IS BREATHING CONTROL AN EFFECTIVE COPING STRATEGY FOR PUBLIC SPEAKING ANXIETY?

By

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Abstract

Two studies were conducted to determine whether controlled, abdominally-predominant breathing could be accurately implemented during periods of acute anxiety by speech anxious/phobic individuals, and what effect breathing control has on autonomic and subjective indices of anxiety. Twenty-two moderately speech anxious young adults took part in Study 1. The results of this study indicated that after two weeks of training, only 50% of trainees were able to implement the controlled breathing technique with any degree of accuracy while waiting to deliver an impromptu speech before a small audience. No one were successful at reliably implementing the technique during the speech itself. As in previous research, training had little impact on autonomic arousal but was associated with improvements in self-reported anxiety. Similar findings emerged for Study 2, which differed from Study 1 in that it involved a larger (N = 48) and more highly speech anxious sample who participated in a longer (4-week), more intensive training program. Although training had little effect on subjective or autonomic arousal during speech anticipation and speech delivery, it did result in significantly higher predictions of speech aptitude and emotional control relative to no treatment. Such findings suggest that breathing control is not a useful emotion-focused coping strategy on its own, but may add to the effectiveness of exposure-based therapies by enhancing patients' self-efficacy and willingness to expose themselves to feared situations.

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Introduction

The emergence of panic disorder as a unique diagnostic category in DSM-III-R has sparked new and innovative ways of looking at the phenomenon of anxiety and how best to treat it. One of the new approaches to treating this age-old problem is breathing control training. To date, at least nine treatment outcome studies have been conducted with panic disorder/ agoraphobic patients in which some form of breathing control training was included, either as the principal intervention or as an adjunct to well established interventions such as graduated exposure and cognitive restructuring (e.g. de Ruiter, Rijken, Garssen, & Kraaitmaat, 1989; Hegel, Abel, Etscheidt, Cohen-Cole, & Wilmer, 1990; Michelson, Marchione, Greenwald, Glanz, Testa, & Marchione, 1990; Michelson, Marchione, & Mavissakalian, 1985; Salkovskis, Jones, & Clark, 1986).

Interest in controlled breathing has an even broader basis however. For years now, psychologists have been teaching clients to adopt a slower, deeper, more rhythmic breathing pattern as part of stress management strategies like Benson's (1975) "relaxation response", Bernstein and Borkovec's (1979) "progressive relaxation training", and Luthe's (1963) "autogenic training". Health care professionals have also advocated breathing control procedures for a variety of patients, including those preparing for painful/stressful medical examinations or recovering from surgical procedures (Bartlett, Gazzaniga, & Geraghty, 1973; Flaherty & Fitzpatrick, 1978; Healey, 1968;

Lindeman & Van Aernam, 1971; Mogan, Wells, Robertson, 1985), as well as patients with chronic disorders such as hypertension (Bali, 1979; English & Baker, 1983; Jacob, Kraemer, & Agras, 1977; Patel, 1977), chronic pain (Philips, 1987), chronic obstructive pulmonary disease (Tiep, Burns, Kao, Madison, & Herrara, 1986), and idiopathic seizures (Fried, Rubin, Carlton, & Fox, 1984). Practitioners of various meditation and yoga procedures have likewise ascribed considerable importance to controlled breathing (Benson, Beary, & Carol, 1974; Fenwick, Donaldson, & Bushman, 1977; Goleman & Schwartz, 1976; Lehrer & Woolfolk, 1984; Singh, 1984; Wallace & Benson, 1972; Woolfolk, 1975).

However, it is not at all clear from the research literature why breathing control, and in particular slow, abdominally-predominant breathing, should have a positive impact on autonomic arousal or subjective distress. The results of several controlled laboratory investigations with healthy individuals suggest that a single session of training to breathe more slowly with the aid of some external pacing mechanism (e.g. timing lights, tones, respiration tracings) has little, if any, effect on reducing physiological arousal to various acute stressors (Cappo & Holmes, 1984; Clark & Hirschman, 1980; Epstein & Webster, 1975; Harris, Katkin, Lick, & Habberfield, 1976; Holmes, McCaul, & Solomon, 1978; McCaul, Solomon, & Holmes, 1979). In contrast, the results of several treatment outcome and case studies involving psychiatric patients (e.g. Clark, Salkovskis, &

Chalkley, 1985; Compernolle, Hoogduin, & Joele, 1979; Grossman, de Swart, & Defares, 1985; Kraft & Hoogduin, 1984) and patients with various medical disorders (e.g. Bali, 1979; English & Baker, 1983; Jacob et al., 1977; Patel, 1977; Tiep et al., 1986) have generally been quite positive, suggesting that breathing control training may have a role in reducing arousal and/or anxiety.

The discrepancy between the apparent effect of breathing control on healthy and clinical subjects draws attention to a fundamental problem in the literature on breathing control effects. The problem is that researchers and clinicians alike make a number of assumptions about controlled breathing which have yet to be adequately tested. For instance, it is often assumed that slow, rhythmic, abdominally-predominant breathing can directly attenuate autonomic and somatic arousal. Some clinicians have even suggested that it can induce a pleasurable "hypometabolic state" when combined with mental focusing techniques (Beary & Benson, 1974; Benson, 1975). In turn, the attenuation of physiological arousal is commonly believed to result in reduced levels of subjective distress, the primary goal of many relaxation/coping strategies (Borkovec & Sides, 1979a).

In the literature on stress reduction strategies, one of the most commonly prescribed procedures for reducing subjective distress involves teaching clients to reduce their levels of muscle tension by systematically tensing and relaxing different muscle groups. Other clients are taught to reduce autonomic

arousal directly via techniques such as skin temperature and blood pressure biofeedback. The proponents of these methods reason that the response being learned is opposite to the one manifested when the client is anxious or stressed (Jacob & Chesney, 1986). To some extent, this assumption has been borne out in the enormous research literature that has accumulated over the past two decades (see Lehrer & Woolfolk (1984) for a comprehensive review of the literature).

Although a number of cardiorespiratory reflexes have been identified whereby adjustments in the rate, depth, or rhythmicity of breathing can affect heart rate and blood flow (Grossman, 1983; Schaefer, 1979; Shepherd, 1981; Stern & Anschel, 1968), it has yet to be shown that the sustained practice of some breathing technique yields a corresponding decrease in cardiovascular arousal (i.e. reduced sympathetic tone). Even if strategies such as slow, deep breathing are clearly found to attenuate autonomic arousal, it is possible that cognitive processes are responsible for this effect rather than direct physiological ones. For instance, by practicing controlled breathing, an individual's sense of self-control and self-confidence may increase to the point where he or she no longer perceives the stressor as threatening. The decreased arousal observed in this situation cannot simply be attributed to some specific physiological effect of the breathing strategy. Rather, it may as a result of reappraising a situation as nonthreatening that arousal is attenuated. The extent to which this interpretation is true can

be determined in part from the person's self-reported confidence in the breathing strategy, by the amount of training he/she has had in using the technique, and/or by his or her self-reported locus of perceived control.

Alternatively, the practice of breathing control may have its arousal-attenuating effects by distracting the individual from focusing on the stressor. The importance of attention distraction has long been recognized by psychologists who use exposure-based techniques like systematic desensitization to treat phobic clients (Craske, Street, & Barlow, 1989). However, the specific role of distraction via diaphragmatic and paced breathing has yet to be evaluated. The continued monitoring of some pacing machine or one's proprioceptive breathing cues (e.g. ribcage and abdominal movement) may draw attention away from other stimuli in the person's immediate environment, including his or her catastrophic, worrying thoughts.

A second commonly-made assumption underlying breathing control training is that certain breathing patterns are dysfunctional and therefore need correcting. In general, these patterns are the ones seen most often in clinically-anxious individuals (Bass & Gardner, 1985a; 1985b; Damas-Mora, Grant, Kenyon, Patel, & Jenner, 1976; Gibson, 1978; Lum, 1981; Skarbek, 1970; Tobin, Chadha, Jenouri, & Sackner, 1983). They are also reported to occur in normal individuals encountering real-life or laboratory stressors (Dudley, Holmes, Martin, & Ripley, 1964;

Hait & Linden, 1987; Ley, 1985b; Salkovskis, Warwick, Clark, & Wessels, 1986; Suess, Alexander, Smith, Sweeney, & Marion, 1980; Svebak, Dalen, & Storfjell, 1981). Faulty breathing habits are assumed to directly or indirectly influence emotional and cognitive functioning (e.g. Bass & Gardner, 1985b; Cowley & Roy-Byrne, 1987; Garssen, van Veenendaal, & Bloemink, 1983; Hibbert, 1984a; Huey & West, 1983; Ley, 1985a; 1988; Magarian, 1982; Salkovskis, Clark & Jones, 1986). More specifically, panic attacks are considered by some investigators to be the end result of a vicious cycle initiated by acute overbreathing (i.e. breathing in excess of metabolic requirements). Whatever the cause of such overbreathing, the critical outcome is a biochemically-mediated experience of cognitive and somatic symptoms that are thought to precipitate a panic attack in individuals who catastrophically misinterpret their meaning (e.g. heart palpitations are interpreted as a sign of an impending fatal heart attack).

Considerable overlap has been demonstrated between the symptoms of panic and hyperventilation. Furthermore, these symptoms have been reported to be successfully reduced or eliminated in the majority of chronic hyperventilators who underwent breathing control training (Grossman et al., 1985; Lum, 1976; Magarian, 1982). The results of two uncontrolled clinical trials conducted with panic disorder/agoraphobic patients have also shown clinically meaningful improvement with this form of treatment given either alone (Clark et al., 1985; Salkovskis et

al., 1986) or in combination with other strategies (e.g. Bonn, Readhead, & Timmons, 1984; Michelson, Mavissakalian, & Marchione, 1988).

A third, related assumption is that slow, deep, even breathing achieved primarily by abdominal movement (versus shallow or ribcage-predominant breathing) is the ideal breathing pattern to teach individuals experiencing acute or chronic emotional distress. This pattern is often referred to as "diaphragmatic breathing", although this is a misnomer since all breathing involves movement of the diaphragm to some extent. Slow, abdominally-predominant breathing is apparently taught because it is the pattern opposite to the one observed when people are anxious or stressed. But as several investigators have reported, when healthy subjects are trained to reduce their breathing rate by half in a single session, they often experience increased rather than decreased somatic and subjective arousal (e.g. Harris et al., 1976). Other researchers have also noted that deep inspirations reflexively increase heart rate (Deane, 1965; Sroufe, 1971), as well as increase the work of breathing.

To date, most of the research on breathing control has involved rate manipulations. However, because this strategy requires subjects to attend to some external pacing machine (or at the very least to silently count out the length of each breathing cycle), subjects likely had limited capacity to attend to other aspects of their immediate environments. Such

attentional demands may make paced breathing a useful strategy where individuals are prone to dwell excessively on some upcoming aversive experience (e.g. awaiting an injection), but there are many other situations in which continuous distraction might be counterproductive (e.g. preparing to give a talk; driving a car). Paced breathing may also be too difficult to maintain in some highly demanding, anxiety-laden situations. Based on the research to date, it is not clear what the ideal rate and depth of breathing is, if such an ideal even exists. Equally uncertain is whether either of these two breathing parameters should be the focus of self-regulation training.

Finally, it is generally assumed that breathing control strategies can be learned quickly and then accurately reproduced in situations where they are thought to be of greatest benefit, namely, where the trainee is anticipating or actively coping with some anxiety provoking object or event. Furthermore, the benefits of such training are frequently expected to be evident soon after its onset. However, conclusive evidence to support this assumption is lacking (Faling, 1986).

Because these assumptions about breathing control have been largely ignored in the literature there remains considerable uncertainty about whether breathing control training is of value, either alone or as an adjunct to other interventions. Equally uncertain is why breathing control training should be of benefit. In other words, by what mechanism might it influence subjective

and physiological indices of anxiety or arousal? Answers to these questions will help to elucidate there is a physiological basis for breathing control training and whether one form should be advocated over another.

Study 1

Purposes of Study 1

The purpose of the present research project was to address these untested assumptions with regard to usefulness of breathing control in mitigating anxiety, particularly public speaking anxiety.

The first objective was to determine whether individuals who are taught a simple abdominally-predominant breathing strategy for attenuating anxiety/stress are able to reproduce this pattern accurately when confronted with a personally-relevant stressor. Given that psychological stress can occur both in anticipation of, and during, encounters with threatening events, a stress management strategy should be reproducible in both situations. If a breathing strategy is to be considered useful, people must be able to implement it during the stressor anticipation period, a period when attentional demands are relatively low. If it is reproducible during the actual encounter with the stressor then the strategy may have additional value. In the past, people have been found to have difficulty implementing other forms of relaxation when actively encountering stressors (Cauthen & Prymak, 1977; Cuthbert, Kristeller, Simons, Hodes, & Lang, 1981).

The success of abdominal/diaphragmatic breathing where other strategies have failed would suggest it receive greater attention as a stress management technique.

The second objective of the present research project was to determine whether controlled abdominal breathing is effective in reducing subjective and physiological arousal to highly feared events. As discussed earlier, the evidence for a physiologically-mediated effect of breathing control strategies is weak; however, they do appear to elicit lower levels of self-reported anxiety.

The two studies conducted as part of this project were designed to test the effects of controlled breathing on anxiety in the following ways. First, the breathing control training taught in each study involved (a) a plausible rationale, (b) graduated practice towards an individualized goal for rate and depth of breathing, and (c) focusing each subject's attention on proprioceptive feedback rather than on some external feedback mechanism. Second, breathing control was taught to a population known to experience a high level of arousal to a stressor that can be simulated well in the laboratory, namely, individuals with public speaking phobia giving a brief speech to a small audience (Beidel, Turner, & Dancu, 1985; Kirsch & Henry, 1979). And third, the length of training was markedly increased from the single 5-20 minute session common in previous studies to 2-3 60-

minute sessions conducted over a 2-3 week period. Subjects also practiced daily at home.

Method

Subjects

Twenty-two young adults from the University of British Columbia took part in this treatment outcome study. They were recruited via newspaper and classroom advertisements (Appendix A) for a free three-week training program on strategies for managing public speaking anxiety. The specific inclusion and exclusion criteria are listed below.

Inclusion criteria.

1) Self-reported ratings of at least 60 on a scale ranging from 0 (complete calm) to 100 (absolute panic) describing the level of anxiety typically experienced just minutes before giving a talk to an audience of 10 or more people. This cut-off score was thought to represent a moderately high level of public speaking anxiety.
2) A score of 700 or higher on the 14-item Subjective Units of Discomfort Scale: Pre-speech (Appendix B).

Exclusion criteria.

1) Self-report of health problems that might be exacerbated by exposure to acute stress (e.g. asthma, coronary heart disease) or might interfere with breathing control training (respiratory infections, emphysema).

2) Concurrent participation in any other form of treatment for public speaking anxiety or DSM-III-R anxiety disorder.

Sample characteristics.

The 22 subjects in this study were randomly assigned to the treatment and waitlist control conditions. The sample included an equal number of men and women with a mean age of 21.6 ± 2.9 years. The average pre-speech anxiety rating reported by subjects was 76.2 ± 9.9. Although seemingly high, this score was later found to be in the normal range, based on the responses of 215 undergraduates at the University of British Columbia to a public speaking anxiety survey (Appendix A). A similar finding emerged for scores on the Subjective Units of Discomfort Scale: Pre-speech questionnaire (mean = 786 ± 124). These findings suggest that subjects were mildly to moderately speech anxious at the outset of this study.

Research Design

This study can be summarized as a simple between-groups comparison (treatment versus no-treatment) involving both a pretest and a posttest. During each assessment session, repeated observations were obtained on a variety of dependent measures. Observations were recorded during a quiet rest period, while anticipating a stressor, and while actively engaged with the stressor. A two-week delay separated the pre- and posttreatment assessment sessions. In summary, the research design was of the following form: 2 (Group) X 2 (Session) X 3 (Recording Period).

Recording Equipment and Materials

Three types of data were recorded in this study: 1) autonomic; 2) self-report; and 3) respiratory. The first two were included to assess treatment outcome; the third served both as a manipulation check and as a biofeedback source in treatment.

Autonomic measures.

Autonomic activity was assessed on the basis of three cardiovascular measures: (1) heart rate (HR), (2) systolic blood pressure (SBP), and (3) diastolic blood pressure (DBP). These measures were chosen because of their frequent use in earlier research on the effectiveness of breathing control strategies (e.g. Harris et al., 1976) and in studies of public speaking anxiety (e.g. Matias & Turner, 1986; McKinney & Gatchel, 1982). They have also been used frequently in studies of anxiety responses to acute laboratory stressors (e.g. Hait & Linden, 1987; Linden, 1986; Linden, McEachern, & Frankish, 1985). Furthermore, heart rate, and to some extent systolic blood pressure, represent objective indices of the most commonly reported symptom of public speaking anxiety, namely, a pounding, racing heart. Finally, these measures can be obtained noninvasively, thereby limiting the extent to which speech stressor responses are contaminated by equipment-induced arousal.

All three cardiovascular measures were obtained via an automated blood pressure monitor (Dinamap 845 Vital Signs Monitor, Criticon Corporation) with the pressure cuff positioned

around the subject's upper arm (nondominant arm). Blood pressure measurements with the Dinamap monitor have been found to correlate highly with intra-arterial measurements (Borow & Newburger, 1982).

Respiratory measures.

Four types of respiratory activity indices were recorded in this study. These include respiration rate, ribcage amplitude, abdominal amplitude, and variability in abdominal amplitude. Ribcage amplitude is a measure of thoracic wall displacement. With each inhalation, the thoracic wall extends outwards. The degree of outward extension varies as a function of inhalation depth. Similarly, abdominal amplitude represents displacement of the abdominal wall during each breathing cycle. The variation in outward movement of the abdominal wall from one breathing cycle to the next defines abdominal amplitude variability.

All four measures were obtained via bellows strain gauges, one attached around the subject's abdomen 5 cm below the sternum and the other fastened around his/her chest at the level of the armpits. The abdominal strain gauge was positioned directly against the subject's skin and secured in place with surgical tape. The thoracic strain gauge was secured over the subject's clothes with safety pins. In this way, movement artifacts were minimized in the respiratory recordings. Output from the abdominal gauge was fed into a Beckman coupler (Model 9872) integrated with a Sensormedics Dynagraph (Model R611). This

signal was filtered (frequencies higher than 30 Hz were eliminated) and amplified (.1 mV/mm) to yield the cleanest, most interpretable tracings possible, as determined by previous testing. In addition, the coupler's sensitivity setting was adjusted to produce signal amplitudes equivalent to those generated by the thoracic gauge coupler (Sensormedics Model 9853A) over a wide range of resistance changes. The thoracic gauge signal was also filtered (frequencies higher than 30 Hz and lower than .53 Hz were eliminated), with signal amplification set at .01 mV/mm. With the recording equipment arranged in this way, it was possible to simultaneously record the amplitude of respiratory movements in both respiratory compartments. Furthermore, because the two couplers had been calibrated to be equivalent in sensitivity, it was possible to directly compare ribcage amplitude with abdominal amplitude.

Self-report measures.

Four self-report measures were used to assess treatment outcome. These included the Speech Expectancy Scale (SES), the Symptom Rating Scale (SRS), the Subjective Units of Discomfort Scale (SUDS), and the Treatment Credibility/Expectancy for Improvement Scale.

The SES is a 3-item scale developed especially for this study to assess public speaking self-efficacy (Appendix B). The scale was administered following announcement of each impromptu speech. Subjects rated, on a 0-100 scale, how anxious they

expected to feel during the upcoming speech, how much control they anticipated having over anxiety, and how well they thought they would do at their speeches. High ratings on the first item and low ratings on the second two indicate low self-efficacy.

The SRS (Appendix B) was also developed specifically for this study and consists of the 12 DSM-III-R symptoms of panic disorder, plus two symptoms commonly reported by speech anxious individuals (dry mouth and memory lapse) and two infrequently reported symptoms (chest pain and choking). Together, these 16 symptoms represent a subset of those included on many previous inventories used to assess hyperventilation and panic (e.g. Barlow, 1988; Chambless, Caputo, Bright, & Gallagher, 1984; Clark & Helmsley, 1982; Grossman & deSwart, 1984; Huey & West, 1983; Ley, 1985a; Margraf, Taylor, Ehlers, Roth, & Agras, 1987; Rachman, Levitt, & Lopatka, 1987). Immediately after each impromptu speech, subjects rated the intensity of all 16 symptoms on a 0 (not even noticeable) to 100 (very intense) visual analog scale. Two summary scores were obtained from these ratings (1) the number of symptoms rated at or above 25, and (2) the average intensity of all 16 symptoms. A cut-off rating of 25 was chosen because it provides a reasonably clear indication that a particular symptom had actually been experienced. It was also thought to approximate the "1 = mild" cut-off point reported for the more commonly used 0-4 anxiety rating scale (e.g. Michelson et al., 1985).

Post-speech verbal ratings of speech-related anxiety were obtained on the 0 (no anxiety) to 100 (complete panic) SUDS scale. This scale has a long history of use in the assessment and treatment of anxiety disorders (e.g. Clark et al., 1985; Craske & Craig, 1984). It is easy to administer and interpret. Furthermore, clinical use suggests that it is sensitive to changes in perceived anxiety level. However, published data on its psychometric properties are unavailable.

Subjects in the treatment group also completed an additional questionnaire known as the Treatment Credibility/Expectancy for Improvement Scale (Appendix B). This questionnaire consists of five standard questions regarding the perceived relevance and effectiveness of treatment (Borkovec & Nau, 1972). Subjects rated how rational they perceived the treatment to be and how confident they were in its effectiveness by circling a number from 0 (not at all logical/confident) to 10 (very logical/confident). A maximum score of 50 on this scale reflects extreme confidence in treatment. Prior research has shown that scores on this scale correlate highly with treatment outcome, irrespective of they type of treatment (Agras, Horne, & Taylor, 1982). Expectation for anxiety relief has been demonstrated to be an important factor in positive response to progressive relaxation training and systematic desensitization (Borkovec, 1972; 1973; Gatchel & Procter, 1976), and to meditation (Bradley & McCanne, 1981).

Two other self-report measures were administered pretreatment to confirm that subjects were at least moderately speech anxious. The first was a 14-item rating scale known as the Subjective Units of Discomfort Scale: Pre-Speech (SUDS:PS). The 14 scale items represent a hierarchy of public speaking situations. Using a 0-100 scale, subjects rated how anxiety-provoking each situation would be for them. Although this scale has been used in earlier speech anxiety research, details on its psychometric properties are unknown. The second measure was a SUDS rating of how anxious subjects typically feel moments before giving a speech. It was obtained during a 15-minute assessment interview on the nature and severity of subjects' public speaking difficulties.

Procedure

A summary of the procedure can be found in Table 1. Upon arrival at the recording room, subjects were introduced to the research assistant and then seated in a straight-backed armchair located in an adjoining, sound-attenuated room. Participant consent was obtained in writing following a scripted overview of the experimental protocol (Appendix D). The physiological recording equipment was then attached to subjects by the assistant. Female assistants performed this task with female subjects for ethical reasons. The function and safety of the equipment was described in order to allay any concerns about it. Once the equipment had been checked and adjusted, subjects

remained seated quietly alone for 10-12 minutes. During this waiting period, they completed the SUDS:PS questionnaire.

Baseline period (BL).

The 10-minute baseline period began once the assistant had left the room. Physiological recordings were obtained during the last minute of this period. These served as baseline measures. Once these recordings had been obtained, the experimenter conducted a 20-minute assessment interview with each subject.

Speech anticipation period (ANT).

At the end of the interview, subjects were informed that in five minutes they would be expected to give a 4-minute impromptu speech to a small audience on a specified topic. They were also told that their talks would be videotaped for later review. After giving written consent to the videotaping (Appendix D), subjects completed the Speech Expectancy Scale. The speech topic was then presented. In Session 1, subjects were asked to speak about why they sought treatment for public speaking anxiety and the importance of public speaking to their present or future careers. (The topic for the posttreatment session was "Which personal qualities of yours are you most proud of and why?"). Subjects were reminded that they had four minutes to prepare for the speech. It was also suggested that they try to relax during this period.

Subjects were then left alone for two minutes while the first physiological recordings were obtained (Minutes 1-2). At the beginning of Minute 3, the assistant set up the video camera and arranged chairs for the audience. The assistant was instructed not to speak with subjects during this period. Further recordings were obtained between Minutes 3-4.

Speech delivery period (SPE).

Immediately after the second of two anticipation period recordings had been obtained, the assistant instructed each subject to begin his/her speech. Subjects were reminded to remain seated throughout the speech. As in the anticipation period, physiological recordings were obtained between Minutes 1-2 and 3-4. The first time a subject stopped speaking for longer than 15 seconds, he/she was reminded to continue talking for the full four minutes. Subsequent pauses were left unchallenged. In the event that subjects became noticeably distressed or clearly indicated that their speech was over before four minutes had elapsed, the assistant announced that the speech test was over and thanked them for participating. This occurred for three of the 22 subjects.

Following the speech, all subjects completed the Symptom Rating Scale. Those in the treatment group were then given a 15-minute rationale for breathing control training followed by 15 minutes of training in abdominal/pursed lips breathing. Subjects

assigned to the waitlist condition were invited asked to return in two weeks to begin treatment.

Breathing control training: Session 1.

A summary of the training program can be found in Table 2. As part of the rationale for treatment, subjects were shown recordings of their breathing patterns and cardiovascular responses. They also monitored their own pulse rates (radial artery) during several deep inspirations and prolonged exhalations in order to verify exhalation is associated with a reflexive slowing of heart rate. During the training period, subjects were instructed to attend to the rate, depth, and predominant mode of their breathing by placing one hand flat against their chests and the other over their abdomens just below the sternum. Next, they were coached to increase the outward movement of their abdomens during inspiration without increasing, and preferably decreasing, the amount of ribcage movement.

To assist subjects in learning this technique, three mental images were described to them. First, they were to imagine a soft sponge ball (e.g. Nerf ball) inside their abdomens which, during exhalation, is squeezed very small, but then quickly rebounds to its original size at the start of the next breath. The second image suggested was that of a tall container separated into two compartments by a trap door. Subjects were encouraged to imagine the top compartment filled with a heavy column of air which, when the trap door suddenly drops open, rushes down into

the lower compartment causing its flexible walls to expand outwards. In the same way, subjects were to think of inspiration as a rapid, relatively effortless expansion of their abdomens. Finally, it was suggested that subjects think of their torsos as being like a car tire with a puncture hole at the top. At the end of each inspiration, the tire would be full of air. Then, just as air would slowly leak out the punctured tire causing it to settle downwards and outwards onto the road, so too they were to let air escape slowly from a small opening between their lips and notice their abdomens relaxing outwards.

To ensure that subjects were accurately reproducing the prescribed breathing pattern (i.e. a breathing rate between 7-11 breaths per minute with an abdominal amplitude at least 50% greater than observed at rest but little breath-by-breath fluctuation in amplitude), the trainer monitored each subject's thoracic and abdominal respiratory tracings by means of a video display connected to a video camera mounted above the polygraph in the adjacent room. This display was hidden from the subject's view. Verbal feedback was periodically provided to them to reinforce successive approximations to the prescribed pattern. That pattern involved breathing at a rate of 7-11 respiratory cycles per minute (cpm) with an abdominal amplitude at least 50% greater than resting amplitude and little variation in amplitude from breath to breath. After successfully reproducing the target pattern for at least one minute, subjects were shown their

tracings on the video screen and encouraged to manipulate these tracings by adjusting ribcage and abdominal movements.

The first training session concluded with an explanation of the homework assignment for the coming week. This assignment involved practicing abdominal/pursed lips breathing for 10 minutes twice daily. Subjects were encouraged to use their hands as they had in the training session to provide additional feedback on the extent of their ribcage and abdominal movements. The use of the mental imagery was also emphasized. A daily recording sheet to enhance compliance and monitor practice time (Appendix E). Instructions were summarized in a handout distributed at the end of the session (Appendix E). Finally, subjects completed the Treatment Credibility/Expectancy for Improvement Scale.

Training session 2.

Subjects in the treatment condition returned for a second treatment session one week after Session 1. The 30-minute session began with a review of the previous week's homework. Subjects were asked to demonstrate the breathing technique they had been practicing that week. All approximations to the target pattern were reinforced with praise, whereas deviations from this pattern were pointed out and corrected. The trainer then modeled the breathing strategy and provided feedback to subjects as they practiced the strategy for five more minutes.

In the remaining time, subjects were taught an exercise designed to enhance their awareness of, and control over, breathing during speech. The exercise required subjects to increase the length of time that they could sustain, at a constant pitch and volume, three different phonal sounds first modelled by the therapist. Subjects began by sounding the phoneme 'm' on three consecutive trials. Because this sound is formed by exhaling air exclusively through one's nostrils, the rate of exhalation is slow and controllable. Subjects were coached to inhale solely via outward abdominal extension and to exhale slightly more air than they normally would before taking their next breath. In this way, subjects could learn to avoid gasping for air while speaking, a response that may lead to hyperventilation and increased subjective anxiety (Ley, 1985b). The same procedure was repeated in subsequent trials to produce the sounds 'oo' (moderate exhalation rate) and 'ah' (rapid exhalation rate). Subjects were encouraged to gradually lengthen these vocalization trials while maintaining good tonal quality and volume. Incentive was provided by timing each trial with a stopwatch.

The final exercise involved reading a half-page paragraph utilizing the skills learned in the previous exercises (i.e. abdominal inspiration; sustained volume and pitch; extended exhalation). Subjects were encouraged to stop speaking as soon as their voice quality began to deteriorate rather than risk running short of air and reflexively gasping on the next breath.

Once again, subjects were told to monitor their respiratory movements with their hands and to correct performance errors identified by the trainer.

The home assignment for that week was to practice both the phoneme exercise and the reading exercise once daily each over the next week, and to log practice times on the recording sheet. It was also suggested that they continue practicing the pursed lips breathing technique twice daily.

Assessment session 2 (posttreatment).

The procedure followed in the posttreatment evaluation session (Session 2) was nearly identical to the one followed in Session 1. Both involved a baseline period followed by speech anticipation and delivery periods. Session 2 differed from Session 1 in that (1) there was no assessment interview, (2) trainees were instructed to employ the breathing control strategy during the speech anticipation and delivery periods whereas their untreated peers were simply instructed to relax, and (3) trainees were told that the purpose of the session was to assess their progress at the technique whereas waitlist subjects were told that training would begin once new baseline recordings had been obtained.

Following the speech delivery period, subjects were debriefed regarding the purposes of the study. Those in the waitlist group were offered the same training program undertaken

by the treatment group. In all cases, this offer was accepted. Treatment group members, on the other hand, were given additional feedback about changes observed in physiological and/or reported arousal over the course of their treatment. Videotaped recordings of their speeches were also made available to subjects. Finally, subjects were given copies of a 10-page handout on effective public speaking (Appendix E).

Data reduction and analyses

Two types of data were generated in this study. The first involved indices of treatment implementation (i.e. respiration measures) whereas the second included indices of treatment effect (i.e. cardiovascular and self-report measures).

Treatment Implementation

Respiratory activity was sampled during three periods of the pre- and posttreatment sessions. These periods were (1) baseline (BL), (2) speech anticipation (ANT), and (3) speech delivery (SPE). For each of the four respiratory measures (respiration rate, ribcage amplitude, abdominal amplitude, and abdominal amplitude variability) the two 30-second recordings (Minutes 1-2 and 3-4) obtained during the speech anticipation period were averaged to yield single scores for that period. For the speech delivery period, only data recorded during the first minute were retained for analysis because of the low number of subjects who spoke long enough to obtain data during Minute 2-3. Respiratory recordings (60-second duration) were also obtained during the

first training session to serve as reference values for evaluating subsequent technique accuracy. The prescribed or reference pattern involved (1) breathing at a rate of 7-11 respiratory cycles per minute (cpm), (2) with an abdominal amplitude that was at least 50% greater than resting amplitude, and (3) little breath-to-breath variability in abdominal amplitude (i.e. variability not significantly different from that observed during the "target" period of the first training session). Trainees were expected to maintain this pattern throughout the speech anticipation period.

Two types of analyses were utilized to evaluate breathing technique implementation. The first was a 2 (Group) X 2 (Session) X 3 (Recording Period) multivariate analysis of variance (MANOVA) involving the raw scores for all four of the respiratory parameters recorded in this study. With respect to this analysis, only the 2- and 3-way interactions involving the group and session factors were of interest. Subsequent simple effects testing involving Group X Session comparisons was planned in the event that either the 2- or 3-way interactions were statistically significant. With this analysis approach, it was possible not only to determine whether trainees breathed differently from their untrained peers following treatment, but also at what point in the assessment session (i.e. resting baseline, speech anticipation, speech delivery) such differences occurred.

The decision to include Session 1 (i.e. pretreatment) data in the analyses rather than covary them out was based on a logistical problem associated with the MANOVA design. Neither of the two main statistical analysis programs currently available (SPSS:X and BMDP) permit one to include a unique covariate for each of several variates (i.e. dependent measures) in a multivariate repeated measures design such as the one employed in this study. In other words, the researcher cannot limit the effect of one covariate (e.g. pretreatment baseline heart rate) to a single variate (e.g. posttreatment baseline heart rate). Instead, that covariate will apply to all levels (e.g. baseline, speech anticipation, speech delivery) of the variate (e.g. posttreatment heart rate). Such an approach was deemed statistically inappropriate for the present study. The alternative strategy of deriving change scores (e.g. post-treatment basal heart rate minus pretreatment basal heart rate) suffers from other statistical weaknesses which make it an undesirable option. The inclusion of each level (e.g. baseline, speech anticipation, speech delivery) of each factor (e.g. recording period) in the MANOVA provides the most statistically sound, albeit most conservative and complicated, approach to analyzing the data.

The second type of analysis utilized to evaluate breathing technique implementation were two separate one-way analyses of variance (ANOVA) in which the "target" breathing rates of trainees during the first training session were compared with

rates recorded during the speech anticipation and delivery periods of Session 2 (posttreatment).

Treatment Outcome

Cardiovascular arousal.

Heart rate and blood pressure were sampled and analyzed in the same way as the respiration data. Unlike the respiratory analyses, however, cardiovascular responses obtained during the "target" period of training were not compared with posttreatment responses.

Subjective anxiety.

SUDS ratings obtained from treatment and waitlist subjects following the posttreatment speech were included in a one-way ANOVA. The symptom number and symptom intensity scores derived from the Symptom Rating Scale were included as variates in a 2 (Group) X 2 (Session) MANOVA.

Self-efficacy estimates.

The three self-efficacy predictions included on the Speech Expectancy Scale were incorporated as variates in a 2 (Group) X 2 (Session) MANOVA.

Analyses of treatment outcome were considered a separate family from those used to assess treatment implementation. With use of the adjustment procedure recommended by Huberty & Morris (1989), the risk of a Type I error for each analysis was 5%. A

Type I error risk of .10 was accepted for the treatment manipulation analysis. For analyses involving more than two levels of a repeated measure, the Greenhouse-Geisser adjustment procedure was applied. Post hoc testing involved Group X Session comparisons performed separately for each recording period.

In order to facilitate interpretation of the results obtained in this study, and also to permit easy comparison with results obtained in other studies, effect sizes were calculated for all within- and between-group comparisons. This was done for each dependent measure and represented the degree of change from pretreatment to posttreatment. Specifically, the calculation procedure for within-group comparisons involved (1) subtracting the pretreatment mean scores for each recording period from the respective post-treatment mean scores, (2) dividing these values by the respective mean standard deviations for the pre- and posttreatment sessions, and finally (3) dividing in half the quotient obtained in Step 2. This procedure yields normalized mean score differences that are equatable with eta-squared estimates obtained from analyses of variance. Calculation of between-group effect sizes simply involved subtracting the within-group effect sizes for the waitlist group from those of the treatment group. In this way, one can judge at a glance the relative degree of change from pre- to posttreatment shown by each group at each recording period and on each dependent measure. As recommended by Cohen (1977), effect sizes at or below .20 can be considered small, those between .20 and .40 are

moderate, and those greater than .40 may be viewed as large. The only effect sizes of interest in this study are those involving between-group comparisons.

Results

Treatment Implementation

Were trainees able to reliably reproduce the prescribed breathing pattern in anticipation of and/or while actually engaged in the anxiety-provoking speech test? In general, the answer is 'Yes'. Relative to their untreated peers and their own pretreatment responses, trainees breathed more slowly and abdominally during the posttreatment assessment session. This was determined by comparing the breathing patterns (rate, depth, mode, and variability) of treatment and waitlist subjects at each period (BL, ANT, SPE) of Sessions 1 and 2. The resulting 2-way interaction involving the Group and Session factors were significant ($F(4,16) = 12.2$, $p < .001$). Follow-up simple effects testing, in which Group X Session comparisons were conducted separately for each recording period, indicated that trainees breathed significantly differently from their untrained peers during the speech anticipation period only. Compared to their respective pretreatment patterns, trainees breathed more slowly and abdominally while awaiting the second speech than did waitlist subjects. On average, trainees reduced their breathing rates from 15.9 cpm at Session 1 to 13.1 cpm at Session 2. Waitlist subjects, on the other hand, showed no significant

change across sessions (17.1 versus 16.8 cpm, respectively). These results can be seen in Figure 1.

A similar pattern emerged for abdominal amplitude. Prior to treatment, the average abdominal amplitude for trainees during the anticipation period was 9.7 mV/mm; posttreatment the average amplitude increased to 19.9 mV/mm. For waitlist subjects, abdominal amplitudes remained stable across sessions (11.4 versus 11.0 mV/mm, respectively). No group differences emerged for the baseline and speech delivery periods. Similarly, there were no significant differences in ribcage amplitude across sessions or periods. The mean scores and standard deviations for each group are summarized in Table 3. Effect sizes for each group comparison can be found in Table 13.

In terms of the accuracy with which trainees reproduced the prescribed breathing pattern, a repeated measures ANOVA based solely on breathing rate responses revealed that in general trainees breathed more rapidly during the speech anticipation period than they did during the initial training session ($\underline{F}(1,12) = 4.84$, $\underline{p} < .05$). In the first training session, trainees averaged 8.4 breaths per minute (range = 6 - 11). This average increased to 13.1 cpm during the speech anticipation period, a period they had been instructed to implement the technique in. This problem carried over into the speech delivery period as well. It is unlikely that such inaccuracy is simply due to a lack of practice since trainees reported practicing the technique

an average of 63 minutes during the first week of training and 57 minutes during the second.

Overall, these results indicate that breathing control trainees were able to reduce their breathing rates and adopt a deeper, more abdominally-predominant breathing pattern in anticipation of an anxiety-arousing task. However, they were generally unable to do so during the task itself. Given such findings, further analysis of the breathing strategy with respect to its effectiveness might best have been limited to the speech anticipation period, since it was during this period alone that the strategy was implemented with any degree of accuracy. Nevertheless, subsequent analyses included speech delivery responses in order to assess for possible carry-over effects.

Treatment Outcome

The question addressed in this section is whether breathing control training had a beneficial effect on autonomic and subjective indices of speech-elicited anxiety, and on public speaking self-efficacy.

With respect to autonomic arousal, multivariate comparison of the heart rate and blood pressure of the two groups across sessions and periods did not confirm the hypothesis that trainees would be less autonomically aroused posttreatment than waitlist subjects. In fact, the opposite was found to be true. Unlike

waitlist subjects, trainees showed an increase in diastolic blood pressure from pre- to posttreatment ($F(2,15) = 4.95$, $p < .01$). This increase appears to account for the weak 3-way interaction between the group, session, and period factors ($F(6,11) = 1.92$, $p < .10$). Follow-up simple effects testing indicated that between-groups differences were limited to the speech delivery period ($F(3,15) = 2.64$, $p < .10$). As expected, this effect was associated primarily with diastolic blood pressure. These data are summarized in Table 4 and Figure 2.

The hypothesis that trainees would experience lower levels of subjective anxiety posttreatment than untrained individuals was partially confirmed by the data. Confirmatory evidence came from the symptom ratings offered by both groups following the pre- and posttreatment speeches. In general, trainees reported having experienced fewer and less intense symptoms of anxiety during the second speech than they had during the first. This was not true for waitlist subjects ($F(2,14) = 8.19$, $p < .01$). The number of symptoms endorsed by trainees as having clearly been present decreased from an average of 7.1 in Session 1 to 3.9 in Session 2. Little or no change occurred in the responses of waitlist subjects (6.0 versus 6.4, respectively). Effect sizes for these comparisons are listed in Table 14.

A similar pattern emerged for symptom intensity. Following treatment, trainees offered an average symptom intensity rating of 12.9 $\pm$ 14.8 compared to 27.7 $\pm$ 18.2 pretreatment. In

contrast, waitlist subjects rated their symptoms as equally intense across sessions (22.8 ± 14.7 for both). The most intense and commonly reported symptoms among trainees were, in rank order: memory impairment, difficulty breathing, tachycardia, blushing, trembling, and dry mouth. Among waitlist subjects these symptoms primarily included: tachycardia, dry mouth, perspiring, memory impairment, blushing, and trembling.

In contrast to the above results, the anxiety ratings reported by both groups following the second speech were not significantly different ($t(17) = -1.09$, ns). The apparent difference in mean scores for the two groups (41.8 versus 60.0 for treated versus untreated groups, respectively) was washed out by high within-group variability, especially among treatment participants ($SD = 25.8$).

The hypothesis that training would lead to a significant improvement in public speaking self-efficacy was not confirmed by the data. Although as a group trainees predicted they would speak better and experience less anxiety and better anxiety control during the second speech compared to the first, their responses did not differ significantly from those of waitlist subjects ($F(3,16) = 2.02$). Large variations in the responses of the trainees may have obscured a treatment effect, especially with respect to speech aptitude predictions. As Table 5 illustrates, trainees became more confident in their public

speaking abilities from Session 1 to Session 2, whereas waitlist subjects did not.

Discussion

Two questions were addressed in the present study: (1) can the slower, rhythmic, more abdominally-predominant breathing pattern commonly prescribed to reduce anxiety be implemented with a reasonable degree of accuracy in a situation where it is most likely to be of benefit, namely, while awaiting and then delivering an anxiety-arousing speech? and (2) will individuals trained to adopt this breathing pattern to cope with anxiety actually experience less anxiety, either anticipatory or stressor-specific, than their untrained peers? The results of this study provide partially affirmative answers to both questions.

With respect to the first question, it was found that trainees were able to breathe more slowly and abdominally while waiting to give an impromptu speech than their untrained peers. This finding supports the assumption that anxious individuals can breathe in a controlled manner in anxiety-provoking, attention-demanding situations.

However, the above conclusion is limited by three observations. First, only about 50% of the trained subjects actually produced breathing pattern changes that approximated the pattern taught. The remaining trainees either showed little

change or inconsistent change in how they breathed during the speech anticipation period. Second, even among those trainees who approximated the prescribed breathing pattern, none were accurate in reproducing the target pattern. In general, breathing adjustments were too deep, too rapid, or inconsistently maintained. In particular, respiration rates during the speech anticipation period of Session 2, a time when subjects remained physically inactive, were on average four breaths per minute faster than the 6-10 breaths per minute rates recorded at the end of the first training session. A breathing rate of 6-8 breaths per minute is the one commonly advocated in the clinical and research literature for promoting relaxation (e.g. Grossman et al., 1985; Harris et al., 1976). Finally, trainees were generally unable to maintain the rhythmic, abdominal breathing pattern when actively encountering the feared event, namely, giving a speech.

Although the failure of trained subjects to maintain the prescribed breathing pattern during the speech stressor might not be surprising given the inherent interaction between the technique and the task of public speaking, it must be remembered that subjects received training and practice at breathing rhythmically and abdominally while talking. Additional training may have enabled subjects to be more successful at this task just as, with practice, actors, singers, and wind musicians develop proficiency at breathing "diaphragmatically" while speaking, singing, or playing. However, the emphasis in the present study

was on determining whether breathing control training represents a *brief*, effective and therefore cost efficient alternative to other anxiety management strategies. Because it is possible that modifications to the training process may yield considerably improved performance, treatment modification should be considered for future studies.

Having established that controlled abdominal breathing can be adopted to some extent during a period when its practitioners are anticipating the onset of a feared event, the next question to be answered is "Does it have any beneficial impact on either subjective or physiological arousal?". The data suggest that it does not. For instance, when the treated and untreated groups were compared with respect to cardiovascular arousal during the period when the technique was being implemented most successfully, no significant differences emerged. This finding also held true for the speech delivery period when subjects were more physiologically aroused. Similarly, trainees showed no significant advantage over untrained subjects with respect to how anxious they thought they would become during the second speech, how much control they thought they could exert over their anxiety levels, or how confident they were in their ability to speak well.

In contrast, trainees reported significantly fewer and less intense symptoms of anxiety than untrained subjects. A trend was also evident for trainees to predict experiencing less speech-

elicited anxiety, and greater emotional control and public speaking ability following treatment than waitlist subjects.

A number of hypotheses can be put forward to explain these inconsistent but generally negative findings. One hypothesis is that trainees found the second impromptu speech more anxiety-provoking than their untreated peers due to the additional demand placed on them to accurately reproduce the prescribed breathing pattern. It could be argued that trainees were performing three tasks: 1) breathing abdominally; 2) controlling their anxiety; and 3) delivering a good speech. In contrast, waitlist subjects were only responsible for delivering a speech and controlling their anxiety. Thus, although the breathing strategy may be effective in controlling both subjective and autonomic signs of anxiety in nonexperimental settings, such an effect could have been masked by context-elicited performance anxiety. This problem has plagued previous laboratory studies. The present study was designed to redress this problem.

At least two solutions to this problem can be proposed. First, rather than cue trainees to implement the breathing technique, they could be left to employ the technique of their own accord. In this way, breathing control implementation becomes a dependent measure, reflecting both how confident trainees are of the technique's effectiveness and how able they are to reproduce it under stressful conditions. The second solution is to provide trainees with opportunities to practice

the technique under distracting and physiologically arousing conditions such as giving a speech. However, to avoid confounding the effects of breathing control with the effects of stimulus exposure, the practice conditions must differ from the test conditions in significant ways. Possible analogue stressors for this purpose include conversing with a stranger and engaging in submaximal exercise.

A second possible explanation for these inconsistent findings is that controlled, abdominal breathing -- at least as taught in the present study -- simply does not have a beneficial effect on cardiovascular arousal. Based on the results of Sroufe (1971), one could argue that the breathing patterns trainees adopted during the speech anticipation and delivery periods were more likely to elicit increased, rather than decreased, heart rates. Although these patterns were also generally deeper, more erratic and more rapid than the prescribed pattern, the fact that trainees adopted them after two weeks of training -- more time than that allotted in most research and clinical applications to date -- suggests that a modified technique may be more useful as an anxiety management strategy.

As mentioned in the introduction, in order for breathing control strategies to be clinically useful, they must be quickly and easily learned, and easily applied in anxiety-provoking situations (see Benson, 1975). This does not appear to be the case for the strategy taught in this study -- the second most

commonly prescribed strategy in the literature next to rate-reduction techniques. Nevertheless, it is still possible that, with more practice, trainees could develop sufficient skill in performing the technique.

Considering the recent findings that applied relaxation training yields significantly better treatment outcomes with anxiety disorders than relaxation training alone and/or exposure alone (e.g. Butler, Cullington, Munby, Amies, & Gelder, 1987; Goldfried & Trier, 1974; Osberg, 1981), subsequent studies of breathing control effectiveness would probably do well to include *in vivo* practice as part of training. Furthermore, an emphasis on acute coping efforts, rather than prolonged practice, is also worth considering given the difficulty trainees had at consistently reproducing the technique over time. To this end, trainees might be taught to breathe more slowly and abdominally for a sequence of, for example, 4-6 breaths to allow sufficient time to regain a sense of control.

Based on findings from the present study, slower, more abdominally-predominant breathing can be stimulated by having trainees prolong the length of their exhalations, the pause between exhalation and inhalation, or both. Such a strategy may one's immediate sense of control over anxiety. Hirsch and Bishop's (1981) reported that this technique can trigger periodic heart rate reductions which may further convince trainees that they are achieving control over their anxiety.

Although the above arguments have merit one must still explain why the treatment group, which as a whole breathed more slowly and abdominally during the speech anticipation period than the waitlist group, showed no evidence of reduced cardiovascular arousal, yet reported some improvement in indices of subjective anxiety. Such a finding is consistent with earlier research. In every breathing control study that was reviewed, only self-report measures consistently showed treatment-related improvements; few studies reported physiological improvements (e.g. Cappo & Holmes, 1984; Clark & Hirschman, 1980; Harris et al., 1976; McCaul et al., 1979; Quintanar, Cacioppo, & Monyak, 1980; Benson, Dryer, & Hartley, 1978).

One conclusion that follows from such observations is that the primary effect of breathing control training is to change trainees' perceptions of how threatening or aversive a stressor is and/or how well they can cope with that stressor. In the present study, however, trainees showed only moderate improvement in their perceptions of how threatening (anxiety-provoking) the second impromptu speech would be. The same is true for their estimates of how much control they could exert over anxiety. Such findings may reflect a lack of experience at successfully applying the breathing control strategy in public speaking situations.

The conclusion that perceived control is a function of self-mastery experience is hinted in a study by Booth (1990). Booth compared three brief treatments for claustrophobia, only one of which involved exposure to the fear stimulus, namely, remaining in a confined space for several minutes. Subjects in the nonexposure-based treatments showed little improvement in fear predictions when tested posttreatment. The behavioral avoidance test used in the posttreatment assessment represented the first opportunity these subjects had to try out the techniques they had learned. Only after this exposure trial did subjects show any significant reduction in predicted fear. A similar finding was reported by Borkovec, Wall, & Stone (1974) who observed that when speech anxious subjects were led to believe that their speech-related heart rates were lower than they were, they failed to show any immediate benefit in terms of self-reported anxiety, but reported significantly less fear during a subsequent speech test.

Such findings are consistent with Bandura's (1977) prediction that self-efficacy is most likely to increase when people realize they had coped better in a feared situation than they thought they would. The implication of this observation for the present study is that trainees might have predicted less fear and greater anxiety control if such reports had been obtained post-speech. Such a finding would support the notion that cognitive reappraisal had occurred. In fact, many trainees reported feeling less anxious during the speech than they

predicted they would. Overall, however, the results indicate that treatment-specific change was rather limited.

Other methodological issues arising from this study are worth noting. First, based on the magnitude of heart rate increases, it appears that the speech stressor elicited only moderate anxiety compared to the levels reported in other studies (e.g. Knight & Borden, 1979). According to Barlow (1988, pp. 179-90) individuals who are experiencing profound anxiety, as is the case with panic-prone patients exposed to various chemical infusions, typically experience heart rate increases of 20 bpm or more. Such was not the case in the present study. Not only does this limit the study's relevance to real-life speaking situations, it also leaves unanswered the question of whether breathing control efficacy is restricted to situations that induce high physiological arousal. The so-called "floor effect" certainly has been a problem in other stress reduction studies according to Lehrer & Woolfolk (1984) and is a factor the present study was designed to avoid. Possible ways of correcting the problem, based on the findings of earlier speech anxiety studies, include increasing the size of the audience, prolonging the speech anticipation period, assigning speech topics that require more intimate self-disclosure, having subjects stand before a podium to deliver their talks, and increasing the ambience of a real-life speech via the use of spotlights.

A second, related methodological concern is the fact that, on average, subjects showed relatively little evidence of rapid, shallow breathing during the speech stressor. While this finding is consistent with results of an earlier study involving 100 healthy men responding to a mental arithmetic stressor (Hait & Linden, 1987), it is inconsistent with the assumption underlying most clinical applications of breathing control training to date (e.g. Grossman et al., 1985; Lum, 1976). One is left wondering why breathing control training should be undertaken with speech anxious individuals if their breathing is essentially normal. The old adage "if it ain't broke, don't fix it" would seem to apply here.

However, before dismissing the relevance of breathing control training, three observations should be considered. First, subjects in the present study were still breathing considerably faster than the rate commonly considered to be therapeutic, namely, 6-8 breaths per minute. In fact, the mechanism by which controlled breathing influences anxiety levels may have little to do with respiratory physiology. Andrasik and Holroyd (1980), for instance, reported that headache patients who received EMG biofeedback reported significant improvement in headache frequency and intensity regardless of whether they increased or decreased muscle tension. So whether or not breathing patterns covary with stressor onset may be irrelevant to the value of breathing control training.

The second observation is that the subjects in this study appeared to be only moderately speech anxious; whether more highly speech anxious people might have reacted to the speech test with increased rate and decreased depth of abdominal breathing is unknown. In previous studies, those individuals with the highest breathing rates or other signs of "maladaptive" breathing at rest are the ones commonly diagnosed as suffering from some form of anxiety disorder (Bass & Gardner, 1985b). In panic induction situations, they are also the most likely to report symptoms associated with panic attacks (e.g. Gorman & Uy, 1987; Gorman, Fyer, Goetz, Askanazi, Liebowitz, Fyer, Kinney, & Klein, 1988; Griez & van den Hout, 1982). Such findings may hold true for speech anxious individuals as well. It is therefore recommended that a more highly speech anxious sample be recruited for future studies.

Finally, the implications of the present study are limited by the small size of the subject sample. Besides the obvious limitation to the statistical power of the main analyses, the small sample size precludes useful post-hoc analyses of those factors that discriminate "successful" trainees from "unsuccessful" ones. Such information could be of value in matching treatment to patient, as well as providing insights into the process of change in speech anxiety treatment.

In summary, the present study provides partial support for the assumption that, with training, slower, abdominally-

predominant breathing can be adopted in anxiety-arousing situations. Limiting this finding is the observation that approximately 50% of the trainees had difficulty accurately implementing the technique. Even among those subjects who successfully reproduced the prescribed pattern while anticipating stressor onset, few could maintain it during the stressor itself. Unfortunately, these findings did not elucidate whether reproduction inaccuracy is specific to the particular breathing strategy taught in this study (i.e. continuous, abdominally-predominant breathing) or is an inherent limitation of all breathing control strategies attempted in response to fear-provoking events. In addition, whether the observed inaccuracies are due to insufficient length or comprehensiveness of training could not be determined. A second study is needed to answer these questions.

Study 1 confirmed that breathing control training had a negligible impact on stressor-elicited cardiovascular arousal yet is associated with some reduction in reported anxiety and anxiety symptomatology. In addition, the results suggested that when phobic individuals are taught anxiety management techniques without opportunity to practice them *in vivo*, they experience relatively little change in their expectations of fear or their ability to control fear. In other words, simply learning a breathing strategy touted as having anxiolytic properties is not sufficient to change one's view of how threatening a feared situation is or how well one believes he/she can cope in that

situation. A second study would help clarify whether breathing control training elicits self-efficacy changes on its own or requires *in vivo* exposure to the feared situation to elicit such change.

A second study could also clarify other treatment-related concerns arising from the present study. For instance, it is not clear whether the failure of training to attenuate cardiovascular arousal is the result of (a) inaccurate technique implementation, which in turn may be a function of insufficient training, (b) the ineffectiveness of the breathing technique being taught, or (c) other factors that are unrelated to training such as the level of anxiety experienced by subjects. Equally uncertain is how critical breathing-specific changes are to any observed reductions in anxiety level. It may be that psychological factors play the greatest, perhaps even the only, role in determining treatment outcome. Such questions could be addressed in a study that includes a larger number of subjects, a broader scope of dependent measures, and a longer, more comprehensive training program.

Study 2

Purposes and Hypotheses of Study 2

In light of the preceding discussion, a second study was conducted. This study had two main objectives. The first was to determine if a longer, more comprehensive training program involving a modified breathing technique could be accurately

implemented under more anxiety-arousing conditions than those of Study 1. The second objective was to determine whether the revised treatment program has a clinically significant effect on expectations of fear and experiences of fear in a highly threatening situation. The specific hypotheses are listed below.

Breathing Control Implementation

1. Trainees will exhibit breathing patterns during a posttreatment coping skills demonstration that are consistent with the pattern prescribed and practiced in treatment.
2. Trainees will have posttreatment breathing patterns during the speech anticipation period, and possibly also during the speech delivery period, that are significantly different from those of untrained individuals, and is consistent with the pattern prescribed in treatment.

Breathing Control Effectiveness

Autonomic arousal.

1. Trainees will show lower heart rates and skin conductance levels during a posttreatment speech anticipation period than untreated subjects. These effects may also extend to the speech delivery period.

Subjective anxiety.

1. Trainees will report experiencing reduced emotional tension/distress during the posttreatment speech

anticipation period than untrained subjects. This group difference may also generalize to the speech delivery period, depending on how well trainees are able to implement the breathing technique during this period.

2. Trainees will report having fewer and less intense symptoms of anxiety during a posttreatment impromptu speech than untrained subjects.

Self-efficacy/expectations of fear.

1. Following treatment, trainees will predict that they will experience less anxiety, more control over anxiety, and greater confidence in their speaking abilities prior to an impromptu speech than will their untrained peers.

2. This group difference in self-efficacy predictions will be even greater for ratings given with respect to a third, ostensibly more difficult speech.

3. The proportion of trainees who agree to give a third speech will be significantly greater than will be found among untreated subjects.

Method

Subjects

Forty-eight speech anxious adults from the general public and university populations participated in this study. They were

recruited via newspaper, radio, and classroom advertisements for a free 4-week training program on strategies for controlling public speaking anxiety. Participation was restricted to a more highly anxious sample than that in Study 1. This was done to boost the study's power to detect possible treatment effects and also to increase the generalizability of the findings to clinically-anxious populations. The specific inclusion and exclusion criteria for this study are listed below.

Inclusion criteria.

1) Self-report ratings of at least 80 on a scale ranging from 0 (complete calm) to 100 (absolute panic) describing the level of anxiety experienced minutes before giving a talk to an audience of 10 or more people. This cut-off score corresponded to approximately the 75th percentile for speech anxiety ratings given by 215 U.B.C. undergraduates. This rating also exceeded the average pre-speech anxiety rating reported by the participants in Study 1.
2) A score of at least 70 on the Personal Report of Communication Apprehension (PRCA) questionnaire (Appendix B). This cut-off score has been commonly used in studies of public speaking anxiety to distinguish between highly and normally speech anxious individuals (e.g. Klopf & Cambra, 1980). Those who score 70 or above on this questionnaire are in the top 20th percentile for public speaking anxiety. Use of this measure permitted comparison of the present study's findings with those of previous studies.

3) Reports of having avoided at least 50% of all public speaking opportunities over the past two years. As with previous criteria, this one was based on the results of the U.B.C. student survey, in which the average public speaking avoidance rate was 30%.

Exclusion criteria.

As per Study 1 (see page 11).

Sample characteristics.

Of the initial 52 volunteers for this study, 26 were randomly assigned to the treatment group after having been matched to 26 waitlist control subjects on several demographic and treatment outcome measures. These matching variables included gender, age, speech anxiety rating, and resting heart rate. For matching purposes, the latter three variables were subdivided as follows: age (in years; 20-29, 30-39, 40-49, 50-59, 60-69); anxiety rating (in SUDS; 80-89, 90-100); heart rate (in bpm; 50-59, 60-69, 70-79, 80-89, 90-99). The mean age of this sample was 35.3 $\pm$ 13.3 years and 54% were women. However, as a result of two withdrawals from treatment, three cases of procedural error (all treatment group members), four cases where subjects declined to give the posttreatment speech (three being treatment group members), and four cases (all waitlist subjects) who scored below the cut-off score of 70 on the PRCA, the final sample size for most analyses was reduced to 39. This final sample consisted of 21 men and 18 women, with each gender equally

represented across conditions. The treatment and waitlist groups also did not differ significantly with respect to age, resting heart rate, blood pressure, speech anxiety rating, and PRCA scores (Table 6).

Research Design

The research design followed in this study was identical to that of Study 1 except that the number of observation periods (i.e. repeated measures) increased from three to four to reflect the increased length of the speech anticipation period (from four to eight minutes).

Recording Equipment and Materials

As in Study 1, two categories of physiological activity were recorded, autonomic and respiratory. Autonomic activity, represented by both heart rate and skin conductance level, served as an index of stressor-elicited anxiety.

Autonomic measures.

The rationale for recording heart rate (HR) was presented in Study 1. The method for recording it, however, differed from Study 1. In the present study, bipolar electrodes were attached to the lateral aspects of each subject's lower ribcage, with a ground electrode affixed to the back of his/her neck. This configuration was recommended by Constant (1981) and has been reported in previous studies (e.g. Hait & Linden, 1987) to yield a clean ECG signal from which heart rate can be calculated. The

ECG signal was filtered (30 Hz) and amplified (.05 mV/mm) by a Sensormedics cardiotachometer coupler (Model 9857) integrated with a Sensormedics Dynagraph (Model R611). Heart rate (beats per minute) was calculated from the number of R-waves in each 30-second recording period.

Skin conductance level (SCL) was included as a measure of autonomic arousal for several reasons. First, skin conductance level represents an objective estimate of a commonly reported anxiety symptom, namely, sweaty hands. Second, along with heart rate, it has been included in previous studies of breathing control effectiveness (Wallace, Benson, & Wilson, 1971; Harris et al., 1976), and in studies of anxiety responses to acute stressors (Craske & Craig, 1984; Holmes et al., 1979; Knight & Borden, 1979), and treatments for public speaking anxiety (Borkovec & Sides, 1979b; McKinney & Gatchel, 1982). These studies have shown skin conductance level to be sensitive to stressor-elicited anxiety and to the effects (albeit temporary) of arousal-attenuating procedures like meditation and paced breathing. It was with such studies that the present study's findings were compared. Finally, skin conductance level can be recorded noninvasively. As a result, the risk of test-induced anxiety was minimized. It was for this reason that blood pressure was not recorded. Regular inflation of a blood pressure cuff such as the one used in Study 1 can be disruptive. With such safeguards in place, it was expected that Study 2 would

yield results with greater internal and external validity than those obtained i previous studies.

The procedure followed for recording skin conductance level conforms with widely-accepted standards specified by Fowles, Christie, Edelberg, Grings, Lykken, & Venables (1981). Two silver/silver chloride 1 cm^2 electrodes were filled with a conductance gel comprised of one part 0.9% physiological saline in two parts Unibase and attached to the distal phalanges of the index and middle fingers of each subject's nondominant hand. Dual electrode collars were used to ensure equivalence of surface contact areas across subjects. Output from these electrodes was fed into a Beckman coupler (Model 9844) and recorded on chart paper. Pilot testing revealed that a high frequency filter setting of 30 Hz with .05 mV/mm amplification provided sufficient sensitivity to detect the range of skin conductance levels exhibited by 25 speech anxious individuals. For the purposes of this study, skin conductance level (in micromhos units) was defined as the average of three levels recorded at equidistant time points within each 30-second recording period.

Respiratory measures.

The rationale for recording respiratory activity was the same as in Study 1. However, unlike Study 1, only abdominal movement was monitored. The four respiratory parameters derived from this signal included respiration rate (RR), abdominal amplitude (AA), fractional inspiratory time (FIT), and exhalation

time (Te). All were calculated by hand from the polygraph tracings. Calculations were based on six successive breathing cycles. The variables fractional inspiratory time and exhalation time were added because they represent key elements of the revised breathing control strategy. Fractional inspiratory time, for instance, represents the relative amount of time spent inhaling during each respiratory cycle. The lower this value, the greater the exhalation time and/or the longer the pause before inhaling again. The goal of training was to reduce fractional inspiratory time. Exhalation time represents an even more direct measure of the prescribed breathing pattern. It also provides some indication of breathing rate; the greater Te, the fewer inspirations in a given interval.

Self-report measures.

The same four self-report measures used in Study 1 to assess treatment outcome were used in this study. They included the Treatment Credibility/Expectancy for Improvement Scale, the Speech Expectancy Scale (SES), the Subjective Units of Discomfort Scale (SUDS), and the Symptom Rating Scale (SRS). The latter two underwent minor revisions. Specifically, the SUDS was converted from a verbal rating scale to a visual analog scale to reduce the impact of experimental demand on subjects' responses (Appendix B). It was administered three times per session (post-adaptation, pre-speech, post-speech) instead of just once (post-speech). With respect to the SRS, modifications were made to facilitate scoring and to permit comparison of symptom ratings in

this study with those reported in other studies (Appendix B). To do this, the 0-100 visual analog scale used in Study 1 was converted to a 0-4 scale with 5 anchor points ("not even noticeable", "mild", "moderate", "severe", and "very severe"). These anchor points and corresponding numeric scale are most often reported in the treatment outcome studies with panic disorder (e.g. Michelson et al., 1985) and other anxiety disorders. As in Study 1, two summary statistics were generated from these data: 1) the number of symptoms rated as being at least "mild" in intensity; and 2) the mean intensity of 16 symptoms associated with anxiety. The results of Study 1 indicated that the second statistic had excellent test-retest reliability over two weeks (r = .95, N = 10), while the first statistic was less reliable (r = .52).

Behavioral measures.

Two behavioral measures of treatment outcome were included in this study. The first measure was of each subject's willingness to give a third talk after completing the posttreatment speech test. Subjects were led to believe that this third talk would take place in one week and would involve speaking to an audience of 20 speech-anxious peers for 5-10 minutes on a topic of their choice. This third speech was a ruse and therefore never scheduled. It was designed to assess the generalizability of any treatment effects. To minimize the impact of experimental demand on subjects' responses, the

experimenter described the third speech as a purely voluntary venture.

The second behavioral measure was of each subject's ability to accurately implement the breathing control strategy during the speech anticipation and delivery periods. This measure was included primarily as an index of how confident subjects were in the breathing technique. Failure to implement the technique suggested that subjects either did not perceive the technique as useful or had not practiced it enough to feel confident in using it. However, breathing control accuracy can also be seen as a measure of how well the breathing control procedure can be implemented in the face of mounting anxiety and external distractions.

Intake assessment measures.

As in Study 1, self-report measures were used to confirm that subjects were highly speech anxious prior to treatment. In Study 2, however, the structured interview (Appendix B) was a revised version of the Anxiety Disorder Interview Schedule (ADIS-R) for social phobia (Barlow, 1988, 545-47; DiNardo, O'Brien, Barlow, Waddell, & Blanchard, 1983). The greater length and scope of this structured interview was considered more representative of true clinical assessment/treatment procedures than the one used in Study 1. In turn, the structured interview was expected to enhance perceptions of the treatment program as highly credible. The interview consisted of 10 questions

addressing the extent of public speaking fear/phobia in particular, and social anxiety/phobia in general. It also included two questions regarding the perceived etiology of subjects' public speaking fear plus questions about previously tried treatments and current expectations regarding treatment. A final section was included to determine if other forms of psychopathology were present which might have required immediate treatment or would have interfered with the training program. The two interview responses of most interest were: 1) ratings of pre-speech anxiety levels on a 0 (complete calm) to 100 (total panic) scale; and 2) estimates of public speaking avoidance (0-100%).

A single questionnaire was administered to corroborate evidence from the interview that subjects were highly speech anxious. Unlike Study 1, the questionnaire used was The Personal Report of Communication Apprehension (PRCA) developed by McCroskey (1970). (Appendix B). The PRCA replaced the Subjective Units of Discomfort Scale: Pre-speech because of its frequent use in public speaking anxiety research and its well documented psychometric properties. The PRCA contains 20 statements about public speaking anxiety which subjects rate, on a 1-5 interval scale, as being "very true" to "not at all true". It was normed on 2479 university students, has a mean of 60.4, a standard deviation of 11.5, and a range of 15 to 100 (McCroskey, 1970). Porter (1981) reported that the PRCA has a high level of internal consistency (average inter-item correlation = .35,

average correlation of each item with the total score = .61, overall estimate of internal reliability = .91). High test-retest reliability (r = .83 over 10 days, N = 769) has been reported as well (McCroskey, 1970). Hansford & Hattie (1982) have confirmed that PRCA scores are independent of age, gender, or nationality based on a cross-cultural study of 1784. The PRCA has also been found to correlate highly with 0-100 visual analog scale ratings of anxiety (post-speech), evidence of its validity as a measure of public speaking anxiety (Taylor, 1981). In a similar study, Behnke & Beatty (1981) established that, together with heart rate, PRCA scores explained approximately 80% of the variance in post-speech anxiety ratings (STAI-State). Finally, McCroskey (1978) summarized the findings of over a dozen studies in which high PRCA scores were found to be good predictors of anxious behavior in a variety of social settings (e.g. restricted length of speeches).

Procedure

The initial procedure followed in the present study is comparable to that in Study 1. Unlike Study 1, however, once the recording equipment was attached, subjects began a 15-minute assessment interview rather than a 10-minute adaptation period. A summary of the entire assessment procedure for Session 1 appears in Table 1.

Baseline period (BL).

Following the interview, subjects sat quietly for five minutes while completing the PRCA questionnaire. During the last two minutes of this adaptation period, baseline recordings of respiratory and autonomic activity were obtained. At the end of this period, subjects rated their current level of tension/anxiety using the SUDS.

Speech anticipation period (ANT).

Once the adaptation/baseline period was completed, the experimenter announced that in 10 minutes subjects would be required to give a 4-minute impromptu talk before a live audience. Subjects were also told that their talks would be videotaped for later review. To reduce the risk of refusals, the experimenter emphasized that the talk was an essential part of the assessment/treatment process. Subjects were assured that the video recording was confidential and that they would have a later opportunity to evaluate their recorded speech performance (Appendix D). After this, guidelines were presented for the preparation and delivery of the upcoming speech. Subjects were encouraged to prepare notes over the next 8-10 minutes, but to use these sparingly when delivering their talks. They were also informed that they were to stand before a podium to deliver their talks.

Once all preparatory instructions had been given, subjects were told the topic for their speeches. Half of the subjects

spoke on the topic of "What do you see as being the primary issues in the debate over abortion and what is your personal standpoint on the issue?". The remaining subjects spoke on the topic "What do you see as being the primary issues in the debate over capital punishment and what is your personal standpoint on the issue?". Assignment of topics was random and counterbalanced across sessions.

At this point, each subject completed the Speech Expectancy Scale, along with a consent form for the videotaping of his/her upcoming speech (Appendix D). In order to encourage unbiased responding to the Speech Expectancy Scale and all other self-report measures, subjects were asked to seal their completed inventories in coded envelopes. They were then reminded of their speech topics and of the order of events to follow.

During the subsequent 8-minute speech anticipation period, autonomic activity was recorded at Minutes 0-1, 2-3, 5-6, and 7-8. These recording intervals were expected to sample the increased arousal that other researchers (e.g. Knight & Borden, 1979) have reported during speech anticipation. At the beginning of Minute 4, the research assistant arranged chairs, lighting, and video equipment. He/she was instructed to avoid initiating any verbal communication with subjects during this time. At Minute 6, two confederates were escorted into the room to serve as an audience. Prior research has indicated that an audience of three is as anxiety-provoking for most speech anxious individuals

as an audience of 20 or more (Baldwin & Clevenger, 1980). It also represents the average audience size employed in earlier studies (Matias & Turner, 1986; McKinney & Gatchel, 1982; Schuler, Giner, Austrin, & Davenport, 1982). As before, verbal contact between confederates and subjects was discouraged. Finally, at the end of Minute 8 subjects were prompted to record their anxiety/arousal level using the SUDS.

Speech delivery period (SPE).

The speech delivery period began as soon as subjects completed the SUDS rating and had been reminded to speak for 4-5 minutes. No other directions were given unless they paused mid-speech for longer than 10 seconds. If this occurred, they received a single prompt to continue speaking for the full 4-5 minutes. Subsequent pauses were left unchallenged. In the event that subjects became noticeably distressed or clearly indicated that their speech was over before four minutes had elapsed, the assistant immediately confirmed that the speech test was over and thanked them for participating. As the assistant and audience left, the experimenter informed the subject that he/she had courageously completed a difficult task.

Autonomic recordings were obtained at Minutes 0-1 and 2-3. At the conclusion of the speech, subjects first rated on the SUDS scale how anxious they felt during the speech and then completed the Symptom Rating Scale.

The session ended with arrangements being made for the first treatment session. Subjects were asked for a list of available treatment times in order to form training groups. After they had been matched to a specific training group, they were contacted by phone, usually within one week of the initial assessment. Those in the waitlist group were told that due to scheduling difficulties, treatment would be delayed by four weeks. For subjects in the treatment group, on the other hand, treatment began within the week.

Breathing control training: Session 1.

The treatment schedule followed in this study is summarized in Table 7. Unlike Study 1, treatment was conducted in group format over a four-week period. Each group consisted of 6-7 trainees led by the experimenter. The first three sessions lasted one hour and were held in a Psychology Clinic office. The last session took place in the recording laboratory as part of the posttreatment evaluation.

The decision to treat subjects in groups rather than individually was based on three observations. First, group therapy is more time efficient than individual therapy. Second, because the popularity of group treatment is increasing, the results of this study were expected to have greater generalizability to clinical settings if group therapy was used. Finally, the risk of a treatment diffusion effect due to nonspecific group process factors was expected to be low given

the brevity and skills-oriented focus of treatment. If the treatment were longer and/or involved more interpersonal interactions, factors such as altruistic behavior and group cohesion would begin to influence treatment outcome, masking any effects specific to breathing control training.

Treatment proceeded in a comparable manner to that in Study 1. It began with a 30-minute rationale for breathing control training delivered by the experimenter from a memorized script. The content of this rationale was similar to that of Study 1, as was the training period that followed. The experimenter first modelling the desired breathing pattern, after which trainees were encouraged to practice it themselves. Unlike Study 1, the prescribed breathing pattern was a sequence of six deep, but progressively diminishing, inspirations followed by gradually lengthening exhalations. In Study 1, subjects were trained to adopt a continuous pattern of slower, abdominally-predominant breathing. The decision to adopt this new breathing pattern followed directly from the results of Study 1 which suggested that it is difficult, if not impossible, to maintain an abdominally-predominant breathing pattern while awaiting or delivering an impromptu speech.

The first goal of the new approach to training was to sensitize trainees to any increased ribcage and/or abdominal tension associated with public speaking. Possible sources of this tension include involuntary breathholding, abdominal

tensing, and rapid, thoracic breathing. The first step in the sensitization process involved taking a deep breath and holding it for 2-3 seconds. This maneuver signaled to the trainee and experimenter that breathing control was being initiated. The next step involved exhaling slowly and evenly through pursed lips. This procedure produces a state of physical quiescence which contrasts sharply with the tension of breathholding. Such a contrast was expected to strengthen the link between controlled exhalation and feelings of calm and control.

The second goal of treatment was to engender a greater sense of anxiety control. The strategy for doing so involved progressively lengthening each exhalation over six breaths. The time between breaths was to be increased gradually, but not to the point of discomfort. A short period of normal breathing followed each six-breath sequence in order to avoid fatigue. Besides promoting an increased sense of self-control, this strategy prompts deeper, more abdominally-predominant inhalations, which interferes with rapid, shallow breathing associated with anxiety. It also facilitates better voice quality and control. This latter benefit may be one of the most important for individuals whose public speaking anxiety increases whenever they notice their voices trembling or lacking volume. Controlled exhalation may prevent hyperventilation-induced hypocapnea, a problem that can arise when individuals first begin breathing control training. As some investigators have suggested

(e.g. Ley, 1985a), the unpleasant symptoms of hypocapnia may trigger increased, rather than decreased, anxiety.

Trainees practiced the prescribed strategy for 10 minutes in the upright seated position. Throughout this period, they were encouraged to use their hands to monitor ribcage and abdominal movement. To facilitate greater abdominal excursion, trainees were instructed to press down firmly with their abdominal hand. Respiratory physiology research (Hirsch & Bishop, 1981; Sharp, Goldberg, Druz, & Danon, 1975) and some pilot testing have shown that this simple procedure dramatically increases the depth of abdominal breathing. An additional two minutes of training was conducted with trainees leaning forward 45°. This posture enabled trainees who were having difficulty with the technique to experience some success: in this position the diaphragm and abdomen can move more easily and efficiently (Faling, 1986). Learning of the technique was facilitated by use of the three mental images described in Study 1.

In total, two sources of learning assistance were available to trainees: (1) verbal reinforcement from the experimenter for successive approximations to the prescribed breathing pattern, and (2) proprioceptive feedback. Unlike Study 1, respiratory tracing feedback was not used because such feedback was not feasible in group training. Furthermore, its use might have been a threat to the external validity of the study.

Training Session 1 concluded with an overview of the first home assignment. This assignment involved practicing slow, abdominally-predominant breathing at least once daily for 10 minutes. Trainees who were having difficulty with the technique were encouraged to practice it in the supine position. Of all postures, the supine offers the least resistance to abdominal/diaphragmatic movement and therefore has the greatest likelihood of success (McLaughlin, 1977). Daily practice (5-10 minutes/day) of the six-breath sequence was also prescribed. Directions for home practice were provided in a written handout (Appendix E). Included with the handout was a daily record sheet (Appendix E) and the Treatment Credibility/Expectancy for Improvement Scale. In order to foster compliance with the home assignment, obstacles to home practice were discussed and solutions suggested. As well, subjects were encouraged to view home practice as something they did for themselves rather than for the experimenter.

Training Session 2.

Session 2 began with a review of the previous week's home assignment. Any problems or questions concerning the technique were dealt with and praise given for achieving practice goals. A 10-minute practice followed in which trainees demonstrated their proficiency at the six-breath sequence. Deviations from the prescribed pattern were identified so that subjects could correct them.

Trainees were then taught to pair feelings and images of tension release with prolonged exhalation. After five minutes of practice, training shifted to a discussion of how and when to implement the technique in public speaking situations. Rhythmic, abdominally-predominant breathing was presented as a useful way to counteract the problem of one's voice becoming weak and shaky while speaking. This problem appears to exacerbate the anxiety associated with public speaking. One cause for a weak, shaky voice is shallow, irregular breathing accompanied by abdominal tensing. Trainees practiced controlled breathing while counting aloud from 1-30 and later while reading aloud. The goal of these exercises was to maintain voice quality and volume without resorting to breathholding and the reflexive gasping for air.

The session ended with an overview of the home assignment. For the upcoming week, trainees continued practicing the six-breath procedure at least 10 minutes per day, focusing on the strategy of releasing tension through prolonged exhalations. They also practiced controlled breathing while reading aloud. As added incentive, they were to bring an audio recording of one of their practice sessions to the next meeting. However, they were cautioned not to attempt public speaking until later in therapy.

Training Session 3.

In Session 3, trainees demonstrated their ability to breathe abdominally and to maintain voice tone while speaking. This was done in dyads, with the therapist providing positive feedback for

successive approximations to the desired pattern. Time was also spent discussing and practicing the revised six-breath sequence. The remainder of the session involved practicing controlled abdominal breathing under relatively distracting or physically arousing conditions. These approximated the kind of conditions likely to be encountered in real-life public speaking situations. The first involved carrying on a conversation with another group member. Trainees alternated between practicing the tension release procedure while listening and controlled abdominal breathing while speaking. This was done for 15 minutes. After this, subjects practiced reducing their heart rates using the six-breath sequence. Heart rates were first elevated to approximately 50% of age-dependent maximum levels by means of stair climbing. This exercise was done twice. In this way, trainees gained experience at employing breathing control to reduce heart rate. The homework prescription for that week was to continue using the six-breath sequence to release physical and emotional tension. Trainees were encouraged to do so during or after physical exercise, during conversations, while doing paperwork, and while driving. Once again, public speaking was discouraged until a later date. Finally, arrangements were made for trainees to be seen individually for the final session. They were told that individual-specific feedback would be offered in that session. They were not informed about the scheduled speech test, partly to reduce the risk of nonattendance, and partly because waitlist subjects had also not been informed of it.

Posttreatment assessment.

The second assessment session took place in the same recording room and involved nearly the same procedures as used in Session 1. During the session overview, trainees were told that physiological recordings would be obtained to document their skill at the breathing technique. Subjects in the waitlist condition, on the other hand, were told that new physiological baselines were needed before training could begin. The goal of these rationales was to contain anticipatory anxiety about the upcoming speech test to the period following adaptation/baseline.

Once the recording equipment had been attached, trainees began a 10-minute discussion about the past week's home assignment, followed by a 5-minute technique demonstration period. This procedure was similar to the one employed in the group sessions. In addition, the two assessment sessions were comparable in duration. Waitlist subjects, spent 10 minutes discussing how they typically cope in anxiety-provoking situations like public speaking. They then demonstrated their coping strategies over a 5-minute period.

For both groups, the baseline, speech anticipation, and speech delivery periods followed as per Session 1. Both groups received identical instructions for the speech anticipation period. The fact that trainees were not specifically cued to implement the breathing control strategy permitted a behavioral test of trainees' confidence in and ability at the breathing

strategy. This procedure was also expected to reduce the likelihood of additional performance anxiety.

Once the speech test had been completed, all subjects were asked to give another speech, this time to a larger audience and on a topic of their choice. They were told that their 5-10 minute long speech would be scheduled in one week and that the audience would consist of 20 speech anxious peers. The voluntary nature of this speech was emphasized to limit response bias. Before indicating their decision, subjects completed the Speech Expectancy Scale with respect to this upcoming speech. They then indicated whether they wished to give the third speech and at what time. Four alternate times were offered to avoid refusals based solely on scheduling problems.

At this point, subjects were debriefed regarding the nature and purposes of the study, including the use of deception with respect to the third speech. Both groups were shown copies of their physiological recordings from each assessment session, along with an explanation of their meaning. They also reviewed video recordings of both speeches. Subjects were encouraged to ask questions at any time. Trainees, were further encouraged to continue practicing the breathing techniques, and provided with suggestions for additional treatment if such was requested. Waitlist subjects were offered the same treatment program provided to treatment group members. In most cases, this offer

was accepted. Finally, all subjects received a complementary handout on effective public speaking (Appendix E).

Data reduction and analyses

As in Study 1, two types of data were generated in this study: (1) indices of treatment implementation; and (2) indices of treatment effect. The former involved respiration measures and the latter included a variety of autonomic, self-report, and behavioral measures.

Treatment Implementation

Respiratory activity was sampled during four periods of the pre- and posttreatment sessions. These periods were: 1) baseline (BL); 2) anticipation, Minutes 0-4 (ANT4); 3) anticipation, Minutes 5-8 (ANT8); and 4) speech delivery (SPE). Except for the speech period, the two 30-second recordings obtained in each were averaged to yield one score per period. For the speech period, only data recorded during the first minute were retained for analysis; too few subjects spoke long enough to obtain Minute 2-3 scores. Additional recordings 60 seconds in length were obtained posttreatment during the technique demonstration period. These recordings served as reference values for evaluation of technique accuracy.

The criterion for technique accuracy was defined as an average expiratory time of 3.5 seconds or greater. This criterion not only exceeds the average expiratory time of over

95% of subjects at pretreatment, but also is consistent with respiration rates (8-12 breaths/minute) adopted in earlier breathing control studies. This criterion is within the range of expiratory times which trainees adopted in the practice sessions. Expiratory time was selected rather than the other four respiratory parameters (respiration rate, fractional inspiratory time, abdominal amplitude, amplitude variability) because it correlated highly with each at every period of the pretreatment session (Table 17). By reducing redundancy among dependent measures, statistical power in subsequent analyses was preserved.

Analyses of breathing technique accuracy were of two types: (1) tabulation of the proportion of trainees and waitlist subjects meeting criterion during each of the five 30-second posttreatment recording periods; and (2) a 2 (Group) X 2 (Session) X 4 (Period) repeated measures ANOVA. With respect to the latter, only the 2- and 3-way interactions involving the group and session factors are of interest.

The decision to define breathing technique accuracy as the proportion of participants who met criterion rather than as the proportion of time participants met criterion was based primarily on a pragmatic concern for the amount of time and effort required to derive the time-based accuracy estimate. Derivation of the latter estimate would have required hand coding of all nine minutes of respiratory tracings obtained for each participant in the speech anticipation and delivery periods of both assessment

sessions. The benefit of such enormous effort, in terms of increased information about techique implementation, was not considered worth the cost. In fact, the time sampling procedure that was employed for estimating technique accuracy accounted for 25% of the total time available for implementing the breathing technique, and provided estimates from five distinct time periods in the speech anticipation and delivery periods.

Treatment Outcome

Autonomic arousal.

Heart rate and skin conductance levels were sampled and analyzed in the same way as the respiration data.

Subjective anxiety.

SUDS ratings were obtained three times per session (post-adaptation, post-anticipation, post-speech) for inclusion in a 2 (Group) X 2 (Session) X 3 (Period) repeated measures ANOVA. The only effects of interest are the 2- and 3-way interactions involving the group and session factors. The symptom number and symptom intensity scores derived from the Symptom Rating Scale were included as variates in a 2 (Group) X 2 (Session) MANOVA.

Self-efficacy estimates.

The three self-efficacy predictions included on the Speech Expectancy Scale were incorporated as variates in a 2 (Group) X 3 (Speech) MANOVA.

Analyses of treatment outcome were considered a separate family from those used to assess treatment implementation. With use of the adjustment procedure recommended by Huberty & Morris (1989), the risk of a Type I error for each analysis was 5%. A Type I error risk of .10 was accepted for the treatment manipulation analysis. For analyses involving more than two levels of a repeated measure, the Greenhouse-Geisser adjustment procedure was applied. Post hoc testing involved Group X Session comparisons performed separately for each recording period.

Results

Treatment Implementation

Two questions are addressed in this section: (1) did trainees adequately learn the prescribed breathing pattern?; and (2) were they able to implement it accurately during periods of increasing distraction and anxiety (i.e. while awaiting and then giving an impromptu speech)? In general, the answer to the first question is 'Yes' and to the second, 'No'.

With respect to the first question, 83% of trainees met the criterion for breathing technique accuracy during the posttreatment demonstration period. The criterion for accuracy was defined as an average expiratory time of at least 3.5 seconds. Prior to treatment, only one person from the entire sample exhibited a resting expiratory time equal to or greater than this value. During the demonstration period, however,

trainees averaged 7.4 ± 1.9 seconds per exhalation, levels well above criterion.

With respect to the second question, however, success at implementing the breathing strategy declined over subsequent recording periods. As Table 8 shows, 60% of trainees met criterion at baseline. During the anticipation period, 20% of trainees were accurately employing the technique. Although low, these success rates still greatly exceeded those of untrained individuals. They also exceeded the pretreatment success rate of the training group. Nevertheless, the decline over time suggested that breathing control accuracy is linked to situational demands; as demands on one's time and attention increase, accuracy diminishes.

Similar results were obtained when the expiratory times of trainees were compared with those of waitlist subjects across sessions and recording periods. Unlike untreated subjects, trainees prolonged their exhalations far longer during posttreatment baseline and anticipation periods than during the pretreatment period (Figure 3). This conclusion stems from the significant 3-way (Group X Session X Period) interaction obtained in a repeated measures ANOVA ($F(3,31) = 2.79$, $p < .10$, Greenhouse-Geisser adjusted) and the simple effects testing that followed. The latter involved 2 (Group) X 2 (Session) ANOVAs done separately for each recording period (BL, ANT4, ANT8, and SPE1). Only for the first three recording periods did

significant findings emerge ($F(1,36) = 10.53$, 4.92, 7.13, respectively, $p < .05$). No between-groups differences emerged for the speech delivery period. The effect sizes for these comparisons are listed in Table 15.

Taken together, these results indicate that the prescribed breathing pattern was being implemented by trainees during the baseline and speech anticipation periods. However, the accuracy with which the breathing strategy was implemented was modest.

Treatment Outcome

The primary question addressed in this section is whether breathing control training is associated with lower levels of autonomic arousal and self-reported anxiety, and higher levels of self-efficacy, relative to no treatment. Overall, the results suggest that training had little impact on autonomic and subjective indices of anxiety, but had a significant effect on public speaking self-efficacy.

With respect to autonomic arousal, no group differences emerged across sessions or periods; neither the Group X Session X Period interaction nor the Group X Session interaction involving heart rate and skin conductance level were significant ($F(6,23) = 0.41$ and $F(2,27) = 0.41$, respectively). Both groups showed equivalent and fairly large increases in arousal level from baseline to speech delivery in Sessions 1 and 2 (Table 9). In fact, the increase in speech-related arousal reported by

investigators such as Knight and Borden (1979) was evident in the heart rate data of both groups. These data are presented in Figure 4. However, contrary to expectation, heart rate and skin conductance level were not well correlated across recording periods. The average correlation between these two indices of autonomic arousal during the pretreatment session was only $\underline{r}$ = -.17, with the range being $\underline{r}$ = -.13 to $\underline{r}$ = -.20. These correlations are presented in Table 17.

The hypothesis that trainees would report significantly lower levels of speech-elicited anxiety than untrained individuals was also not supported. Analysis of the SUDS ratings of both groups following the baseline, speech anticipation, and speech delivery periods of Sessions 1 and 2 yielded nonsignificant findings. For the 3-way interaction, $\underline{F}(2,36)$ = 0.59 (Greenhouse-Geisser adjusted). Similarly, for the Group X Session interaction the $\underline{F}$ value was 1.35 ($\underline{df}$ = 1,37). On average, trainees and waitlist subjects reported feeling moderately anxious during the baseline period of both sessions (SUDS = 34 to 46) and very anxious just prior to speaking (SUDS = 71 to 78). Lower ratings were reported following each speech (SUDS = 52 to 67). The mean scores for both groups are summarized in Table 10 while the effect sizes for each comparison are listed in Table 16.

Multivariate analysis of the number and intensity of symptoms endorsed on the Symptom Rating Scale also yielded a

nonsignificant result ($F(2,35) = 0.87$). As with the SUDS ratings, both groups showed pre- to posttreatment reductions in symptom number and intensity. However, trainees did not show consistently greater changes than their untrained peers (Table 11).

Significant between-group differences were evident for three related indices of public speaking self-efficacy. Unlike waitlist subjects, trainees predicted that they would feel less anxious, exercise more control over anxiety, and perform better when faced with a posttreatment speaking opportunity than they had in the pretreatment session. These results are based on a significant 2 (Group) X 3 (Speech) multivariate interaction involving speech-related anxiety, control, and performance predictions ($F(6,33) = 2.00$, $p < .10$) and the simple effects tests that followed. The latter involved between-group comparisons for Speeches 1 to 3. Significant group differences were found only for Speech 3 ($F(3,37) = 5.75$, $p < .01$). Trainees differed from their untreated peers on all three self-efficacy measures. A similar trend was evident for Speech 2 ratings ($F(3,37) = 1.75$). These results are summarized in Table 12.

A behavioral index of speech-related self-efficacy failed to distinguish between treated and untreated individuals. The vast majority of individuals in each group (81% and 76%, respectively) agreed to give a third, ostensibly more difficult talk.

Examination of the Treatment Credibility/Expectancy for Improvement Scale ratings confirmed that trainees found the treatment to be credible. The average rating was 34.9 $\pm$ 7.7 on this 0 (not credible) to 50 (very credible) scale.

Correlations Among Outcome Measures

To assist in the interpretation of treatment outcome findings, correlations between selected outcome measures were computed. These correlations were based on the responses of all subjects combined (N = 42) in Session 1.

The correlations between the two autonomic indices (heart rate, skin conductance level) and five respiratory measures (breathing rate, expiratory time, fractional inspiratory time, abdominal amplitude, amplitude variability) were consistently low across the four recording periods (BL, ANT4, ANT8, SPE). These correlations are presented in Table 17. The largest correlation was r = .29 and involved heart and breathing rate responses at Minute 1 of the speech. However, 19 of the 20 cardiorespiratory correlations were below an absolute magnitude of .20. The largest respiration-skin conductance correlation was low as well (r = .34). Only 6 of the 20 correlations exceeded an absolute magnitude of .20. The data did suggest a trend for autonomic and breathing rate responses to covary as task demands increased (i.e. speech responses were more highly correlated than either anticipation or resting baseline responses).

Similar findings emerged for correlations between the two autonomic measures. The largest correlation across the four recording periods was only $r = -.20$. Likewise, the correlations between self-report measures and heart rate were consistently low, the highest being only .19. Somewhat larger correlations were found between self-report responses and skin conductance level. The largest correlation involving these responses was .38, with 6 of the 7 correlations exceeding an absolute magnitude of .20. A trend was evident for self-report and skin conductance responses to covary with increasing task demands, as was the case for breathing rate and skin conductance level.

Discussion

Two questions were addressed in Study 2. The first was whether phobic individuals who had been taught to breathe more slowly and abdominally in order to control acute anxiety could do so while awaiting and/or actively encountering a highly feared event. The second question was whether such training had a beneficial effect on fear responses in these two conditions.

Breathing Control Accuracy

The results of this study indicated that trainees had learned the prescribed breathing pattern after three weeks of practice. The majority (i.e. 83%) of them met criterion for breathing control accuracy during a cued demonstration period. However, their ability to implement this pattern uncued during periods of increasing anxiety and distraction was not as good as

expected. Technique accuracy rates dropped to between 15% and 20% while trainees prepared for an upcoming impromptu speech. Nevertheless, their breathing patterns during this period more closely approximated the prescribed one than those of untrained individuals. This advantage was lost once trainees began their speeches. One can conclude from these findings that short-term, uncued breathing control is difficult to employ as a coping strategy in fear-provoking situations -- at least in situations where there are many immediate demands on one's attention. The fact that the results of Study 2 replicated those of Study 1 lends support for this conclusion. Such results make it difficult to draw meaningful conclusions about the effectiveness of prolonged exhalations for attenuating anxiety responses. However, given the relatively high rates of technique accuracy during the technique demonstration and baseline periods, breathing control might be a useful coping strategy in situations where individuals do not have to perform some task or where attention distracting events are minimal. One such situation is awaiting or enduring a painful medical procedure, a situation in which passive coping may be the only option available to the patient.

One might argue that positive findings for breathing control effectiveness may have emerged if training had been longer or more comprehensive. However, the three-week program employed in this study is much longer than other training protocols reported in the literature, including the protocol evaluated in Study 1.

Furthermore, in Study 2 the training program included hands-on practice at implementing the technique in situations approximating real-life scenarios. Finally, the level of statistical power to determine if breathing control could be implemented during times of mounting anxiety was high in both Study 1 and Study 2 (.70 to .98, respectively). Taken together, these observations suggest that the question of how well breathing control can be implemented has already been answered about as well as it can be.

From a practical standpoint, additional efforts to enhance breathing control accuracy by increasing the length or comprehensiveness of training would contradict the primary objective of breathing control training, namely, to provide patients with an easy-to-learn, easy-to-employ acute coping strategy. An alternative to increasing the length of training would be to have trainees practice the strategy on their own for a time (e.g. 1-2 months) before retesting them. Presumably, if the technique is perceived as easy and helpful, trainees would continue to practice it. This objective could also be achieved by including the technique as a component of a comprehensive treatment program. However, both options open the door to treatment diffusion effects, poor compliance, and other confounding variables which jeopardize make meaningful interpretation of the data.

The findings of the present study have implications for the interpretation of the results of previous studies. They call into question the common conclusion that controlled breathing is a causal factor in positive treatment outcomes (e.g. Fried et al., 1984; Grossman et al., 1985). It seems unlikely that trainees in these studies were implementing the strategy as well as was thought (but not actually tested). The fact that trainees could reproduce the prescribed rate or depth of breathing while resting quietly is no guarantee that they could reproduce this during acute stressors -- even after extensive practice. Clark and Hirschman (1990) recently reported that trainees quickly revert to their usual breathing patterns without the aid of external pacing cues .

For similar reasons to those outlined above, the results of previous studies by other investigators (Harris et al., 1976; Holmes et al., 1978; McCaul et al., 1979) are likely of limited value. The assumption made in most of these studies was that once trainees had practiced the prescribed pattern for several minutes, they would maintain the pattern on their own during subsequent stressor periods. This did not occur in the present study. If such a carry-over effect could be demonstrated, the chance of it occurring after only a few minutes of training, especially training that focuses one's attention away from kinesthetic cues to visual or auditory pacing signals, seems remote.

Treatment Outcome

With respect to the second question addressed in this study, the results suggest that breathing control training has relatively little impact on how autonomically aroused or subjectively anxious individuals with public speaking phobia become while waiting to give an impromptu speech. However, training does enhance their sense of control or competence in this situation.

The fact that autonomic arousal was largely unaffected by training replicates the findings of many earlier studies (e.g. Clark & Hirschman, 1980; Helbick, 1981; McCaul et al., 1979). This is particularly true for heart rate. Not a single study to date has demonstrated that heart rate can be consistently attenuated with breathing control training. Yet it has been demonstrated that breathing manipulations such as prolonged exhalations and deep inhalations can elicit transient heart rate slowing (e.g. Furedy & Shulhun, 1985; Hurwitz, 1981; Porges, McCabe, & Yongue, 1982; Sroufe, 1971). The gap between these two lines of research is puzzling. Why should breathing control continue to be taught as an arousal reduction technique if it does not achieve this goal? The answer appears to have more to do with the perception of control than with true control.

It is also possible that for a subset of people, meaningful heart rate attenuation or reduction can be achieved with breathing control training. A visual scan of the polygraph

records was consistent with this hypothesis. Thus, with pre-screening, the success rate for breathing control may increase markedly. With the size of the sample in Study 2, it was not feasible to test for subgroups of individuals capable of implementing the breathing strategy under stress.

The finding that skin conductance levels were not significantly attenuated as a result of treatment is consistent with results reported by others (e.g. Cappo & Holmes, 1984; Harris et al., 1976). When faced with threats of electric shock or some other aversive and distracting experience, breathing control trainees in these studies experienced nearly as great an increase in skin conductance as control subjects. When trainees showed lower conductance levels than untrained individuals, this occurred during periods of quiescence.

Before concluding that breathing control has little impact on autonomic arousal, one must keep in mind that only a small proportion of trainees implemented the technique with any degree of accuracy during the stressor periods. The training group might have shown lower levels of autonomic arousal than the waitlist group if more of them had implemented the breathing strategy. However, in situations where technique accuracy rates were high (e.g. the demonstration and baseline periods), the two groups still did not differ significantly. Thus it is unlikely that controlled exhalation and abdominally-predominant inhalations alter autonomic arousal to a significant extent.

The finding that breathing control did not have a significant impact on self-reported anxiety was surprising. It certainly is inconsistent with the results of previous research. What could account for this discrepancy?

One explanation for why trainees in this study did not report significantly reduced anxiety is that they simply were not implementing the breathing strategy when faced with mounting anxiety. In other words, there was no reason to expect treatment to be effective since the technique was not even being implemented. However, the same argument could be made for earlier breathing control studies, including those in which subjective anxiety was reportedly reduced. It is possible that technique implementation was better in this study than in earlier ones, given the length of training, reliance on internal feedback cues, and focus on brief deployment. Thus, poor technique implementation is an unlikely explanation for the unexpectedly low level of self-reported improvement.

A second possible explanation is that the measures used to assess subjective state were either insensitive or unreliable. Post hoc analyses suggested that the SUDS scale was unreliable across assessment sessions ($\underline{r}$s = .12 to .53). However, this measure has been adopted in many previous breathing control studies. The SRS, on the other hand, was found to be a reliable ($\underline{r}$s = .76 to .80) and valid ($\underline{r}$s = .41 to .65 with SUDS ratings)

index of speech-related anxiety. In all likelihood, responses to these two self-report measures were more reliable than any obtained in previous studies. This may reflect the fact that in the present study, steps were taken to reduce response bias (e.g. 'good subject' roleplaying). Thus, measurement error fails to explain the negative findings of this study.

The most plausible explanation for the fact that trainees in Study 2 did not report significantly reduced subjective anxiety, unlike earlier studies, is that Study 2 participants experienced the stressor task as more anxiety-provoking. This is evident when on comparing their autonomic and self-reported anxiety responses with those of Study 1 subjects. From these data, one can see that the subjects in Study 2 experienced intense anxiety in response to the speech tests. Individuals whose fear approaches such levels often require a more comprehensive and individually-tailored treatment program than was offered in the present study in order to achieve clinically significant fear reduction. With no prior experience to guide them, trainees may have found themselves overwhelmed when faced with the task of trying to breathe in a new way while also preparing speech notes. Additional experience at the task may have made it easier, allowing a possible treatment effect to emerge (Ost, 1988). However, to provide trainees with such additional experience would have introduced a treatment confound, namely, the effect of exposure. For some trainees, such practice was not necessary; their posttreatment anxiety ratings were considerably lower than

those reported in the pretreatment session. Thus even though breathing control training produced a weak treatment effect, it was helpful for some people.

The most important finding in this study was that breathing control training is associated with significantly more positive expectations regarding how anxious one would feel when faced with giving another speech, and how well one would actually do at that speech. This effect was strongest after trainees had had an opportunity to try implementing the technique during the posttreatment speech test. That experience, which can be seen as an *in vivo* practice session, solidified improvements already made in self-efficacy beliefs. Such changes in belief may be very important to the overall process of fear reduction. Individuals who believe they can cope adequately in fear-provoking situations are more likely to (a) experience less return of fear (Craske & Rachman, 1987) and (b) put themselves in such situations in the future (Bandura, 1984). In turn, repeated exposure has been shown to be one of the most important elements in fear reduction (Barlow, 1988, 407-409; Butler, 1985; Linden, 1981). What would be interesting to determine is whether success at adopting the prescribed breathing pattern during the posttreatment stressor task is associated with the greatest improvement in self-efficacy predictions with respect to the third speech.

Overall Conclusions

Both Study 1 and Study 2 provided evidence consistent with the commonly-made assumption that controlled, abdominally-predominant breathing can be reproduced in anxiety-provoking situations. However, the accuracy with which this strategy can be implemented by most individuals was below clinically useful levels. This was found to be true for subjects in both Study 1 and Study 2, studies which differed on a variety of important dimensions such as the age and pretreatment anxiety level of subjects, the sensitivity of the treatment outcome measures employed, and characteristics of the treatment itself, such as the length of training, whether the breathing technique was to be implemented continuously or sporadically, and whether implementation was cued or uncued. What this finding suggests is that breathing control implementation in earlier breathing control studies was also inconsistent and/or inaccurate (e.g. Cappo & Holmes, 1984; Clark & Hirschman, 1980; Clark et al., 1985; Grossman et al., 1985; Harris et al., 1976; Holmes et al., 1978; McCaul et al., 1979). Given the brevity of the training procedures employed in these earlier studies, such a conclusion seems all the more likely. Adding further suspicion, breathing implementation accuracy during stressor exposure trials was not monitored or reported by these investigators. Evidence of accurate technique implementation is a must if one is to draw meaningful conclusions about the specific effects of that technique.

The failure of trainees in Studies 1 and 2 to accurately and consistently implement a controlled, abdominally-predominant breathing pattern in the face of mounting anxiety calls into question conclusions arrived at in earlier breathing control studies about the specific effects of breathing techniques. In these earlier studies, it was commonly reported that slower and/or abdominally-predominant breathing is associated with decreased skin conductance response and self-reported anxiety. This was not found to be true in Studies 1 and 2. Given the methodological superiority of Studies 1 and 2 over earlier studies, and given the low level of technique accuracy found for Studies 1 and 2, it seems unlikely that the benefits ascribed to breathing control in these earlier studies were due the breathing control per se. Instead, whatever benefits were reported are better attributed to nonspecific factors such as positive expectations for change, socially desirable responding, and/or chance.

Consistent with the conclusion that whatever effects breathing control has are not mediated by specific physiological changes is the observation in Study 2 that the correlations between autonomic and respiratory responses were invariably low. Thus, if one is looking for an emotion-focused coping strategy to manage acute anxiety, other strategies such as cognitive restructuring should be considered before advocating breathing control.

Nevertheless, breathing control enhances estimates of self-control in situations usually associated with low self-efficacy and high avoidance rates. Given its relative simplicity to teach and its acceptance by most people as a plausible coping strategy, breathing control may serve as a useful adjunct to exposure therapies for various phobias. Whatever its specific application, breathing control may be particularly beneficial in controlling anticipatory anxiety rather than as a means of attenuating acute anxiety associated with the performance of some difficult or threatening task. Where performance demands are high, such as in public speaking, the increase in confidence that trainees might derive from implementing the technique could be offset by increased performance anxiety. Situations for which it may be ideally suited include awaiting stressful dental or medical procedures, and exposure to feared animals, heights, and enclosed spaces.

From a theoretical perspective, the present findings provide further evidence that treatments with a somatic focus, such as slow, abdominally-predominant breathing, have nonspecific rather than specific effects with respect to reducing or attenuating anxiety responses. This is particularly evident from the observation made in both Study 1 and Study 2 that trainees reported improvements in public speaking self-efficacy despite having demonstrated only minor success at implementing the breathing control strategy. The challenge for future research will continue to be the delineation of how cognitive and

situational factors interact with somatically-based treatments in achieving positive treatment outcomes. For instance, to what extent does a positive expectation for change influence the outcome of breathing control training? Also, do individuals who report intense somatic symptoms of anxiety -- including breathing difficulties and other signs of hyperventilation -- respond preferentially to breathing treatments? Answers to these questions will help clarify how breathing control training has its effects and for whom it may be most beneficial. In the final analysis, although considerable research is needed to explore the full potential of breathing control training, breathing control will continue to be taught as long as patients believe in its effectiveness.

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Table 1

Comparison of the Assessment Protocols of Studies 1 and 2

Study 1		Study 2	
Period	Duration (min)	Period	Duration (min)
Orientation/set-up	15	Orientation/set-up	15
Adaptation/baseline	10	Assessment interview	20
Assessment interview	20	Adaptation/baseline	5
Speech anticipation	4	Speech anticipation	8
Speech delivery	4	Speech delivery	4

Table 2

Summary of Individual Treatment Procedure: Study 1

Training Session 1

1. Treatment rationale
2. Demonstration and practice of pursed lips breathing (PLB)
3. Obtain minute-long recording of target breathing pattern.
4. Home exercises prescribed:
   a) attend to breathing patterns during daily activities.
   b) twice daily practice of PLB with "hands-on" feedback.

Training Session 2

1. Review home assignment, including demonstration of PLB.
2. Practice abdominally-predominant breathing while;
   a) sitting quietly.
   b) producing simple vowel sounds.
   c) reading aloud.
3. Home exercises prescribed:
   a) daily practice at PLB to release emotional tension.
   b) practice abdominal breathing while talking and reading aloud
   c) make 2-minute audiotape of speech or recitation. changing posture etc.

Posttreatment Assessment

1. Practice breathing strategies while anticipating and then giving impromptu speech.
2. Post-speech review of impromptu speech video recordings with feedback on areas of strength and evident improvement.
3. Provide Notes on effective speaking and list of additional public speaking resources.

Table 3

Respiratory Responses (Means +/- SD) of Trained and Untrained Subjects in Sessions 1 (PRE) and 2 (POST): Study 1

Group	Session	Period		
		BL	ANT	SPE
		Respiration rate (cpm)		
Treatment	1	16.6 (2.2)	15.9 (2.9)	12.3 (1.6)
	2	16.0 (2.4)	13.1 (2.6)	12.3 (2.8)
Waitlist	1	15.4 (3.7)	17.1 (3.4)	15.1 (2.9)
	2	16.9 (3.2)	16.8 (2.5)	14.6 (3.5)
		Ribcage Amplitude (mV/mm)		
Treatment	1	4.5 (1.0)	5.6 (2.2)	6.8 (2.1)
	2	4.4 (1.4)	5.1 (1.8)	5.7 (2.2)
Waitlist	1	3.8 (1.0)	3.9 (1.0)	5.5 (2.7)
	2	5.2 (1.0)	5.2 (1.1)	6.9 (3.0)
		Abdominal amplitude (mV/mm)		
Treatment	1	9.6 (4.3)	9.7 (5.2)	9.1 (4.9)
	2	11.4 (6.4)	19.9 (9.9)	16.0 (8.6)
Waitlist	1	11.4 (5.5)	10.1 (4.1)	9.6 (4.2)
	2	11.0 (3.4)	12.4 (4.6)	10.9 (4.8)
		Amplitude variability (mV/mm)		
Treatment	1	2.7 (1.8)	3.9 (2.4)	4.7 (2.8)
	2	2.9 (3.0)	6.3 (4.4)	7.4 (4.6)
Waitlist	1	3.4 (2.5)	3.2 (1.2)	4.1 (2.1)
	2	3.5 (3.0)	3.3 (1.7)	4.6 (2.3)

Note: BL = Baseline
ANT = Speech Anticipation, Minutes 0-4
SPE = Speech Delivery, Minute 0-1

Table 4

Cardiovascular Responses (Means +/- SD) of Trained and Untrained Subjects in Sessions 1 (PRE) and 2 (POST): Study 1

Group	Session	Period BL	Period ANT	Period SPE
		Heart rate (bpm)		
Treatment	1	65.8 (10.5)	71.0 (10.1)	75.8 (11.2)
	2	67.9 (9.0)	78.5 (9.5)	83.7 (9.8)
Waitlist	1	71.9 (7.8)	76.8 (11.4)	81.3 (14.7)
	2	74.3 (11.8)	78.4 (12.2)	83.7 (12.5)
		Systolic blood pressure (mmHg)		
Treatment	1	118.9 (7.5)	128.5 (14.1)	136.7 (15.6)
	2	118.5 (6.8)	123.5 (11.1)	142.5 (8.4)
Waitlist	1	118.5 (14.0)	128.3 (13.1)	134.2 (14.2)
	2	114.1 (12.7)	124.0 (9.5)	133.9 (12.0)
		Diastolic blood pressure (mmHg)		
Treatment	1	70.6 (9.2)	80.3 (7.5)	87.4 (8.5)
	2	68.1 (11.1)	77.9 (8.9)	92.7 (9.2)
Waitlist	1	63.6 (4.7)	73.5 (4.9)	80.6 (7.0)
	2	63.4 (10.1)	69.0 (8.0)	78.1 (8.9)

Note: BL = Baseline
ANT = Speech Anticipation, Minutes 0-4
SPE = Speech Delivery, Minutes 0-1

Table 5

Predictions (Means +/- SD) of Speech-related Anxiety, Emotional Control, and Aptitude by Trained and Untrained Subjects: Study 1

		Speech	
Predictions	Group	1	2
Anxiety (0-100)	Treatment	72.6 (11.6)	60.0 (12.8)
	Waitlist	70.0 (12.0)	62.1 (15.4)
Control (0-100)	Treatment	41.8 (13.5)	48.7 (18.7)
	Waitlist	48.1 (11.1)	44.9 (13.4)
Aptitude (0-100)	Treatment	26.8 (18.5)	41.9 (17.2)
	Waitlist	45.4 (16.1)	43.1 (16.2)

Note: High scores on predictions of control and aptitude indicate greater self-efficacy.

Table 6

Pretreatment Characteristics (Means +/- SD) of Treatment and Waitlist Subjects: Study 2

Characteristic	Group	
	Treatment	Waitlist
Gender (male/female)	10 / 8	11 / 10
Age (years)	33.7 (13.5)	36.7 (13.4)
PRCA (15-100)	78.9 (6.6)	81.0 (6.2)
SUDS (0-100)	86.7 (5.1)	87.1 (7.2)
Resting HR (bpm)	76.2 (12.7)	74.8 (11.9)
Resting SBP (mmHg)	129.3 (14.3)	127.6 (12.6)
Resting DBP (mmHg)	79.1 (12.4)	75.9 (8.2)

Note: PRCA = Personal Report of Communication Apprehension
SUDS = Subjective Units of Discomfort Scale

Table 7

Summary of Group Treatment Procedure: Study 2

Training Session 1

1. Treatment rationale
2. Demonstration and practice of pursed lips breathing (PLB) in;
   a) forward-leaning
   b) seated upright postures.
3. Home exercises prescribed:
   a) attend to breathing patterns during daily activities.
   b) twice daily practice of PLB with "hands-on" feedback.

Training Session 2

1. Review home assignment, including demonstration of PLB.
2. Demonstration and practice of abdominal breathing;
   a) pairing exhalation with tension release
   b) while standing up and walking to podium
   c) while reading aloud
   d) while talking.
3. Home exercises prescribed:
   a) daily practice of breathing sequence to release tension.
   b) practice abdominal breathing while reading aloud, changing posture etc.

Training Session 3

1. Review home assignment, including demonstration of breathing while speaking.
2. Demonstration and practice breathing sequence while;
   a) having a conversation
   b) recovering from brief exercise.
3. Home exercises prescribed:
   a) daily practice of breathing sequence to release tension.
   b) practice controlled breathing during/after exercise, conversations, doing paperwork, driving car etc.

Posttreatment Assessment

1. Review home assignment, including demonstration of breathing control pattern.
2. Post-speech review of impromptu speech video recordings with feedback on areas of strength and evident improvement.
3. Review self-report data for treatment-related changes.
4. Provide Notes on effective speaking and list of additional public speaking resources.

Table 8

Percentage of Trained and Untrained Subjects Meeting the Breathing Control Criterion in Each Period of Session 2: Study 2

Period	Group	
	Treatment (N=20) (%)	Waitlist (N=21) (%)
Demonstration	83	5
Baseline	60	5
Anticipation, Min. 0-4	20	5
Anticipation, Min. 5-8	15	0
Speech Delivery	50	52

Note: Criterion = mean exhalation length $\geq$ 3.5 seconds

Table 9

Autonomic and Respiratory Responses (Means +/- SD) of Trained and Untrained Subjects in Sessions 1 (PRE) and 2 (POST): Study 2

Group	Session	Period (Means) BL	ANT4	ANT8	SPE
		Heart rate (bpm)			
Treatment	1	76.2	88.2	93.4	108.4
	2	78.4	88.6	96.1	112.3
Waitlist	1	74.9	84.5	90.7	105.8
	2	75.4	86.0	94.9	104.6
		Skin conductance level (mhos)			
Treatment	1	9.1	11.0	11.5	12.6
	2	8.2	8.5	8.5	8.9
Waitlist	1	6.8	8.9	9.3	10.1
	2	7.4	7.7	7.8	8.5
		Respiration rate (cpm)			
Treatment	1	17.3	16.8	18.6	11.3
	2	11.4	15.3	15.8	9.9
Waitlist	1	18.1	18.8	19.4	12.2
	2	17.5	19.9	20.2	11.2
		Fractional inspiratory time			
Treatment	1	.37	.37	.37	.38
	2	.33	.35	.37	.37
Waitlist	1	.36	.38	.37	.38
	2	.36	.38	.39	.37

Table 9 (cont'd)

Group	Session	Period (Standard Deviations) BL	ANT4	ANT8	SPE
		Heart rate (bpm)			
Treatment	1	12.7	15.3	15.3	20.8
	2	11.9	12.6	15.2	18.4
Waitlist	1	12.2	15.3	19.9	23.1
	2	13.0	21.0	23.7	29.1
		Skin conductance level (mhos)			
Treatment	1	6.1	6.5	6.7	7.7
	2	3.9	3.8	3.9	4.2
Waitlist	1	3.9	4.7	4.9	4.8
	2	4.8	4.4	4.6	4.5
		Respiration rate (cpm)			
Treatment	1	4.5	4.7	4.6	3.7
	2	4.2	4.2	4.4	1.6
Waitlist	1	3.7	3.7	4.0	2.7
	2	3.6	3.4	4.0	2.9
		Fractional inspiratory time			
Treatment	1	.05	.06	.05	.08
	2	.08	.07	.06	.14
Waitlist	1	.05	.05	.05	.09
	2	.05	.04	.04	.10

Note: BL = Baseline
ANT4 = Speech Anticipation, Minutes 0-4
ANT8 = Speech Anticipation, Minutes 5-8
SPE = Speech Delivery, Minutes 0-1

Table 10

SUDS Ratings (Means +/- SD) of Trained and Untrained Subjects in Sessions 1 (PRE) and 2 (POST): Study 2

Group	Session	Period		
		BL	ANT	SPE
Treatment	1	45.0 (22.4)	78.1 (18.3)	67.2 (25.1)
	2	33.6 (15.0)	70.8 (18.7)	52.2 (18.7)
Waitlist	1	45.9 (20.4)	76.4 (13.9)	64.8 (20.2)
	2	41.2 (21.0)	70.5 (17.0)	60.2 (18.9)

Note 1: BL = Baseline
ANT = Speech Anticipation
SPE = Speech Delivery

Note 2: SUDS = 0 (completely calm) to 100 (extremely anxious).

Table 11

Number and Intensity of Anxiety Symptoms (Means +/- SD) Reported by Trained and Untrained Subjects: Study 2

Symptom Rating Scale Statistic	Group	Speech 1	Speech 2
Symptom number[a]	Treatment	10.6 (3.8)	7.9 (2.1)
	Waitlist	12.8 (3.3)	10.6 (3.2)
Symptom intensity[b]	Treatment	1.5 (0.8)	0.8 (0.3)
	Waitlist	1.7 (0.6)	1.4 (0.5)

[a]Symptoms rated as at least 1 (mild) in intensity on a 0-4 scale.

[b]Mean rating across all 16 symptoms of the Symptom Rating Scale.

Table 12

Predictions (Means +/- SD) of Speech-related Anxiety, Emotional Control, and Aptitude by Trained and Untrained Subjects: Study 2

		Speech		
Prediction	Group	1	2	3
Anxiety[1]	Treatment	80.3 (16.6)	68.5 (19.9)	71.0 (17.1)
	Waitlist	81.0 (11.7)	75.5 (12.4)	83.3 (10.3)
Control[2]	Treatment	37.3 (23.6)	53.8 (21.3)	56.5 (20.8)
	Waitlist	37.7 (24.5)	43.0 (21.8)	40.5 (24.5)
Aptitude[2]	Treatment	36.5 (17.6)	48.8 (21.5)	56.0 (16.7)
	Waitlist	33.0 (17.8)	34.5 (18.7)	35.0 (17.6)

[1]High scores (0-100) indicate **low** self-efficacy.

[2]High scores (0-100) indicate **high** self-efficacy.

Table 13

Within- and Between-Group Effect Size Comparisons for the Physiological Responses Observed in each Period of Sessions 1 (PRE) and 2 (POST): Study 1

Analysis	Group	Period BL	ANT	SPE
		Respiration Rate		
Within-group	Trained	.09	.51	.00
	Untrained	-.21	.05	.08
Between-group		.30	.46	-.08
		Heart Rate		
Within-group	Trained	-.11	-.40	-.46
	Untrained	-.10	.04	-.09
Between-group		-.01	-.36	-.37
		Systolic Blood Pressure		
Within-group	Trained	.00	.19	-.10
	Untrained	.15	.18	.10
Between-group		-.15	.01	-.20
		Diastolic Blood Pressure		
Within-group	Trained	.17	.14	-.32
	Untrained	-.05	.31	.22
Between-group		.22	-.17	-.54

Note: BL = Baseline SPE = Speech Delivery
ANT = Speech Anticipation

Table 14

Within- and Between-Group Effect Size Comparisons for Self-report Responses in Sessions 1 (PRE) and 2 (POST): Study 1

Effect Size	Group	Symptom Reporting	
		Number	Intensity
Within-group	Trained	.32	.45
	Untrained	-.04	.00
Between-group		.36	.45

Effect Size	Group	Self-efficacy Predictions		
		Anxiety	Control	Aptitude
Within-group	Trained	.52	.20	.42
	Untrained	.29	-.13	-.07
Between-group		.23	.33	.49

Table 15

Within- and Between-Group Effect Size Comparisons for the Physiological Responses Observed in each Period of Sessions 1 (PRE) and 2 (POST): Study 2

		Period			
Effect Size	Group	BL	ANT4	ANT8	SPE1
		Exhalation Length			
Within-group	Trained	.48	.15	.20	.16
	Untrained	.05	-.09	-.13	.17
Between-group		.43	.24	.33	-.01
		Respiration Rate			
Within-group	Trained	.64	.18	.31	.25
	Untrained	.08	-.14	-.13	.19
Between-group		.56	.32	.44	.06
		Heart Rate			
Within-group	Trained	-.09	-.02	-.09	-.10
	Untrained	-.01	-.04	-.10	.03
Between-group		-.08	.02	.01	-.13
		Skin Conductance Level			
Within-group	Trained	.09	.24	.29	.32
	Untrained	-.07	.13	.16	.18
Between-group		.16	.11	.13	.14

Table 16

Within- and Between-Group Effect Size Comparisons for Self-report Responses in Sessions 1 (PRE) and 2 (POST): Study 2

Effect Size	Group	Dependent Measure		
		Symptom Reporting		
		Number	Intensity	
Within-group	Trained	.47	.62	
	Untrained	.34	.39	
Between-group		.13	.23	
		Self-efficacy Predictions		
		Speech 2 - Speech 1		
		Anxiety	Control	Aptitude
Within-group	Trained	.33	.37	.32
	Untrained	.23	.11	.04
Between-group		.10	.26	.28
		Self-efficacy Predictions		
		Speech 3 - Speech 1		
		Anxiety	Control	Aptitude
Within-group	Trained	.28	.44	.57
	Untrained	-.11	.05	.05
Between-group		.39	.39	.52

Table 16 (cont'd)

Effect Size	Group	Dependent Measure		
		SUDS Ratings		
		Period		
		BL	ANT	SPE
Within-group	Trained	.31	.20	.34
	Untrained	.17	.19	.11
Between-group		.14	.01	.23

Table 17

Selected Correlations from Session 1 of Study 2.

Correlations Between Respiratory Measures Recorded During All Periods of Session 1 (All Subjects Combined)

		Period			
Measure 1	Measure 2	BL	ANT4	ANT8	SPE1
Te	RR	-.84	-.84	-.84	-.40
	FIT	-.61	-.79	-.64	-.36
	AA	.41	.60	.68	.03
	AAV	.31	-.04	.19	-.23
RR	FIT	.47	.62	.46	.16
	AA	-.33	-.49	-.54	-.23
	AAV	-.16	-.11	-.30	.11
FIT	AA	.03	-.31	-.15	-.18
	AAV	.31	.16	-.01	.54
AA	AAV	.38	-.26	.00	-.13

Correlations Between Respiratory and Autonomic Measures Recorded During All Periods of Session 1 (All Subjects Combined)

		Period			
Autonomic Measure	Respiratory Measure	BL	ANT4	ANT8	SPE1
HR	Te	-.03	-.14	-.14	-.14
	RR	.08	.05	.18	.29
	FIT	-.18	.07	.12	.14
	AA	.03	.03	-.03	-.03
	AAV	.01	.14	-.05	-.07
SCL	Te	-.09	-.14	-.19	-.09
	RR	.13	.16	.16	.33
	FIT	.16	.22	.31	-.27
	AA	.34	.09	.07	.19
	AAV	.13	.06	.07	-.34

Table 17 (cont'd)

Correlations Between Heart Rate and Skin Conductance Level During the Four Recording Periods (All Subjects Combined)

		Period			
Measure 1	Measure 2	BL	ANT4	ANT8	SPE1
HR	SCL	-.20	-.16	-.20	-.13

Correlations Between Autonomic and Self-report Measures During the Four Recording Periods (All Subjects Combined)

		Period		
Autonomic Measure	Self-report Measure	BL	ANT	SPE
HR	SUDS	-.04	.19	.08
	Symptom Number		.06	.06
	Symptom Rating		.14	.16
SCL	SUDS	-.02	.20	.34
	Symptom Number		.27	.38
	Symptom Rating		.21	.29

Concurrent Validity of Anxiety Self-report Measures Recorded During Session 1 (All Subjects Combined)

	SUDS		Symptoms	
Measure 1	ANT	SPE	Number	Rating
Predicted SUDS	.39	.32	.31	.33
Symptom Rating	.51	.65	.89	
Symptom Number	.35	.41		

Note: BL = Baseline
ANT4 = Speech Anticipation, Minutes 0-4
ANT4 = Speech Anticipation, Minutes 5-8
SPE = Speech Delivery, Minutes 0-1

Figure 1. Mean respiration rates of trained and untrained subjects at each period of Sessions 1 and 2: Study 1.

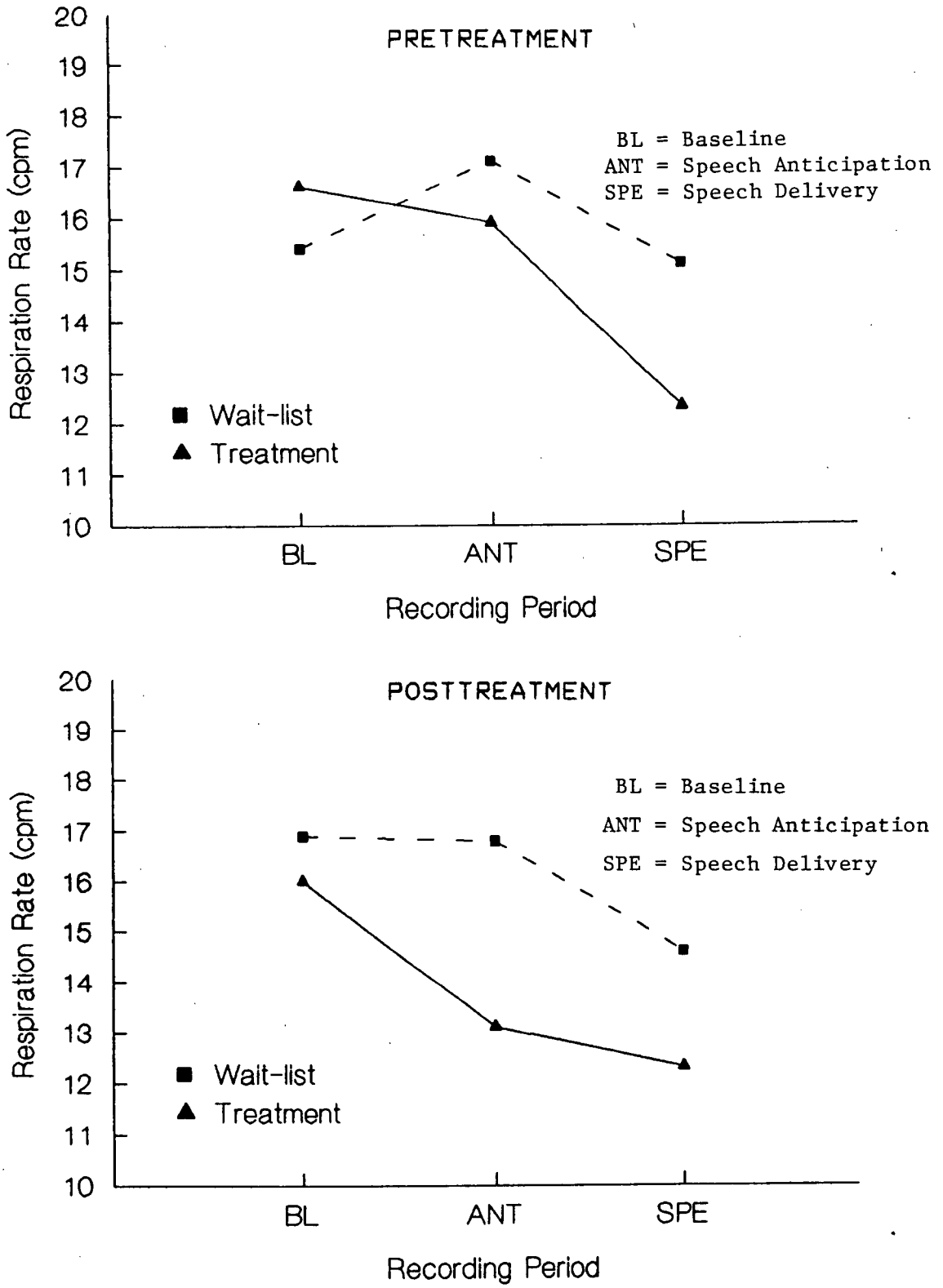


Figure 2. Mean heart rates of trained and untrained subjects at each period of Sessions 1 and 2: Study 1.

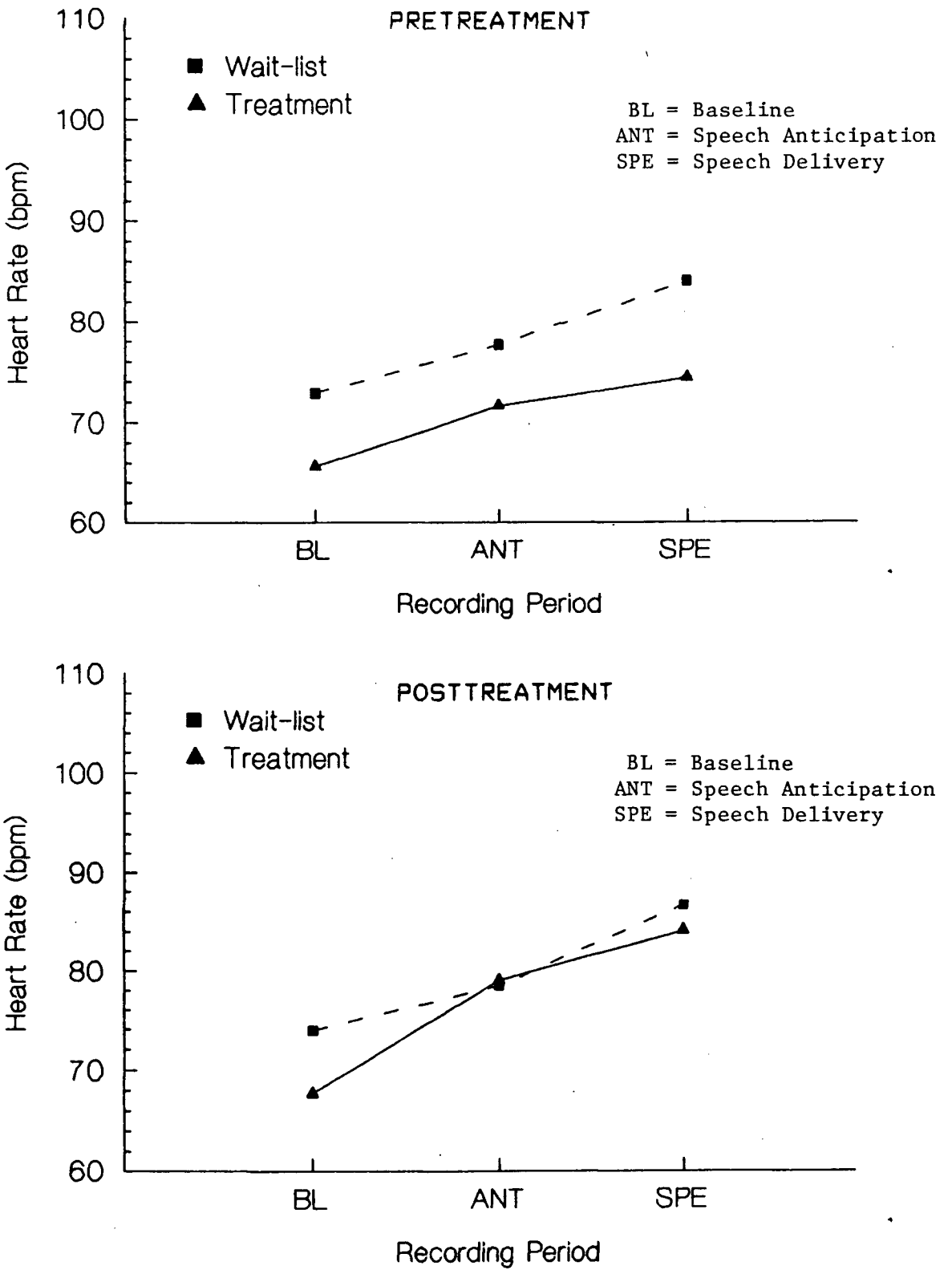


Figure 3. Mean exhalation lengths of trained and untrained subjects at each period of Sessions 1 and 2: Study 2.

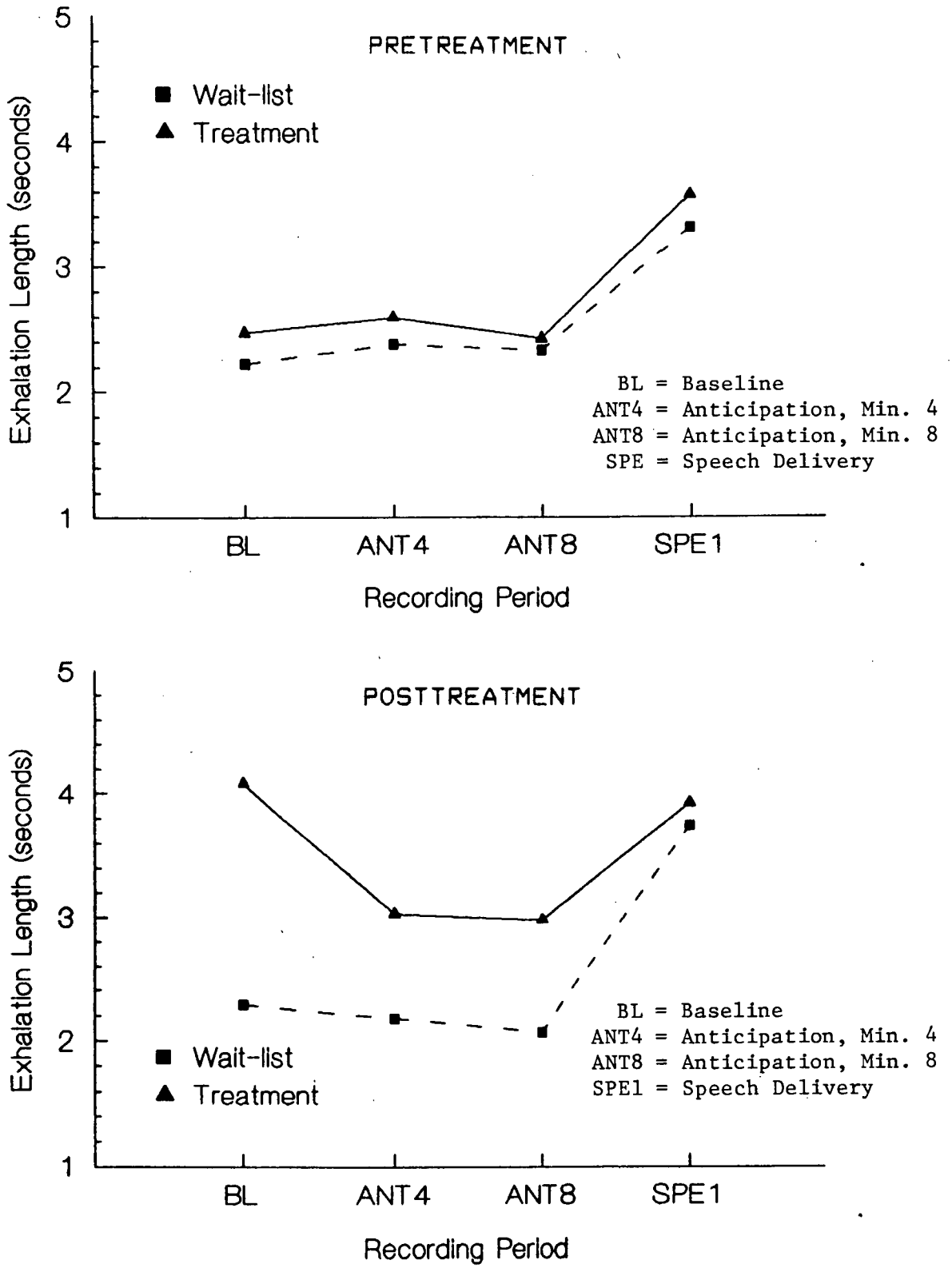
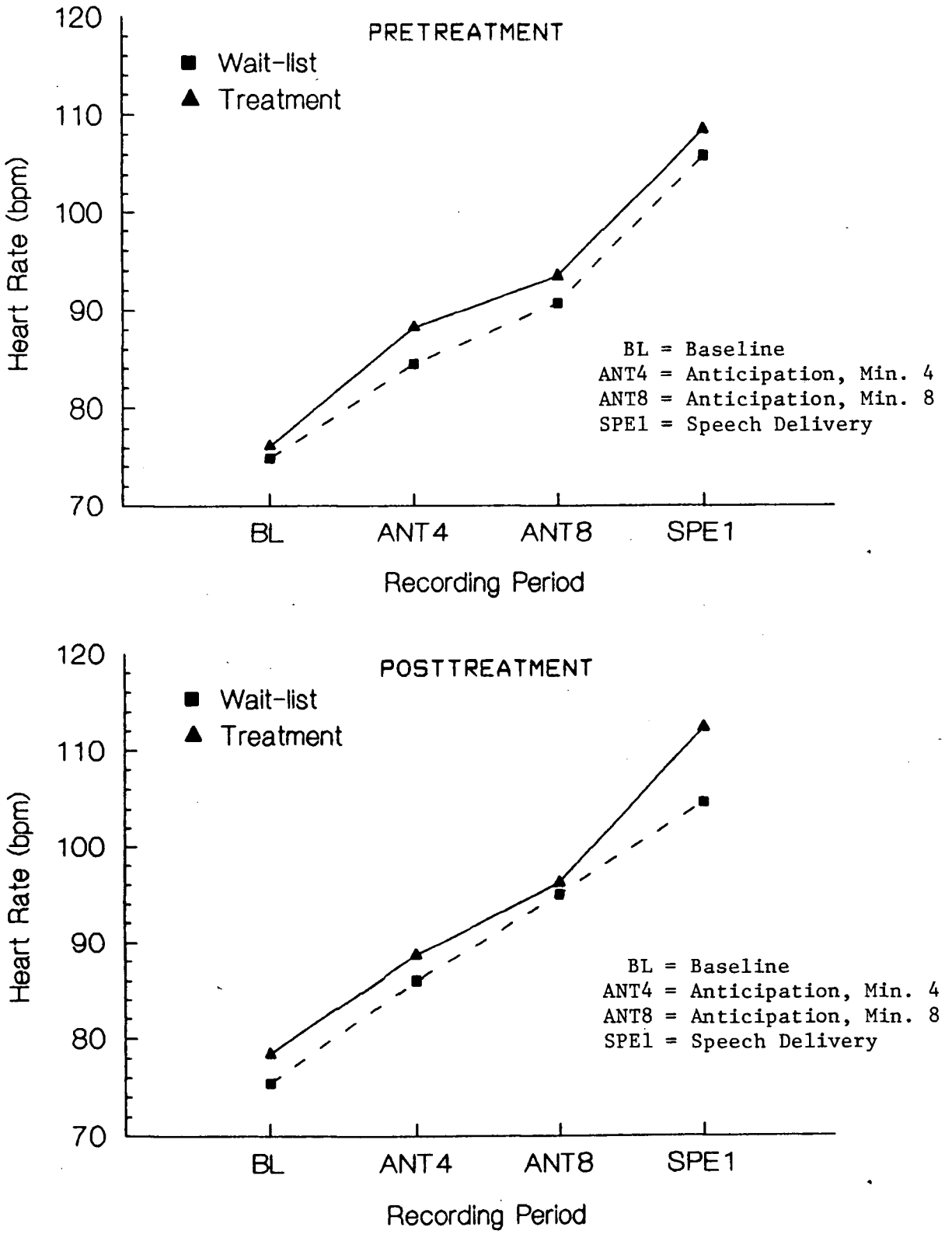


Figure 4. Mean heart rates of trained and untrained subjects at each period of Sessions 1 and 2: Study 2.



Appendix A

Advertisement for Subjects

Anxious about speaking to audiences, giving class presentations, sharing your opinions in groups? Avoiding such opportunities?

If your answer is **'Yes'** to either questions, you have the chance **right now** to enroll in a **free**, **4-week training program** in **anxiety management techniques** being offered through the **Department of Psychology, U.B.C.**

For further information, **contact Aaron Hait, M.A. @**

Appendix A

Public Speaking Anxiety Survey

Many people report feeling quite anxious about speaking in public, whether it be contributing their opinion in a group discussion or delivering an address to a large audience. In the questions below, you will be asked to indicate what your own personal experience of public speaking anxiety is like. Please note that this is a survey, not a test: there is no "best way" to answer these questions.

1. In the past two years, approximately how often have you;
   a) given a formal talk or presentation? _____ times
   b) avoided a public speaking opportunity? _____ times

2. On a scale from 0 to 100, where 0 indicates a feeling of complete calm and 100 represents feelings of panic, how anxious would you say you typically feel in the following situations;

___ waiting those last few minutes before giving your talk:
___ standing up in front of your audience, looking out at them just before you begin to speak:
___ half way through your talk:

3. Listed below are some sensations that are often associated with anxiety. Please indicate which ones you typically experience when your public speaking anxiety is at its peak (as rated above). Do this by marking a slash ("/") on the corresponding 0-4 intensity scale.

	Not even noticeable	Mild	Moderate	Intense	Very Intense
Feeling light-headed/dizzy	0	1	2	3	4
Feeling short of breath	0	1	2	3	4
Racing/pounding heart	0	1	2	3	4
Trembling/unsteady feeling	0	1	2	3	4
Perspiring/sweaty palms	0	1	2	3	4
Nauseous/feeling sick	0	1	2	3	4
Confused/dream-like feeling	0	1	2	3	4
Restless/nervous feeling	0	1	2	3	4
Worrying that you might die	0	1	2	3	4
Fear you might lose control	0	1	2	3	4
Numbness or tingling feeling	0	1	2	3	4
Blushing or feeling chilled	0	1	2	3	4
Chest pain or discomfort	0	1	2	3	4
Choking	0	1	2	3	4
Dry mouth	0	1	2	3	4
Mind goes blank/memory lapse	0	1	2	3	4

Name & phone number (optional)

_____

Appendix A

Instructions: Public Speaking Anxiety Survey

Hi. As Dr. _____ has already mentioned, my name is Aaron Hait and I'm a Ph.D student in Clinical Psychology here at U.B.C. The reason I've come to your class today is to ask you to complete a 1-page survey and a brief questionnaire about your experiences with public speaking anxiety. Your responses to these two self-report forms will help to provide normative data on the extent and severity of public speaking anxiety in the university population, including the type and intensity of symptoms that accompany public speaking anxiety. Of course, you are under no obligation whatsoever to complete these self-report forms: participation is entirely voluntary.

I also want to describe for you a brief anxiety management training program I'm currently offering for people bothered by public speaking anxiety. You may be surprised to learn that at least one out of every five people experiences such intense anxiety about giving talks and presentations, or speaking up in group meetings that their lives are significantly interfered with. Perhaps you've had this experience yourself. In the survey, you'll be asked to rate how anxious public speaking makes you feel, and what some of the sensations are that go along with it.

Once you've completed the survey, if you're interested in participating in **4 free training sessions** in anxiety management offered here on campus then at the very bottom of the questionnaire, **print your name and phone number**. Each session is approximately **30-60 minutes in length** and will involve individual instruction in self-relaxation and coping skills. Some videotape feedback of your public speaking performance and physiological responses will also be included.

If you're not interested in the training program, please fill out the survey anyhow and simply fold it in half without writing down your name. Your survey responses are important for helping us better understand public speaking anxiety.

Okay, just to summarize the procedure, everyone fills out the survey. Then, if you want to participate in the training program or would like more information about it, write down your name, phone number, and contact times at the bottom of the survey, fold it in half, and put it in the manila envelope being passed down your row. If you're not interested in the training program, don't bother putting down your name and number - just fold the survey in half and put it in the envelope. I'll collect these envelopes in 7-minute's time. Any questions. Good. Thanks for your help.

Appendix B

Subjective Units of Discomfort Scale (SUDS): Pre-Speech

Beside each statement, indicate the amount of anxiety you would expect to feel in that particular situation. The scale ranges from 0 to 100. A score of 0 describes the most relaxed and calm state you have ever experienced, while 100 refers to the most anxious or distressing experience you have ever had. Please enter a response for **each** statement.

SUDS

____ 1. One week before you are scheduled to give a speech, you are lying in your bed about to fall asleep.

____ 2. You are reading about speeches alone in your room.

____ 3. One week before your speech, you are discussing it with a friend.

____ 4. One week before giving a speech, you are listening while another person gives a speech.

____ 5. You are working on your speech in the library.

____ 6. You are practicing your speech alone in your room.

____ 7. It is the morning you give a speech and you are getting dressed.

____ 8. You are walking over to the place where you are to give your speech.

____ 9. On the day of your presentation, you are in the room waiting while another speaks.

____ 10. You are walking up to the front of the room to give your speech.

____ 11. You are delivering a speech to a group of your **peers**.

____ 12. You are delivering a speech to a group of **strangers**.

____ 13. You are delivering a speech in a gym to around 1000 students.

____ 14. You are delivering a speech in a hall to around 1000 professionals in your area of work or study.

Appendix B

Speech Expectancy Scale

Please complete each of the questions below by **circling** the number that best describes your **current** expectations.

1. How anxious do you think you will feel just before and/or during your upcoming speech?

Completely calm — Extremely anxious

0---10---20---30---40---50---60---70---80---90---100

2. How much control do you think you will have over your anxiety level before and/or during your speech?

Absolutely no control — Complete control

0---10---20---30---40---50---60---70---80---90---100

3. How well do you think you will do at your speech?

Very poorly — Very well

0---10---20---30---40---50---60---70---80---90---100

Appendix B

Bodily Sensations Checklist I.D.# ____

Listed below are some sensations that are often associated with anxiety. Please indicate which ones you **typically** experience when your public speaking anxiety is at its peak. Do this by marking a slash ("/") on the corresponding 0-100 intensity scale. If a sensation doesn't apply to you, simply circle "0" on the scale.

	Not even noticeable	Very Intense
Feeling faint or dizzy	0----------	----------100
Feeling short of breath	0----------	----------100
Racing/pounding heart	0----------	----------100
Trembling/shakiness	0----------	----------100
Perspiring/sweaty palms	0----------	----------100
Nausea	0----------	----------100
Confused/dream-like feeling	0----------	----------100
Awful, apprehensive feeling	0----------	----------100
Worrying that you might die	0----------	----------100
Mind goes blank/memory lapse	0----------	----------100
Fear you might lose control	0----------	----------100
Numbness or tingling feeling	0----------	----------100
Chest pain or discomfort	0----------	----------100
Choking	0----------	----------100
Dry mouth	0----------	----------100
Blushing or feeling chilled	0----------	----------100

Appendix B

Credibility / Expectancy for Improvement Scale

Please complete the questions below by circling one number for each of the questions.

1. How logical does this type of treatment seem to you?

Not at all logical										Very logical
0	1	2	3	4	5	6	7	8	9	10

2. How confident would you be that this treatment would be successful in significantly reducing your fear of speaking before a group?

Not at all confident										Very confident
0	1	2	3	4	5	6	7	8	9	10

3. How confident would you be in recommending this treatment to a friend who was extremely anxious about making speeches?

Not at all confident										Very confident
0	1	2	3	4	5	6	7	8	9	10

4. If you were extremely anxious in speech situations, would you be willing to undergo such treatment?

Not at all willing										Very willing
0	1	2	3	4	5	6	7	8	9	10

5. How successful do you feel this treatment would be in decreasing a different fear: for example, strong anxiety regarding social situations such as dating, arguments etc.?

Not at all successful										Very successful
0	1	2	3	4	5	6	7	8	9	10

Appendix B

ADIS-R Social Phobia Interview

Establishing the Diagnosis:

1.a. (In social situations where you might be observed or evaluated by others, do you feel fearful/anxious/nervous?) **YES/NO**

b. (Are you overly concerned that you may do and/or say something that might embarrass or humiliate yourself in front of others, or that others may think badly of you?) **YES/NO**

c. (Do you try to avoid these situations?) **YES/NO**

2. (I'm going to describe some situations of this type and ask you how you feel in each situation.)

Find out how much fear, discomfort, and avoidance exists for each situation and rate on the 0-4 scale for fear and avoidance.

0 - - - - - - - 1 - - - - - - - 2 - - - - - - - 3 - - - - - - - 4

No fear/ never avoids	Mild fear/ rarely avoids	Moderate fear/ sometimes avoids	Severe fear/often avoids	Very severe/ always avoids

	Fear	Avoid	Comments
a. Parties	____	____	_____
b. Meetings	____	____	_____
c. Eating in public	____	____	_____
d. Using public restrooms	____	____	_____
e. Talking in front of a group	____	____	_____
f. Writing in public (forms,checks)	____	____	_____
g. Dating situations	____	____	_____
h. Talking to persons in authority	____	____	_____
i. Being assertive e.g.:			
1) Refusing unreasonable requests	____	____	_____
2) Asking others to behave differ.	____	____	_____
j. Initiating a conversation	____	____	_____
k. Maintaining a conversation	____	____	_____

3. (What do you anticipate before going into _____? What do you think will happen before/during?)

_____

4. (Do you experience the fear nearly every time you encounter _____?) **YES/NO**

5. (Does the fear come on as soon as you encounter _____?)
   YES/NO
6. (Have you ever had what you might describe as a **panic attack**? If so, **describe what it was like.**)

   (Look over this list of **symptoms** on this sheet I've just handed you. Rate how intense each sensation typically is using the 0-4 scale provided.)

   0=not present 1=mild 2=moderate 3=intense 4=very intense

   Probe: How can you **predict when** one is about to happen?

   : can't predict (i.e. spontaneous) ___

   : specific situation _____

   : physical sensations _____

   : thoughts _____

   How often have you had this in the **past year**? N = __

   How many have you had in the **past 4 weeks**? N = __

7. (Have you ever experienced a panic attack before or during a speech?)
   YES/NO

   (After one of these attacks, have you been so **afraid of having another one** that you've **avoided** giving talks?)
   YES/NO

   (When is the last time you panicked while awaiting or giving a talk?)

   YEAR _____ MONTH _____

If no evidence is found for fear/avoidance, or if fear/avoidance is clearly related to fear of panic, skip to obsessive-compulsive disorder.

---

8. (In these situations, does it make a difference if the people are:) **Note which is easier;**

Male	___	Female	___	No difference	___
Older	___	Younger	___	No difference	___
Attractive	___	Less attractive	___	No difference	___
Married	___	Unmarried	___	No difference	___
Friends	___	Strangers	___	No difference	___
Large group	___	Small group	___	No difference	___
Informal	___	Formal	___	No difference	___

9. (What public speaking situation **scares you the most?** It doesn't have to be one you've actually been in or even expect to be in soon.

Probe: Number of people present? N = ___

Audience characteristics: M / F
Peers / Authorities
Know well / Strangers

Location _____

Length of talk ___ mins.

Time until talk ___ hrs.

Anxiety cues _____

10a. (When did you first experience this fear?)

Year _____ Month _____

b. (What was the situation?) _____

c. (Has there been a time since then when you were not bothered by these fears?)
YES/NO
If **YES**, When? **From** _____ **to** _____

d. (When did you last give a talk or speech to an audience?)

Year _____ Month _____

11. (Has the fear interfered with your life, work, social activities, family etc.? Has your current job/educational attainment been influenced by the fears?)
YES/NO
If **YES**, How? _____

Rate level of impairment on 0-4 scale. ____

Etiology:

1. (**Why** do you think you have **this problem** in the first place? How do you explain it? **What caused it**?)

Options:
a) Observing or imagining someone else experience fear or trauma while public speaking?
YES/NO

b) Being warned or told unpleasant things about public speaking?
YES/NO

c) Being frightened by something in the situation or being embarrassed or humiliated in this situation?
YES/NO

d) Suddenly experiencing a rush of intense fear, anxiety, and/or a feeling of impending doom for no apparent reason in this situation?
YES/NO

(Were you able to enter this situation, without fear, before this particular experience?)
YES/NO

2. (What distresses you most about this phobia?) Check one:

__ The sensation of fear
__ Aspects of the object or situation

Treatment:

1. (What sort of help have you sought for this particular problem?)

Probe: Toastmasters? __
Debating club? __
Dale Carnegie? __
Assertiveness training group? __
Night school? __
Self-help books (e.g. Burns) _____
Psychologist? __
Psychiatrist? __
Medications? _____
Relaxation training? _____
Hypnosis? __

2. (What do you **expect treatment to do** for you?)

Probe: What kind of treatment would help you most?

Other problems:

1. (Many people have **other difficulties** that they wish they could have help with? Are there some other concerns that you have at this time?)

Probe: Depressed? _____
Fears / Worries? _____
Obsessions / Compulsions? _____
Marital/family problems? _____
Drug/alcohol abuse? _____

Appendix B

Personal Report of Communication Apprehension

This questionnaire includes 20 statements concerning feelings about communicating with other people. Indicate the degree to which the statements apply to you by marking whether you;

1	2	3	4	5
strongly agree	agree	undecided	disagree	strongly disagree

___ 1. While participating in a conversation with a new acquaintance I feel very nervous.

___ 2. I have no fear of facing an audience.

___ 3. I look forward to an opportunity to speak in public.

___ 4. I look forward to expressing my opinion at meetings.

___ 5. I find the prospect of speaking mildly pleasant.

___ 6. When speaking, my posture feels strained and unnatural.

___ 7. I am tense and nervous while participating in group discussions.

___ 8. Although I talk fluently with friends, I am at a loss for words on the platform.

___ 9. My hands tremble when I handle objects on the platform.

___ 10. I have always avoided speaking in public if possible.

___ 11. I feel that I am more fluent when talking to people than most others are.

___ 12. I am fearful and tense all the while I am speaking before a group.

___ 13. My thoughts become confused and jumbled when I speak before an audience.

___ 14. Although I am nervous just before getting up, I soon forget my fears and enjoy the experience.

___ 15. Conversing with people who hold positions of authority causes me to be fearful and tense.

___ 16. I dislike to use my body and voice expressively.

___ 17. I feel relaxed and comfortable while speaking.

___ 18. I feel self-conscious when I am called upon to answer a question or give an opinion in class or group.

___ 19. I face the prospect of making a speech with complete confidence.

___ 20. I would enjoy presenting a speech on a local TV show.

Appendix B

SUDS

Please rate how anxious or tense you've been feeling over the past 3-4 minutes, including your present feeling. Put a slash ("/") through the number that best represents that feeling. A quick response is likely to be the most accurate.

Completely calm — Extremely anxious

0---10---20---30---40---50---60---70---80---90---100

Appendix B

Symptom Rating Scale

Listed below are some sensations that are often associated with anxiety. Please indicate which ones you experienced while awaiting and/or delivering your speech. Do this by marking a slash ("/") on the corresponding 0-4 intensity scale. If a sensation doesn't apply to you, simply circle "0" on the scale.

	Not even noticeable	Mild	Moderate	Intense	Very Intense
Feeling light-headed/dizzy	0	1	2	3	4
Feeling short of breath	0	1	2	3	4
Racing/pounding heart	0	1	2	3	4
Trembling/unsteady feeling	0	1	2	3	4
Perspiring/sweaty palms	0	1	2	3	4
Nauseous/feeling sick	0	1	2	3	4
Confused/dream-like feeling	0	1	2	3	4
Restless/nervous feeling	0	1	2	3	4
Worrying that you might die	0	1	2	3	4
Fear you might lose control	0	1	2	3	4
Numbness or tingling feeling	0	1	2	3	4
Blushing or feeling chilled	0	1	2	3	4
Chest pain or discomfort	0	1	2	3	4
Choking	0	1	2	3	4
Dry mouth	0	1	2	3	4
Mind goes blank/memory lapse	0	1	2	3	4

Appendix C

Script 1: Initial Phone Conversation with Subjects

Hi. This is Aaron Hait from the Department of Psychology at U.B.C. I'm calling because you indicated an interest in the anxiety management project I'm conducting with speech anxious individuals. Would you like to know more about the program?

Okay, as I mentioned in class, this is a 4-week long training program being held on campus in the Psychology Department. You would be seen individually once a week by myself and an assistant. We'd start by conducting a brief initial assessment of your public speaking difficulties. After that, I would describe the coping technique to you and have you practice a series of simple exercises designed to help you learn to relax yourself in stressful situations. You would then be asked to practice some of these exercises at home on a daily basis. On some occasions, recordings will be made of your body's activity levels to help you understand the role that physiological arousal plays in your subjective experience of anxiety.

In case you were wondering, the training program does not involve the use of any medications or drugs, nor would you be hypnotized. Instead, you would be taught a method for exercising physical control over public speaking anxiety. At the moment, I can't tell you more about the method than that except for the fact that it is being evaluated experimentally. As a result, your responses would be recorded periodically for scientific study. Of course, your privacy and confidentiality would be strictly guarded, and you would retain the right to drop out of the program at any time you wish.

Any questions? Good! I have three questions for you. First of all, tell me, how severe do you estimate your public speaking anxiety to be. I'm going to give you a scale you can use to rate its severity or intensity. On this scale, a "0" indicates being totally relaxed while a rating of "100" indicates anxiety that is so intense you're in a state of panic. What would you rate your typical level of anxiety to be in public speaking situations? SUDS = ____. Okay, thanks.

Secondly, are you currently bothered by some type of respiratory disorder, such as emphysema, hay fever, or cold? How about cardiovascular disease? Any history of high blood pressure or coronary heart disease?

And finally, are you currently receiving any form of treatment for public speaking anxiety or some other anxiety problem?

Thank you for answering these questions.

Having heard a little about the training program, would you be willing to participate in it? Great! Why don't we schedule your

first appointment? Could you be available for a 1-hour session at _____ AM/PM this _____ (date). Okay. Come to the Psychology Clinic waiting area on the first floor of the Kenny Building on West Mall - the one with the Totem Pole out front. I'll meet you in the waiting area at ___ o'clock. Look for the Public Speaking Anxiety signs to help guide you to the waiting room. If for some reason you can't make that appointment, please leave a message for me at least 24 hours in advance at the following number: Got that?

Any questions for me or concerns you'd like to discuss with me now? No, then I guess I'll see you on _____ (date) at ____ (time) _____ (subject's name).

Appendix D

Participant Consent Form

I, _____, agree to participate as a volunteer in the research project entitled "A pilot study of the effects of breathing control training" conducted in the Cardiovascular Psychophysiology Lab, U.B.C. under the direction of Dr. W. Linden. The procedures of this 45 to 60-minute long study have been adequately explained to me. As I understand it, my levels of skin conductance, heart rate, peripheral blood flow, and respiratory activity will be monitored noninvasively while I; (1) rest quietly for 10-minutes; (2) answer questions about my difficulties with public speaking anxiety; (3) learn and practice a breathing control technique; and (4) respond to a 5-minute challenge task, the details of which will be explained to me following the training period.

I understand that I have the right to withhold my participation in any or all parts of the experimental procedure at any time I wish. I also realize that the data obtained from my participation in this study are strictly confidential. Although this data may be used in future research, there will be no identification of me personally on any permanent records.

Furthermore, I have been given the opportunity to ask questions pertaining to the procedures of this study and my rights as a participant, and I am satisfied with the answers received.

_____ _____ _____.

Witness Research Participant Date

Appendix D

Participant Consent Form

I, _____, agree to participate as a volunteer in the research project entitled "The effectiveness of breathing control training in the management of public speaking anxiety" conducted in the Cardiovascular Psychophysiology Lab and Psychology Clinic, U.B.C. under the direction of Dr. W. Linden. The procedures of this 4-week long study have been adequately explained to me. As I understand it, I will first be interviewed and asked to complete several questionnaires regarding my experience of public speaking anxiety. Next, my heart rate, respiratory and electrodermal activity will be monitored noninvasively while I; (1) rest quietly for 10-minutes; (2) learn and practice an anxiety management technique; and (3) attempt to implement the technique in response to a challenge task, the details of which will be explained to me following the training period. Subsequent sessions (30-60 minutes/week) will involve additional therapist-guided hands-on practice of the anxiety management technique. Some public speaking will be required on occasion.

I understand that I have the right to withhold my participation in any or all parts of the study at any time I wish. I also realize that the data obtained from my participation in this study are strictly confidential. Although this data may be used in future research, there will be no identification of me personally on any permanent records. Furthermore, I have been given the opportunity to ask questions pertaining to the procedures of this study and my rights as a participant, and I am satisfied with the answers received. Finally, I have read and understood the content of this form, and have received a copy of it.

_____ _____ _____.

Witness Research Participant Date

Contact numbers: Aaron Hait
Dr. W. Linden

Appendix D

Consent to Videotaping

I, _____, agree to the videotape recording of myself delivering a speech on the condition that the videotape recording:

1) is an important component of treatment;
2) will be available to me to review at the end of the study;
3) will not be shown to anyone without my written consent;
4) will not be copied or transcribed without my written consent;
5) will be erased within one month of treatment termination.

_____	_____	_____.
Witness	Research Participant	Date

Contact numbers: Aaron Hait
Dr. W. Linden

Appendix E

Home Practice Handout: Week 1

The technique you are to practice this week is called pursed lips breathing. Pursed lips breathing (PLB) involves having your lips in a whistling position as you breathe out. You breathe in through your nose, allowing your abdomen to extend outwards in the process. Your chest and shoulders, on the other hand, should move relatively little.

There are several reasons for practicing this breathing technique. First, it encourages greater use of your diaphragm, the primary and most efficient muscle of respiration. With practice, you will find that diaphragmatic breathing is easier and more relaxing than ribcage-predominant breathing. Secondly, it prevents you from breathing too rapidly and irregularly, something most people are prone to do when anxious or stressed. As mentioned in Session 1, such a breathing pattern can result in too much CO^2 being exhaled which, in turn, can trigger many of the unpleasant sensations that accompany public speaking anxiety. It can also contribute to poor voice quality when talking - a further source of anxiety for people who find public speaking difficult. Finally, pursed lips breathing can become a powerful cue for both your mind and your body to relax. It engenders the slow, deep, rhythmic breathing pattern people experience when they are most relaxed. In essence, PLB can counteract the effects of anxiety.

However, to get the greatest benefit from this technique, you need to practice it regularly. Listed below are suggestions for the daily practice of pursed lips breathing.

TIME:
- practice twice daily, each session being 7-10 minutes long.
- decide on these practice times in advance and record these times on your Daily Diary once you've completed a session.

LOCATION:
- practice someplace quiet where you won't be interrupted (e.g. your bedroom).
- sit in a supportive, straight-backed chair

CLOTHING:
- loosen all constricting clothing (e.g. belts, pants/skirt buttons, ties)
- remove heavy jewelry / empty your pockets
- if self-conscious about letting your abdomen protrude outwards, wear a comfortable sweater

BODY:
- avoid practicing when hungry or after a big meal
- sit upright, with your lower back against the back of your chair and your feet flat on the floor. Don't slouch!

PROCEDURE:

1. Start by paying attention to how you are breathing at this moment without placing your hands on your ribcage and abdomen. Notice (a) the feeling of tension and stretch in your ribcage and abdomen as you breathe in; (b) the feeling of warmth and relaxation as you breathe out; (c) whether your chest and shoulders move up and down as you breathe in and out; and (4) how far your abdomen extends outwards as you breathe in. Do this for about 1 minute.

2. Now check how accurate your initial assessment was. Do this by placing your hands on your ribcage and abdomen while you continue to monitor your breathing for the next 4-6 breaths.

3. Begin breathing in through your nose and out through pursed lips at about the same depth as is normal for you. Focus on keeping your upper hand from moving - just your lower hand should move.

4. Gradually increase the depth of each breath until your breathing is slower but still comfortable (i.e. you don't feel the need to sigh or yawn). The best way to do this is to concentrate on exhaling a bit more fully. Avoid trying to breathe in too deeply. This only encourages greater ribcage activity.

5. If you feel like yawning or taking an occasional deep breath, do so. However, rather than exhaling right away try holding that breath for 1-2 seconds before slowly exhaling it through pursed lips. This will reduce the risk of breathing out too much CO^2.

6. Continue the pursed lips breathing pattern for at least 5 minutes. You may want to close your eyes as you practice.

7. REPEAT STEPS 1-6 AT LEAST 2 TIMES/DAY.

Comments:

a) it is quite common to experience disturbing or unwanted thoughts/images/feelings while practicing PLB. Don't try to resist them. Instead, simply turn your attention back to the sensations of breathing in and out. If the problem persists, try silently counting out the length of each inspiration and exhalation (e.g. IN - 2 - 3 - OUT - 2 - 3 - 4 - IN ...).

b) as you get better at PLB, try imagining that with each breath out, you're exhaling stress and tension.

c) be sure to record when you began each practice session, its length and any comments about it on your Daily Diary form.

Appendix E

Home Practice Handout: Week 2

This week, you are once again to practice pursed lips breathing but this time without using your hands to provide feedback regarding ribcage and abdominal movement. Instead, focus on the sensation of warmth in your chest and relaxation in your lower abdomen as you breathe in. As you breathe out, imagine that you are breathing out tension and stress. Also, try to breathe out for a longer period of time, with an increasingly longer pause between each exhalation and inhalation. At first you may feel starved for air, but with practice letting your abdomen extend outwards to draw air into your lungs this pattern should become easier. REPEAT THIS PATTERN FOR 5 MINUTES ONCE DAILY. Continue this pattern for another 5 minutes, this time breathing in and out through your nose only (i.e. omit the pursed lips exhalation).

During your second daily practice session, practice breathing in deeply yet gently using your abdomen while either talking, listening to someone else talk, or working on some kind of problem. Concentrate on maintaining a rhythmic breathing pattern, exhaling fully before taking another breath. Watch that your chest and shoulders don't rise when you breathe in (watching yourself in a mirror is very helpful in this regard). If you notice your abdomen tightening up, squeeze it in a little more on your next exhalation, hold it tight for 1-2 seconds, and then let it rebound outwards to initiate your next inhalation. This should release some of the tension.

Finally, tape record at least one 2-minute speech: either read something aloud or make up a speech of your own. Bring it with you to Session 3, along with your completed Daily Diary.

Appendix E

Home Practice Handout: Week 3

Now that you've developed some proficiency at pursed lips breathing, it's time to practice using it to control your physical and emotional responses to stress. This can be done in a variety of situations; for instance, after climbing a set of stairs, or while driving your car, watching a suspenseful movie, talking with a stranger, working at your desk/computer, or waiting for a performance review (e.g. getting an exam back). Use your imagination in deciding when to use the technique! Whenever you implement it, remember to begin with a slow, deep breath to stretch your chest and abdominal muscles, and then release that breath slowly and evenly, ending with a slight pause. Your next breath should be somewhat smaller, easier, and more abdominal in origin, with a slightly longer pause at the end. Continue for another 3-4 breaths or however many you think you need to do to release tension and become more relaxed. Try extending the length of the pause between subsequent breaths, but don't strain, otherwise you'll be gasping for air. In total, each breathing sequence should include 4-5 breaths. Remember to take a break between sequences. Also, remember to record on your Daily Record form when and where you practiced the technique, and what the outcome was.

WAIT UNTIL AFTER THE FINAL SESSION BEFORE ATTEMPTING ANY PUBLIC SPEAKING. The best way to ensure success with the breathing control strategy is to practice it in mildly to moderately stressful situations first. That is the purpose of this week's exercise. Once competence is assured, you can go on to effectively using the technique in public speaking situations.

As with any skill, practicing the basics is important to success. Therefore, it is a good idea to practice abdominally-predominant breathing a few minutes each day, focusing on the feelings that accompany prolonged exhalations and pauses. Remember to loosen your pants or skirt to allow greater abdominal movement. And don't forget to sit/stand upright with your hands and arms settled comfortably on your lap or by your sides (if standing). If you find your mind wandering to distracting or disturbing thoughts, write those thoughts down on paper. We can discuss them next session if you like. Begin a new sequence of breathing, focusing your attention on any feelings of calm and relaxation that start to develop.

Appendix E

Week #___ **I.D.# ____**

Home Practice Diary

For each day of the week, starting tomorrow, please record whether or not you practiced the breathing assignment, when you practiced it, for how long, and any comments you might have about it (e.g. how easy it was; questions about the procedure etc...).

Date	Practice started at	Length of practice	Comments
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			

Appendix E

Notes on Effective Speaking

Words and preparation aside, speaking in public very often requires learning to live with fear. For many of us, bodily clues to our anxiety (e.g. perspiration, rapid heart rate etc...) will always remain a part of public presentations. This is not to say, however, that the audience has to be made aware of our fear. The presence of good delivery techniques creates an audience impression of poise and confidence which is regarded as incompatible with fear. In other words, if we must live with fear, we need not share it with our audience. The delivery techniques outlined below (adopted form Fawcett, 1974; Cribbes, 1978) are designed to promote public speaking without fear and trembling. These techniques will be considered under four main headings: public speaking behaviors, odds and ends, answering questions, and specific speaking activities.

Public Speaking Behaviors

Experimental evidence has suggested the importance of several categories of public-speaking behavior (Fawcett & Miller, 1975). These categories were selected for training based upon a search of the literature (Cooper, 1978; Ott, 1970; Stedman, 1971). In the following section, several categories of speaking behaviors will be examined: appearance, personal preparation, eye contract, posture, gestures, use of props, voice (volume, pitch, rate, pauses), initial speaking behaviors, and closing speaking behaviors.

Appearance.

A speaker should dress so as not to offend the audience. The appropriate style of dress varies, of course, with the particular type of audience. It is recommended that your appearance be well within the limits of what your audience is accustomed to seeing in speakers. It is important that your appearance does not detract form your message.

Of course, your dress should suit the occasion. There is a story of a world-renowned speaker invited to speak to the International Association of Sunbathers. Upon arrival, the speaker was met at the front gate by a nude couple who took him to his room. There the dilemma began. Should he dress as he felt he should - dinner jacket and rather formally - or should he dress as was expected of him (that is, should he not dress)? Much went through his mind and finally he showered, dried thoroughly, combed his hair, marched out of his room and down the stairs, to be greeted by a room full of nudists, formally dressed in his honor.

Personal Preparation.

Make certain that all last minute things are done before you appear before your audience. For example, button your jacket, tuck in your shirt tail, straighten your tie, clear your throat -- do whatever you feel you must do -- before you come to your audience.

Eye Contact.

One of the most important aspects of public speaking style involves making "contact" with the audience. The employment of eye contact (i.e. looking at people) is probably the best technique for letting the audience know that you realize they are there and for convincing members of the audience of the sincerity of your message.

Eye contact consists of directing your head and face toward the audience. Some say pick a spot above the heads of the audience at the back of the room and talk to that. Never! Think a moment. What would your reaction be to an individual who would not look at you when he or she talked to you?

Whether you are speaking to one person, 10 people, or more than 100 people, look them in the eye. Establish eye contact with every single person, if time allows. Do not act like your head is on a swivel though, waving back and forth panning the audience. Rather, establish eye contact in a random manner, but do contact every person.

A note on memorization versus reading: for most formal speaking engagements, extensive reading practice (not memorization) is recommended. You may wish to utilize brief notes in outline form (the briefer, the better) and rehearse until the main ideas of your presentation (if not the precise lines) can be emitted in the presence of these brief notes. For special speaking occasions (e.g. job interview colloquia), memorization of the presentation script is recommended. For example, memorization might involve practicing looking at a slide and reading the script lines until the slide alone serves to cue the words of the sentence cluster.

Posture.

Posture -- how you stand -- is important. Good posture makes for a posed and pleasant appearance. The exact body position to be assumed, ranging from military attention to a more casual stance, depends upon the speaking occasion. However, the following general rules hold true for most occasions:

1. Always stand when speaking in public. This position makes it easier for the audience to see you.
2. Do not lean on the speaker's podium or any nearby table or other object. Rest the weight of your body evenly on both feet.
3. Do not cross your legs. Stand with your feet squarely on the floor and with your weight evenly distributed on the

balls of both feet. Assume this position by keeping your legs straight, knees relaxed, and shoulders straight. Not crossing your legs helps prevent slouching and encourages an upright and pleasant appearance.

4. Assume a comfortable position with your hands. If there is a speaker's podium, you may rest your hands lightly (do not lean) on the top or sides of the podium. You must never, of course, restrain your hands (e.g. put them in your pockets); they are needed for gesturing.
5. Do not fold your arms across your chest, This tends to set you apart from the audience. The goal is to look warm and friendly, not cold and threatening.

Use of Props.

Props can enhance your presentation by increasing its clarity and holding the attention of the audience. At the same time, props often make the speaker feel more comfortable and at ease.

Effective use of a prop demands adherence to the following rules:

1. Do not pick up your prop until you are ready to use it. If you wave it around, it distracts your audience and defeats the purpose of the prop.
2. Hold your prop so all can see it.
3. Do not hide behind your prop. The audience wants to see you.
4. Speak to your audience, not your prop.
5. When you are through with the prop, get rid of it. If you hang on to it, you may be tempted to fidget, and fidgeting distracts your audience.

Voice.

(a) Loudness

Talk loudly enough so that you may be heard in the farthest parts of the room. If possible, station a friend or colleague in a distant part of the room or setting where your formal speech is to take place. Ask this individual to indicate to you by a hand signal whether you need to speak up. Make sure you can see his signal from the speaking platform.

If you must strain you voice to be heard, request a microphone. The neck harness type, once attached, requires the least amount of further consideration. Regardless of the type employed, be certain that the microphone is close enough to your mouth (usually about four inches) to allow your voice to be heard.

(b) Stress, pitch, rate and pauses

Carnegie (1956) describes four important features of a good delivery: stress, pitch, rate and pausing.

Stress the most important words in a paragraph and subordinate the least important ones. For example, in the following paragraph, the underlined words might well be stressed:

> The first experiment addressed the question: was the take-home manual effective in teaching specified program behaviors to individual participants?

Vary the pitch of your voice from high to low and low to high. A monotonous or flat tone has an artificial, non-conversational quality.

Vary the rate of speaking, taking more time in sections meriting emphasis and less time in sections which are of lesser importance. The employment of variations in speaking rate will help maintain the attention of the audience.

Pause before and after important points. Pauses may be used either to call attention to a point about to be made or to give the audience a moment to savor a critical piece of information.

Symbols for the above-noted features (stress, pitch, rate and pausing) may be incorporated in the presentation script to cue the presenter to employ each of these techniques. The orchestration of the presentation script for these features may prompt appropriate delivery techniques in even the most panic-stricken speakers (Fawcett, 1974).

Gestures.

Gestures -- movement of your hands -- can have an important influence on the audience. A sufficient number make for a dynamic and enthusiastic presentation. The exact type and number of gestures recommended varies with the particular speaking occasion.

Gestures, whether used to demonstrate an activity (e.g. to show the individual components of a golf swing -- the grip, foot stance, head, arms, shoulders etc...) or to emphasize a point, should be definite and even exaggerated movements, leaving no doubt as to what is intended. Certainly, for a gesture to be visible to the audience, it must be a fairly gross movement of one or both hands (probably for a distance of at least three inches). Examples of gestures include pointing toward a slide on the screen, or any sweeping, chopping, raising, lowering, or extending of the hand. For added emphasis, you may time the gesture to occur at the same time you pronounce an important word with added stress.

To illustrate the effectiveness of gestures, listen to yourself say with feeling, "No, no, no!". Now try the same words, but this time hit your left palm with your right fist. Your should hear a difference; specifically, more emphasis in the latter. Try saying, "smooth"; then say the same word while

moving your right hand from left to right, as if you were running it over a very smooth surface.

Gestures have the advantage of, through action and movement, letting the audience see what you are saying, while encouraging you to adjust your voice to fit the thought. Moreover, an audience may well judge the enthusiasm of a speaker by the number and quality of gestures he or she employs. It is not excessive to program gestures to occur every ten seconds (i.e. nearly every sentence cluster). The frequency of gestures may not be critical. The objective is to demonstrate enthusiasm through animation.

Initial Speaking Behaviors.

Initial speaking behaviors are important in establishing the initial impression you wish to convey to the audience (i.e. one of self-confidence and friendliness).

The first step is to take your position on stage. Walk slowly up to the speaker's position. Approach it with confidence -- as if you belong. You do. A speaker who timidly approaches is so judged and so treated. You are the expert. These people are here to listen to you. Do not destroy their confidence by appearing timid.

If there is a speaker's stand, table or microphone then take your place behind it so that you are facing the largest part of the audience. If there is no specified speaker position (e.g. stand, table or microphone) then you should stand within ten feet of the first row of chairs so that you are facing the largest part of the audience.

After you have taken your position on the speaking platform, and before you say anything, make an initial eye sweep while smiling at the audience for a few seconds.

At this point you have said nothing, and yet there are many who have already formed opinions about you. With very little effort, you have maximized the probability that these images are positive ones.

If you were introduced as speaker, the next step is to acknowledge the introduction. This involves directing a statement of appreciation to the host person, using his/her title and last name. For example, "Thank you, Dr. Lawson"; or "I appreciate your kind introduction, Dr. Wenger". This is a courtesy to the host.

The fourth step is to make a greeting statement to the audience. This involves facing them, smiling and making a greeting statement to show your friendliness. For example, you could say "Good morning".

The last step is to introduce your topic.

Closing Speaking Behaviors.

Final remarks offer the speaker an opportunity to leave the audience with a favorable impression.

When you have finished the text of the presentation, make a final eye sweep. Then make a statement of appreciation to the audience. Simply face the audience, smile and say "Thank you" or a similar statement which will end your talk on a friendly note.

If time remains, you should request questions from the audience. Move out from behind the platform to be more informal for the question period. Examples of how to request questions include: "Do you have any questions?"; "I would be happy to answer any questions that you have"; or "Any questions?". Specific considerations regarding how to handle audience questions will be described in a later section.

Odds and Ends

Several types of speaking activities, though important, do not easily fall into neat categories. Three such activities (i.e. handling presentation errors; directing the viewer to visual aids; and smiling) will be described in the sections that follow.

Handling Presentation Errors.

Mistakes will be made when delivering even the best prepared presentation. For example, you might forget a script line, lose your place and repeat some information delivered earlier, or say something that is incorrect. We have all seen speakers recognize a mistake and then say something like, "Oh, I'm sorry.". Apologies, however, draw undue attention to mistakes. When you recognize that a mistake has occurred, simply correct the error and move along. For example, if when talking about the mean number of behaviors for a particular measure you give an incorrect figure, you might say, "The mean number of behaviors is actually ...". Or humor can be utilized in correcting an error. For the above example, you might say "It appears that I misled you. The mean number of behaviors is in fact ...". In short, do not apologize for mistakes made during a speech.

Direct the Viewer to Slides/Overheads.

For particularly complex slides or overhead transparencies, it is important to direct the viewer to the critical portion(s) of the image. For instance, when presenting graphs or tables, always identify what the axes or rows and columns represent -- including the units of measurement the data are expressed in (e.g. smiles per minute). It helps to point to the sections of the image to which you are referring. The employment of phrases such as "You will notice..." while gesturing to the

slide/overhead will keep the audience with you and interested in your talk.

Smiling.

Smile at the audience. Let them know that you are a warm, friendly person. A chuckle at one of your humorous slides or a laugh at a clever audience question provides evidence of your humanity.

Answering Questions

A question-and-answer period offers the speaker an opportunity to make personal contact with the audience, clarify parts of the presentation, provide supplementary information, and otherwise delineate the nuances of his/her topic. Several question-answering considerations will be discussed under the following headings: assuming an appropriate question-answering position, repeating audience questions, displaying listening skills, providing direct answers, and handling critical questions.

Assume an Appropriate Question-Answering Position.

If you wish to create an air of informality during this period, move out form behind the speaker's podium. In smaller settings in which your voice can be heard without the microphone (or the microphone can be carried with you), you may wish to walk along the front of the stage in the direction of the person providing the question. By shortening the distance and removing the barriers (e.g. the speaker's podium) between you and your audience, you increase personal contact.

Repeat Audience Questions.

In large speaking settings in which acoustics are poor, it is often difficult for the audience to hear questions. Repeat audience member questions (e.g. "The question is: ...") prior to beginning your response. This increases the probability that your answer will be comprehensible to the audience.

Display Listening Skills.

Listening involves reducing the noise in your system so that you can attend to and understand the question being asked of you. Internal noise often takes the form of self-questioning, such as "Is this questioner hostile towards me?" or "Will I be able to answer this question?". Before accepting a question, take one or two slow, abdominal breaths to let out any tension you might be feeling.

Provide Direct Answers.

The most effective answer is a direct one. Provide a direct answer before supplying supplementary information. For example, assume that the following question asked: "What do you see as the key components of a program for managing public speaking anxiety?". An appropriate response would begin with a direct answer to the question, such as "I believe that repeated practice

at public speaking, coupled with training in anxiety reduction techniques, is critical". You could then go on to describe why you think this is so. The employment of direct answers demonstrates your skills as a clear-thinking speaker.

Handling Critical Questions with Respect.

A sarcastic comment in response to an "offensive" question is likely to make your audience feel embarrassed and uncomfortable. Do not argue with a questioner. Instead, where possible, agree with the importance of the issue being raised. If you can't think of a good answer to someone's question, admit this and offer to look into the matter for them if they wish. The objective is to show respect for both the question and the questioner, while at the same time preserving your own self-respect.

Specific Speaking Activities

This section will offer guidance in five areas of public speaking: introduction of a speaker, impromptu speaking, speaking to get action, talking to inform, and proposing toasts.

Introduction of a Speaker.

The sequence to follow in introducing a speaker is: (1) Topic; (2) Importance; and (3) Speaker. Never depart from this order.

Very few people deserve more than 60 seconds worth of introduction, so limit yourself to answering the following questions:

(1) Why this topic?
(2) Why this topic for this audience?
(3) Why this topic for this audience at this time?
(4) Why this speaker?
(5) Who this speaker is?

An example follows: (1) The Wilson budget, as presented this fall, has wide-ranging ramifications for all Canadians. (2) As Income Tax accountants we, perhaps more than others, must become fully aware of all the new legislation in detail. (3) Since it is now December, we have only one month left to get with it before the tax returns start hitting our desks. (4) Few men have the experience with the changes that our speaker has. As a top level civil servant, he was one of the chief architects of the budget. (5) Prior to joining the finance department, our speaker led a varied life. During his college days, he paid his way by playing piano in a bar and organ at church. He served as a fighter pilot in World War II and opened his own accounting firm after being discharged. Eighteen years, one wife and three children later he left his very successful business to work as the Assistant to the Deputy Minister. You are aware of his rise

to his present position. Ladies and gentlemen, our guest speaker this evening ...

Remember, you are not the speaker. You are the introducer.

Impromptu Speaking.

Make an opening statement that will make people want to hear what you have to say. Relate your opinions to the audience. Involve them. You could, for example, make a statement that is opposite the accepted norm. Or you could start with a humorous observation about something you and the audience have in common -- maybe something that happened on the way to or during the meeting. After relating the details of your story, conclude with an appropriate moral or statement.

Speaking to Get Action.

Whether you want people to vote for you, buy your product, give to your charity or whatever, use the following formula: (1) Example; (2) Point; and (3) Reason.

Whether or not your talk is successful will depend upon how well you deliver it and whether you pick the right example. The example should be a personal experience if possible. If not, be certain that the tale you tell is one with which you are very familiar. It could be a fairy tale you made up specifically for the occasion.

The point will the answer the question "What do you want your audience to do?".

The reason will answer the question "Why should your audience do it?".

If you want examples of the above formula, listen to or watch commercials for charitable organizations.

Talking to Inform.

(1) Use simple language. If you must use technical terms, define and explain them. Repetition will be needed in complex areas, but rephrase rather than directly repeat your definitions.

(2) Organize material carefully. Start at the beginning and proceed logically through to the end. Avoid jumping forward and backward. It confuses.

(3) Use examples and illustrations.

(4) Narrow your subject down to include only what is most important.

(5) Summarize.

Proposing a Toast.

(1) During your opening, make reference to the reason for the gathering (e.g. a wedding).

(2) Refer to the noteworthy achievements of the subject(s) of the toast.

(3) Express, on behalf of the entire assembly, good wishes toward the subject(s) of the toast.

How to Prepare a Talk

The first task in preparing a talk is to determine what you wish to say. For example, are you for or against a certain proposition or practice? Or what would you like your audience to know or to do that they don't presently know or do? Point yourself in a direction. Then spend a few days or weeks gathering quotes, anecdotes, facts, references and ideas. Keep notes, preferably in point form on 3" X 5" cards.

When you have sufficient material, decide how you wish to present it (i.e. in what order). In most cases, your talk should start with an introduction to the thesis or main point of your talk. Next, indicate what your main supporting subpoints are and the order in which you will be discussing them. Finally, list the supporting details for each main subpoint. You now have the structure and materials for the main paragraphs of your talk. Keep in mind that sentences develop paragraphs and paragraphs develop a thesis statement.

To help you stay on track right from the very start, write out a summary of the main ideas you want to leave with your audience. This will form your concluding paragraph.

Once you have listed the paragraph main points and the supporting subpoints, expand these subpoints into sentences and phrases. Then try reading your written talk to yourself out loud. Many phrases "sound" fine when read silently, but stilted and unappealing when read aloud.

By this time you should know your talk. Take each paragraph or idea grouping and select one word which will trigger the whole thought for you. In a way, these key words are like tree branches, supporting a cluster of ideas or phrases like leaves. Practice recalling the network of branches that emanate from the starting point of your speech (i.e. the tree trunk). You should be able to trace your way through the main branches of your talk several times without error. Highlight these key words in your speech notes or write them out on a small note card.