imaginal exposure delivered on four consecutive days with 40 min sessions spaced four days apart. The results indicated that the shorter exposures were more conducive to fear extinction. However, this study did not control for the length of inter-trial intervals between the exposures in the two conditions, so conclusions drawn from this research are limited.

A later study by Stern and Marks (1973) controlled for the length of time between exposure durations. The authors compared 20 min versus 40 min of imaginal exposure and 20 min versus 40 min of in vivo exposures for the treatment of agoraphobia and other travel-related anxieties. The results indicated

that neither varieties of imaginal exposure were helpful for these conditions, and the longer in vivo exposures were more effective than the short exposures at reducing anxiety.

Similar studies by Rabavilas, Boulougouris, and Stefanis (1976) on the treatment of OCD, Chaplin and Levine (1981) on the reduction of public speaking anxiety, and Marshall (1985) on the treatment of acrophobia all showed similar results: longer exposure durations seem to work better in the amelioration of human anxiety.

But there is no consensus behind this conclusion. Other studies have obtained results contrary to the aforementioned work. Mathews and Shaw (1973) compared six 8 min exposure trials to one 48 min exposure session on individuals with public speaking anxiety. They found that the shorter durations were equally efficacious in the reduction anxiety, as measured immediately after treatment and at one-month follow-up. Further research by Grey, Rachman, and Sartory (1981) found that ten in vivo exposures lasting two min each (divided by one minute breaks) were more effective than one 20 min exposure in the treatment of animal phobias. Finally, using even shorter durations, a study by Rubin, Spates, Johnson, and Jouppi (2009) demonstrated that a series of imaginal exposures lasting only 15 s long was more effective than one exposure lasting 2 min in the reduction of public speaking anxiety.

Clearly, the data needed to resolve this issue have been mixed, and further research needs to be conducted. One problem with the previous studies is the large inconsistency in the way "brief" and "prolonged" have been defined. Instead of adhering to a standard across studies, brevity was only relative to the comparison group in each experiment. However, a more careful analysis of these studies reveals an interesting dichotomy: In the studies that showed brief exposure to be inferior (i.e. Chaplin & Levine, 1981; Rabavilas et al. 1976; Stern & Marks, 1973), the "brief" trials were always equal to or longer than 10 min in length (usually >25 min). Yet, in the studies which showed brief exposures to be superior (i.e. Grey et al. 1981; Rubin et al. 2009), the "brief" trials were under eight minutes in length. In addition, treatment outcome research using a single-subject design has supported the findings of Rubin et al. (2009), that even exposures lasting under two minutes can be effective (Seim, Willerick, Gaynor, & Spates, 2008). These very brief "doses" (Spates & Seim, 2005) of exposure may offer certain advantages over traditional exposures in that they are less aversive to undergo and they evoke fewer avoidance behaviors in session. However, a well-controlled comparison had not been made.

To examine the differences between "dosed" exposures and prolonged exposures, a small study was designed to examine the process and outcomes of these treatment methods on behavioral, physiological, and self-report measures of public speaking anxiety.

METHODS

Participants

Participants were recruited via flyers and announcements made to undergraduate college classes. Sixteen individuals who expressed interest in receiving help for public speaking anxiety were screened for this study. Of these, seven met inclusionary criteria during the baseline measurement session and returned for the treatment session. Three individuals were excluded due to histories of asthma, one reported heart disease, and one reported a history of seizures. Four individuals reported that they were unavailable for additional sessions or failed to show for their treatment session. One additional participant was excluded during treatment due to equipment failure. Thus, a total of six individuals (2 male/4 female) between the ages of 23 and 41 completed the experiment. Each group contained two individuals below age 30 and one individual above age 30, and each group consisted of one male and two females. All participants met diagnostic criteria for social anxiety disorder, and all indicated that their fear of public speaking had significantly impacted their performance in work or school.

Setting

All sessions were conducted in a therapy room in a clinical research setting on the campus of a large Midwestern university. The room was furnished with four chairs, a podium, and video recording equipment. In order to eliminate potential sources of distraction, all other objects and decorations were removed from the room. During behavioral assessments and treatment, participants were positioned at one end of the room behind a podium, and audience members were seated directly in front of them. The audience consisted of the experimenter and three individuals that the participant did not know. A video camera was positioned behind the audience, directly in the participant's line of vision.

Design

Although originally designed as a series of single-subject designs, the present study employed between-subject analyses to examine differences between two treatment conditions: a Prolonged Exposure (PE) condition, which incorporated one continuous period of exposure, and a Dosed Exposure (DE) condition, which incorporated a series of several brief exposures. The experiment included two sessions: a baseline assessment session and a treatment session. The treatment session was further divided into three phases: pre-treatment assessment, treatment, and post-treatment assessment.

Procedures

Baseline Session. After obtaining the informed consent of the participant, a trained assessor administered the Social Phobia subscale of the Anxiety Disorders Interview Schedule (ADIS-IV) (Brown, DiNardo, & Barlow, 1994), a semi-structured diagnostic interview based on the DSM-IV (American Psychiatric Association, 1994). This subscale has been shown to have excellent inter-rater reliability (kappa = .77) and diagnostic validity (Brown, DiNardo, Lehamn, & Campbell, 2001). Participants were also asked questions related to their demographic information and medical history. In addition, each participant completed the State-Trait Anxiety Inventory - State subscale (STAI-State) (Spielberger, Gorusch, Lushene, Vagg, & Jacobs, 1983) and the Personal Report of Communication Apprehension (PRCA-24) (McCroskey, 1982), two paper-and-pencil measures which assess for one's current feelings of anxiety and fears of communication, respectively. Both measures have demonstrated good reliability and validity (Spielberger & Vagg, 1984; Beatty & Andriate, 1985), and the Public Speaking subscale of the PRCA-24 has been shown to be a valid measure of public speaking anxiety (McCroskey, Beatty, Kearney, & Plax, 1985).

Participants meeting the following criteria were invited to participate in the treatment session: (1) a score of 18 or higher on the Public Speaking subscale of the PRCA-24, (2) fear and avoidance scores of 6 or higher with respect to at least one social situation on the ADIS-IV, (3) at least two somatic symptoms scores of 4 or higher on the ADIS-IV, and (4) the absence of migraines, heart disease, asthma, seizures, ulcers, un-cued panic attacks, psychotic symptoms, or medications for anxiety or depression.

Treatment Session. Treatment was conducted one week after the baseline assessment session. Each participant was treated individually during a different time period. Before the treatment began, the participant re-completed the PRCA-24 and the STAI-State measures. The participant then attached a mobile heart rate monitor to his or her chest, and a baseline measurement of heart rate was recorded. Finally, a Behavioral Avoidance Test (BAT) was administered to assess behavioral and subjective manifestations of public speaking anxiety. Replicating the methodology of Beidel, Turner, Jacob, and Cooley (1989), the BAT required the participant to give an impromptu speech in front of an audience of three individuals. To prepare for the BAT, the participant was allowed to choose up to three topics from a list of five to speak about and three minutes to organize his or her ideas. The speech was then delivered. Participants were instructed to speak for ten minutes, but they were told that they could end the speech any time after three minutes by holding up an index card on which the word 'Stop' was written. Each participant's distress during the BAT was measured according to the Timed Behavioral Checklist (TBCL) (Paul, 1966), a 20 item checklist used to monitor behavioral indices of distress (e.g. pacing, throat

clearing, hand tremors), and each index was measured according to a specific operational definition. In addition, verbal reports of anxiety were monitored during the BAT using a 101-point (0 = no anxiety, 100 = the most anxiety possible) Subjective Units of Discomfort Scale (SUDS) (Wolpe, 1969). Between 15 and 45 minutes after completing the BAT, the treatment began.

Prolonged Exposure (PE) treatment

Treatment began with 15 min of psychoeducation presented via videotape. This video explained to the participant that anxiety is a learned behavior that affects three responses systems (physiological, cognitive, and behavioral), it is maintained through escape and avoidance behaviors, and, by confronting a feared situation in a safe setting without escaping or avoiding it, one's anxiety can be significantly reduced.

Following this didactic component, the therapist asked the participant to spend five minutes preparing a speech on 3-5 different topics chosen from a list. The audience was then brought into the room, and the participant began speaking, cycling through his or her chosen topics repeatedly until termination criteria (see below) were reached. Participants' heart rate, SUDS, and behavioral indices of distress were measured every five minutes during the treatment. Any time the participant stopped speaking for >10 s, the therapist prompted, "Please continue speaking." If the participant indicated he or she was unable to continue, he or she was able to say "Pause" and take a brief break while standing at the podium. Timing of the interval resumed when the participant began speaking again. The treatment was terminated when one of the following occurred: (1) SUDS levels fell to zero or remained below 20 points during two consecutive measurement periods, (2) the participant spoke for three hours, or (3) the participant exhibited excessive levels of anxiety or refused to continue. Immediately following treatment, the participant re-completed the PRCA-24, the STAI-State, and the BAT.

Dosed Exposure (DE) treatment

The DE condition proceeded identically to the PE condition except that, instead of requiring the participants to speak continuously, they were instructed to speak for only 30 s at a time, take a 30 s break while remaining at the podium, and then continue speaking for 30 s. This cycle was repeated until one of the three aforementioned termination criteria were met.

Treatment Integrity

In order to ensure that the treatments were properly administered, protocol outlines were supplied to each therapist after initial training. Behavioral observations were completed by research assistants who received intensive training on the indices of distress contained in the TBCL and were then asked to rate videotapes of confederates engaging in public speaking tasks. Observers were trained to at least 90% agreement for these speech samples, and, during the experiment, all speech samples were scored independently by two observers.

RESULTS

Behavioral Avoidance

An average of four speeches (range 2-6) were given by each participant during the treatment. Though there was a wide range in treatment times, the average length of time to complete the PE treatment (M = 33.3 min; SD = 16.5) was only slightly shorter than the DE treatment (M = 40 min; SD = 18.7). Participants completed the BATs before and after treatment. The average amount of time participants in the PE group spent during the BAT increased 19% from pre-treatment (M = 312; SD = 94) to post-treatment (M = 372; SD = 162). Due to the wide variability of scores, this was not a statistically significant increase ($t = -.425$, $p = .712$). The average amount of time participants in the DE group spent in the BAT increased 43% from pre- (M = 304; SD = 123) to post-treatment (M = 433; SD = 120). Each participant in the DE group increased his or her score, making this a significant result ($t = -59.2$; $p < .0005$), with a large effect size ($d = -1.06$). See Figure 1.

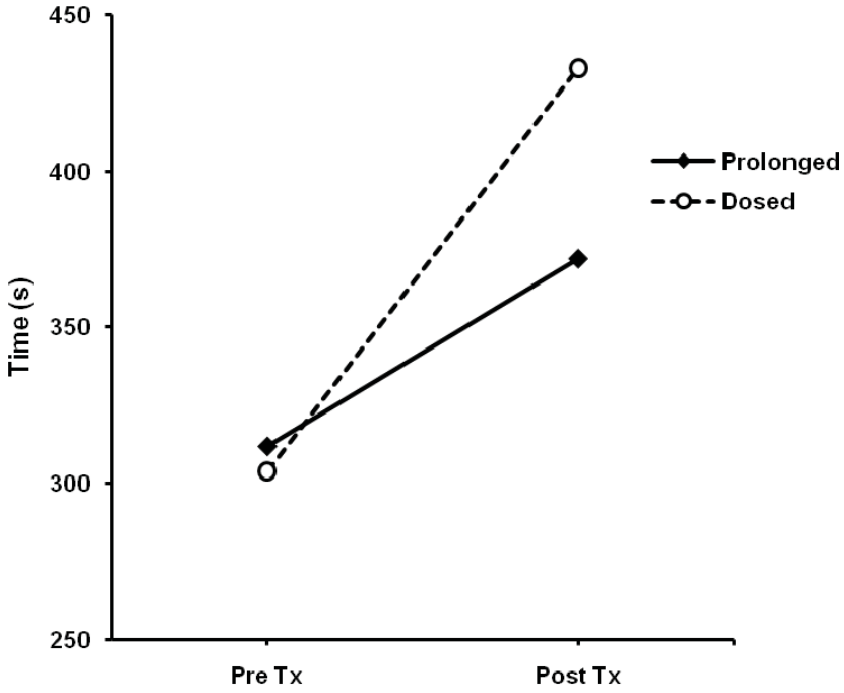

Figure 1. Changes in speech durations during the Behavioral Avoidance Test (BAT).

Subjective Anxiety

Though there were overall significant decreases in subjective anxiety (SUDS) from pre-treatment ($M = 72.8$, $SD = 26.9$) to post-treatment ($M = 20.8$, $SD = 11.7$), as measured using the Wilcoxon signed-rank test ($z = -2.03$, $p < .04$), there was not a significance difference in anxiety reductions between these two groups (Mann-Whitney $U = 3$, $z = -.66$, $p = .5$). This lack of difference between the two exposure therapies may be due to the small sample size of the study, and more research will need to be conducted to determine if the two treatments are equally efficacious in reducing subjective anxiety.

Heart Rate

While the heart rates of participants in the PE group *increased* from the pre-treatment BAT to the post-treatment BAT (mean $\Delta = 1.7$ bpm), the heart rates of participants in the DE group *decreased* from pre-treatment to post-treatment (mean $\Delta = -5.7$ bpm). See Figure 2. There were no significant differences in heart rates between groups during the treatment phase itself.

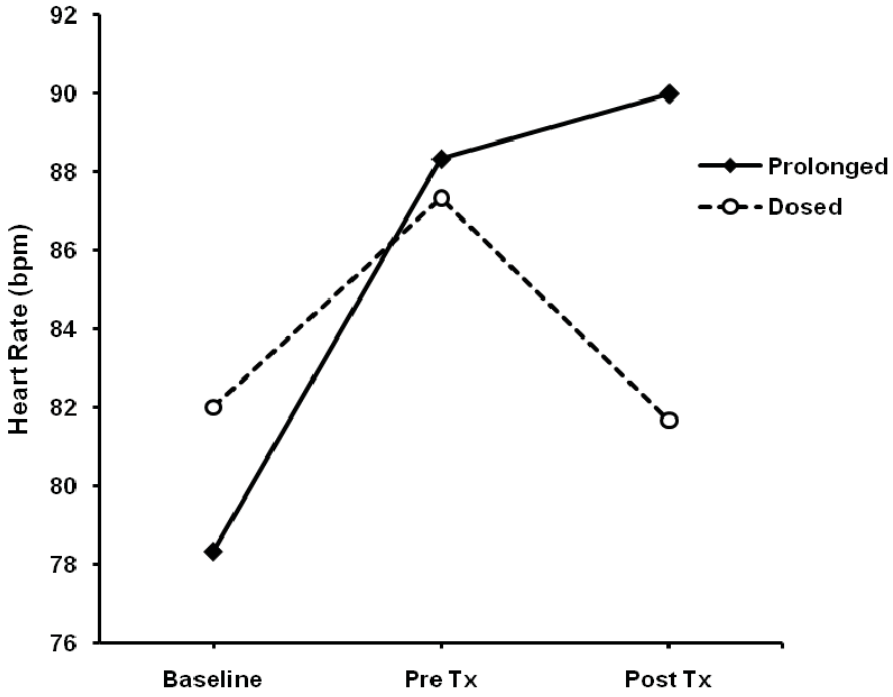

Figure 2. Average heart rates of participants.

Indices of Distress

Twenty behavioral indices of distress were measured throughout the experiment. As stated earlier, each occurrence of an index of distress was measured according to a strict operational definition, and two independent observers marked the occasion of these responses. Inter-observer agreement was calculated by dividing the number of agreements by the sum of agreements and disagreements for each pair of observers. The average inter-observer agreement was 0.87 (kappa = 0.73). An independent-samples t-test was conducted to compare the amount of distressful behaviors exhibited by participants receiving prolonged exposure and dosed exposure therapy. Results showed that participants in the prolonged exposure condition engaged in greater amounts of these behaviors on average during each time period (M = 3.81, SD = 1.03) than participants receiving dosed exposure therapy (M = 2.97, SD = .54) $t = 5.33$, $p < .0005$ (two-tailed)($d = 1.02$).

Paper-and-Pencil Measures

Scores on the PRCA-24 indicated that only one participant in the prolonged exposure group experienced a reduction in public speaking anxiety from pre- to post-treatment, making the overall mean change quite minimal (M = 2% decrease (SD = 7.3)). Conversely, all participants in the dosed exposure group experienced reductions in this measure of anxiety, exemplified by the larger mean change in scores (M = 22% decrease (SD = 7.8); see Table 1). Similarly, while only two out of three participants in the PE group experienced reductions in state anxiety from pre- to post-treatment, all participants in the DE group experienced reductions on this measure.

Table 1. Change in scores on measures of anxiety.

	Prolonged			Dosed		
	Pre	Post	% Change	Pre	Post	% Change
PRCA-24						
Group	21	19	-8%	24	18	-24%
Meeting	21	22	6%	24	22	-10%
Dyad	20	19	-3%	22	18	-15%
Public	24	23	-4%	28	18	-37%
Total	85	83	-2%	97	76	-22%
STAI-State	48	39	-19%	44	30	-31%
BAT (sec)	312	372	19%	304	433	43%

DISCUSSION

This study was designed to compare two exposure-based interventions for anxiety and to determine which treatment elicited the most distress, as measured by behavioral and self-report measures. Currently, there is no consensus as to whether intermittent or continuous exposures are more effective treatments. While the results of some studies suggest that continuous exposures are more efficacious, a small body of research (e.g. Renfrey & Spates, 1994; Rubin et al. 2009; Seim et al. 2008) has demonstrated that, under certain conditions, a massed series of very brief exposures (i.e. "dosed" exposures) can also foster clinical benefit. This study provides further evidence for that conclusion.

These results suggest that the dosed exposure technique is at least as efficacious as the traditional, prolonged exposure method. Indeed, some measures suggest that dosed exposures may be more effective. While there were no differences between these techniques on within-session feelings of anxiety, within-session changes in heart rate, and pre- to post-session changes in subjective anxiety, participants in the dosed exposure group had more significant decreases in public speaking anxiety (as measured by the PRCA-24) and significant increases in the time they were willing to speak during the BAT. In addition, the dosed exposure technique was shown to be a less aversive, more tolerable treatment than prolonged exposures. Participants in the DE group showed greater reductions in heart rate from pre- to post-treatment, and they were less likely to show signs of distress during the treatment itself.

These results run counter to some information-processing theories of anxiety, which suggest that the entire spectrum of anxious responses (including physiological responses and other covert behaviors) must be elicited in order to achieve fear extinction (e.g. Foa & Kozak, 1986). These findings present the possibility that high levels of arousal are not required to achieve the extinction of anxiety.

Instead, it is likely that exposure-based interventions can proceed successfully without eliciting high levels of anxiety, and fewer behavioral indices of distress may be evoked by methods such as dosed exposures. Distressful responses as well as other in-session avoidance behaviors have been shown to negatively impact the effectiveness of exposure interventions (Powers, Smits, & Telch, 2004; Wells, Clark, Salkovskis, Ludgate, Hackmann, & Gelder, 1995). This is the first study to examine behavioral indices of distress between different durations of exposures, and its results demonstrate promise for dosed exposures as a more acceptable alternative to some other anxiety treatments.

Despite its favorable results, this study did carry some significant limitations. First, it was beleaguered with a relatively high rate of participant attrition from the initial screening session to the pre-treatment assessment. Of the 11 individuals who were scheduled to complete this assessment, only seven showed to their appointment and only six underwent the treatment (see above). It should be noted that while scheduling conflicts or fears of undergoing an anxiety treatment may have led to these failures to show, no participant dropped out of either treatment. A second limitation of this study was its small sample size. Although large effect sizes were detected with the current sample of participants and the DE condition produced consistent findings between its participants, a larger sample may have helped detect more minor nuances between the two treatments and strengthened the external validity of these results. Finally, though both interventions used in this experiment were able to reduce participants' fears, neither should be seen as a standalone treatment for public speaking, and it is likely that additional exposure-based practice would be needed to achieve long-term clinical benefit.

In conclusion, more research needs to be conducted using larger sample sizes to determine the effectiveness of dosed exposure as a clinical intervention for public speaking anxiety as well as other anxiety disorders. Although decades of research point to the effectiveness of protracted, uninterrupted exposures, many therapists trained in these techniques fail to use them (Becker, Zayfert, & Anderson, 2004) and clients may find the interventions too scary to enter, too aversive to stay with, and too distressful to recommend to others. In contrast, if the dosed exposure technique of presenting a massed series of very brief exposures continues to demonstrate efficacy, it could provide a less aversive alternative.

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