THE EFFECT OF PACED DIAPHRAGMATIC BREATHING ON ANXIETY REDUCTION IN A SOCIALLY PHOBIC POPULATION

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BY

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ABSTRACT

The present research was suggested by evidence in the literature relating the presence of anxiety to rapid, shallow respiration. A five session behavioural therapy program which included respiration therapy (experimental group) was compared to a similar therapy program which did not include respiration therapy (control group), on a number of self-report, behavioural, and physiological variables. The research design was a pretest-posttest control group design with a one month follow-up. Subjects consisted of 18 self-referred, socially phobic adults, randomly assigned to one of the two conditions. Subjects met individually with the therapist for five one-hour sessions. The experimental program involved teaching of deep diaphragmatic breathing at a target rate of six cycles per minute as a relaxation technique and as a coping device for entering socially anxious situations. In addition, imaginal exposure, role play, and homework assignments of in-vivo exposure were practiced. The control program involved unstructured self-relaxation in combination with imaginal exposure, role play, and homework assignments of in-vivo exposure. All subjects participated in the Social Interaction Test (Marzillier, Lambert, & [illegible]et, 1976) which involved discussion with a stranger, before and after therapy, wherein behavioural and physiological activity was assessed. The experimental condition successfully reduced the experimental subject's respiration rate within treatment sessions. Main effects were found for both treatment groups on all self-report and behavioural measures, and for several of the physiological variables. Multivariate repeated measure analyses of variance revealed the experimental program to be significantly more effective than the control program in decreasing one self-report measure of anxiety. It was concluded that respiration therapy did not provide additive effects in anxiety reduction when combined with imaginal exposure, role play, and homework assignments of in-vivo exposure. Limitations, implications, and contributions of this study are discussed.

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Many studies have shown that in both clinical and normal populations, a rapid, shallow, thoracic, irregular respiratory pattern often accompanies various indicators of anxiety. These indicators include self-report measures of anxiety, behavioral measures and physiological measures such as increased heart rate, lower galvanic skin resistance, higher blood pressure, and increased pulse rate. There have been many claims made asserting that training "correct" breathing behaviours may bring about reductions in various anxiety systems. Many anxiety reduction techniques including Progressive Muscle Relaxation, Yoga, Meditation, and Stress Inoculation utilize breath control as a relaxing response. Results from experimental research in this area attempting to support these claims and procedures however have been equivocal and need to be examined more rigorously.

Respiration and Anxiety

Breathing Patterns. The concordance of tension and anxiety with high respiration rate and irregular respiratory patterns has clearly been established by many researchers (Ax, 1953; Christie, 1935; Dalessio, 1978; Finesinger, 1943, 1944; Goldstein, 1964; Grinker, 1966; Martin, 1961; Reich, 1942; Stevenson & Ripley, 1952; Suess, Alexander, Smith, Sweeney, & Marion, 1980). In addition it has been established that those who have been diagnosed as psychoneurotic or psychotic display a higher respiration rate and greater respiration irregularity in comparison with normals.

Ax (1953) assessed the respiration rate of subjects who were not clinically anxious but who were placed in a fear arousal condition. Subjects were fitted with various pieces of equipment designed to assess physiological arousal. Without warning the subject then received a shock. When the shock was reported, the experimenter checked the equipment, produced some sparks, and claimed in dismay that there was a dangerous short circuit. It was found that this "fear inducing" condition led to a significantly higher respiration rate, compared to baseline and an anger arousing situation.

Cattell (1972) reviewed the studies which have attempted to define the components of the anxiety construct. Those studies which utilized what Cattell refers to as the P technique (wherein one or more persons is compared on one or more variables over a series of occasions) revealed factor loadings for breathing rate on the state anxiety factor which ranged from .21 to .45. Increased respiration rate was concomitant with elevated anxiety.

In a study which compared a clinical population with a normal population, Sutherland et al. (1938) compared the respiratory patterns of subjects diagnosed as neurotic and psychotic with a normal control population. It was found that the neurotic's and psychotic's abdominal records revealed various respiratory abnormalities, periodic gasps, and sighs. When the same subjects were compared a month later, it was found that most subjects displayed a remarkably similar pattern to that which was found in the first session. In addition, as the neurotic and psychotic group's clinical status improved, their respiratory patterns tended to resemble those in the normal groups.

Finesinger (1943) compared the respiratory patterns of psychoneurotics, schizophrenics, and a normal control population utilizing a recording spirometer. It was found that the anxiety neurotics and those deemed hysterical displayed significantly greater irregularity in respiration rate and rhythm and sighed more often, in comparison with the remaining groups. The schizophrenic group evidenced a prolonged forced expiration period indicative of a primarily thoracic type of breathing.

In a study by Clausen (1951), pneumographic records revealed that neurotics and psychotics had a higher respiration rate, and upon analysis of abdominal movement, a smaller abdominal amplitude in comparison with normals. Small abdominal amplitude scores were reported to be indicative of tense abdominal musculature and a chronically restricted or inhibited movement of the diaphragm.

These studies illustrate the relationship between somatic arousal and anxiety as

reflected by a heightened respiration rate and greater respiration irregularities. To more fully understand the relationship between respiration and anxiety, it is necessary to examine the mechanics of breathing, and the physiological changes which accompany alterations in respiratory patterns.

The Mechanics of Breathing. The main function of the human cardiorespiratory system is to "supply oxygen to the metabolizing tissues of the body and remove excess carbon dioxide from them, maintaining optimal pressure of these two respiratory gases in the cells". (Slonim & Hamilton, 1987, p. 2)

In a healthy human, air is drawn into the lungs principally through the action of the diaphragm, a large muscle which separates the thoracic cavity from the abdominal cavity. The diaphragm surounds and is attached to the lower thoracic cage, and when moved downward enlarges the thoracic cavity, leading to inspiration, and deep abdominal respiration. Respiration is also possible through the use of thoracic musculature (Comroe, 1974). Thoracic breathing is much more shallow, however, and more effort is required to supply the body with sufficient oxygen, possibly leading to feelings of fatigue and breathlessness (Keinath-Cooze, 1986). As mentioned previously, thoracic breathing patterns have been associated with those who have been diagnosed as anxiety neurotics or psychotics.

Air is brought down the trachea, via the nostrils and the mouth to alveolar sacs within the lung. Venous blood is pumped to the alveolar region of the lung by the right ventricle of the heart, through numerous capillaries. In the alveolar region gas exchange occurs. Through complex non-passive mechanisms, CO2 is transported out of the blood into the alveolar sacs of the lung. Through exhalation, CO2 is transported out of the lungs. The oxygen composition of venous blood is relatively low in comparison with the air which is brought to the lungs. Again, through complex non-passive mechanisms, oxygen is transported into the venous blood. This new composition of blood is then transported through the left ventricle to the rest of the body tissues.

Body tissues engaged in metabolism, consume oxygen from the blood and form carbon dioxide, adding the carbon dioxide to the blood. This blood is then sent to the right ventricle and the process repeats itself. With an increase in metabolism there is a concomitant decrease of oxygen concentration in the blood (PaO2) and an elevated concentration of carbon dioxide (PaCO2). In preparation for increases of metabolism (i.e., for exercise), hyperpnea occurs (increased breathing rate and/or tidal volume), maintaining a steady paCO2 throughout increased metabolism. It is possible that respiration rate and/or tidal volume may increase without a concomitant change in body metabolism. This phenomenon is known as hyperventilation. (The previous account of the mechanics of respiration was distilled from Comroe, 1974; Gurtner, 1980; Hlastala & Robertson, 1980; and Slonim & Hamilton, 1987).

Hyperventilation Syndrome. It is believed that there is a respiratory adjustment made by humans in response to stressful stimuli, anticipating physical needs necessary for an impending 'fight or flight' reaction (Hibbert, 1984; Magarian, 1982). When the physical response of 'fight or flight' is not made however the respiratory change is not in proportion with the metabolic demands of the body and hyperventilation may occur. Symptoms of the hyperventilation syndrome (HVS) are very similar to those of the panic attack which has led to examination of the role hyperventilation plays in panic attacks and anxiety in general. Studies have shown that a good proportion of those who suffer from panic attacks are also chronic hyperventilators (Franklin, 1985; Garssen, v. Veenendaal, & Bloemink, 1983).

HVS occurs when a person overbreathes unnecessarily (i.e., there is an increase in respiration while there is no increase of metabolic activity and therefore no increase of CO2 production in the arterial blood). This unnecessary overbreathing causes the paCO2 to decrease which in turn causes respiratory alkalosis and a rise in pH of the blood and cerebrospinal fluid. A decrease in paCO2 decreases the availability of calcium, leading to enhanced nerve

excitability manifested in muscle tremors and spasms. A rise in the pH level leads to changes in arterial blood pressure, cardiac output and debilitation of neuromuscular activity. The symptoms of HVS include lightheadedness, nausea, dizziness, feelings of unreality, tremors and shaking, choking, chest pains, palpitations, breathlessness, tingling in arms and legs, drowsiness, anxiety, hot and cold flushes in extremities, weakness, and heavy perspiration. These symptoms may provoke fear causing increased hyperventilation. In turn this may increase symptomatology creating further fear and so on with a vicious cycle ensuing (Garssen et al., 1983; Gorman, Askanazi, Liebowitz, Fyer, Stein, Kinney & Klein, 1984; Hibbert, 1984; Ley, 1982).

The breathing pattern of hyperventilators is often characterized by rapid shallow breaths, marked irregularity of depth and rate of breathing, deep sighing respirations, and a tendency towards thoracic breathing. While irregular breathing may lead to hyperventilation it is not necessary to maintain low levels of paCO2. Magarian (1982) found that chronic hyperventilators may maintain low levels of paCO2 in arterial blood while respirating at a regular rate. An occasional sigh may be all that is required to maintain the low CO2 levels in chronic hyperventilators. It is suggested that with those who are chronically hypocapnic (low levels of arterial paCO2) symptoms may be present much of the time or be triggered by minimal reductions in their already lowered paCO2.

Ley (1985) lists several stimuli which might elicit HVS symptoms including being startled, frustration, anger, aggression or threats thereof, tension of competition, gambling, fear, and yelling. Garssen (1980) cites research which indicates that hyperventilation attacks are often caused by sexual problems, marital conflicts, occupational difficulties or anxiety reactions to situations such as crowds, going out alone, being in small closed spaces, and so forth. With the first hyperventilation attack there was often found a precipitating occurrence of a serious life event such as the loss of a significant other, surgery, or pregnancy. This has led to the belief that anxiety, tension, and worry are important factors in

the development of HVS. From this Garssen (1980) suggests two possible explanations for the occurrence of HVS. The first explanation is in keeping with Selye's (1956) general stress concept in that the hyperventilation is considered to be a part of a general stress response pattern with other parts of the physiological system responding in extremes to the accompanying decrease in paCO2. The second possibility is in keeping with Engle's (1972) concept of 'individual response specificity'. Patients with HVS may have a specific overresponsivity to stress by their respiratory system (i.e., hyperventilatory breathing). Other parts of the physiological system would only respond normally to the decrease in CO2 which accompanies the hyperventilatory respiration. Whereas some people may react to stress by smoking or eating, HVS patients react by specifically hyperventilating. Taking into account either explanation, stress and anxiety appear to be the major precipitants of hyperventilation.

From DSM III the panic disorder is defined as attacks that are manifested by a sudden onset of intense apprehension, fear or terror often associated with feelings of impending doom. The most common symptoms experienced during an attack are dyspnoea, palpitations, chest pain or discomfort, choking or smothering sensations, dizziness, vertigo or unsteady feelings, feelings of unreality, parathesias, hot and cold flushes, sweating, faintness, trembling or shaking, and fear of dying, going crazy or doing something uncontrolled. From this it can be seen that the symptoms of HVS closely parallel those of the panic attack. Studies have indicated that upwards of 60% of those who suffer from panic disorder also suffer from HVS (Garssen et al., 1983; Lum, 1976). There are also studies which indicate voluntary hyperventilation produces symptoms of a panic attack in those who suffer from the panic disorder (Rapee, 1986; Franklin, 1985; Garssen et al., 1983).

Recent studies have questioned the role hyperventilation plays in panic attacks, as it has been shown that increasing the inhalation of CO2 also induces panic attacks (Gorman, Fyer, Goetz, Askanazi, Liebowitz, Fyer, Kinney, & Klein, 1988;

Van den Hout, Griez, Van der Molern, & Lousberg, 1987; Van den Hout, Van der Molern, Griez, Lousberg, & Nansen, 1987). Gorman et al. suggest that there may be sensitive medullary respiratory chemoreceptors in those who suffer from CO_2 induced panic. When these receptors are triggered, minute ventilation is increased (hyperventilatory breathing) in order to maintain normal partial pressures of CO_2. This breathing response may lead to a subjective sense of asphyxiation and panic may ensue. In addition, this ventilatory response induces hypocapnia and alkalosis, which produce the sensation of lightheadedness, and dizziness, common symptoms of panic attack. These findings suggest lowering the partial pressure of CO_2 is not necessary to induce a panic attack, but that some other features of the hyperventilatory response (rapid breathing) might be accounting for panic attacks.

While it is known that abnormal breathing and anxiety are intimately related, the directionality of the relationship has not been conclusively shown. An examination of studies which have attempted to alter breathing patterns in normal and clinically anxious populations is required in order to better understand the nature of this relationship.

Respiratory Control Studies in an Analogue Population

Foss (1975) compared three groups; breathing treatment with homework, breathing treatment without homework, and a no treatment control group on two dependent measures; Spielberger et al.'s (1970) State Trait Anxiety Inventory (STAI) and Wolpe and Lang's (1964) Fear Survey Schedule (FSS). The breathing treatment consisted of having subjects breathe deeply and slowly, but at no particular rate. Results showed that both treatment groups significantly decreased on state and trait anxiety in comparison with the control group, and that there were no significant differences between the two treatments. There were no significant differences in the FSS. No physiological investigations were made in this study.

Scopp (1975) compared four groups; progressive muscle relaxation, breathing

treatment (focusing on slow breathing while increasing depth), combination of both muscle relaxation and breathing, and an attention control on a variety of cognitive and affective measures including Spielberger et al.'s (1970) State-Trait Anxiety Inventory. Results indicated that breathing treatment and progressive muscle relaxation were equally effective in significantly reducing state and trait anxiety in comparison with the attention control. The full treatment's (combination) effect in reducing state and trait anxiety was approximately equal to the effects of both the breathing treatment and the progressive muscle relaxation treatment added together. While physiological measures (heart rate, respiration rate, and skin conductance) were monitored for six members of the full treatment and control groups, and changes were found in the expected direction, no statistical analyses were completed. No specific respiration rate was targeted in the breathing therapy.

Harris, Katkin, Lick and Habberfield (1976) investigated the effects that paced respiration (8 cycles per minute) might have in modifying autonomic responses to induced stress in subjects. Comparing the paced respiration with an attention control group and a baseline control group it was found that those in the paced respiration group evidenced higher skin resistance scores (lower arousal) in response to a threat of electrical shock. Data for heart rate, however, showed no significant differences.

Holmes, McCaul, and Solomon (1978) investigated what effect having subjects replicate their normal breathing patterns (obtained during an earlier baseline rest period) might have in modifying autonomic responses to induced stress. When comparing this "treatment" group with an attention control and a baseline control it was found that the baseline control group had significantly lower heart rate measures and reported significantly less anxiety on the affect adjective checklist (Zuckerman, 1960) when threatened with electric shock in comparison with the other two groups. As skin resistance did not reflect a threat manipulation this measure revealed no significant results. It should be pointed

out, however, that the rate of breathing in this study was not manipulated below a baseline level, which may be crucial in anxiety reduction.

In order to examine the effects of directly manipulating respiration rate (i.e., reducing the respiration rate) McCaul, Solomon, and Holmes (1979) investigated the efficacy of three conditions; (a) breathing regulated at one-half normal rate, (b) breathing regulated at the normal rate, and (c) breathing unregulated, in modifying autonomic responses and self-reported anxiety in response to the threat of electrical shock. To examine a possible expectancy effect, half of the subjects in each group were given explicit expectations, by being told that what they were doing in accordance with the instructions would reduce anxious arousal. The slowed respiration group evidenced significantly higher skin resistance scores (lower arousal), lower finger pulse volume (lower arousal), and reported less anxiety on the affect adjective checklist in comparison to the other two groups. There were no significant findings for the heart rate data. It was also found that expectations did not significantly influence the actual effectiveness of the treatment. An additional finding was that with a lowering of respiration rate there was an increase of respiration depth. As respiration depth was not manipulated, however, its direct effect could not be evaluated.

In order to examine the relative importance of respiratory patterning within biofeedback, Holmes, Solomon, and Buchsbaum (1979) investigated the effect of respiration rate on modifying heart rate. Biofeedback has proven effective in altering heart rate (Gatchel & Proctor, 1976). Eight treatment conditions were created. Half of the subjects were asked to try to increase their heart rate, while the other half were asked to decrease their heart rate. From both of these conditions, half of the subjects were given biofeedback in regard to their heart rate while the other half were not. From each of these conditions half of the subjects were given respiratory instructions (i.e., increase rate and depth of respiration to increase heart rate or decrease rate and depth of respiration to decrease heart rate) while the other half were told to breathe at their normal rate.

It was found that controlling respiration was significantly effective in increasing heart rate but was ineffective in decreasing it. As well biofeedback proved ineffective in modifying heart rate, either independently or in conjunction with controlled respiration.

Holmes, Solomon, Frost, and Morrow (1980) claimed that the Holmes et al. (1979) study clearly indicated that severe changes in respiration rate could produce changes in heart rate. These severe changes in respiration rate would not likely occur in normal biofeedback, wherein changes in heart rate had been obtained, as noted in previous research. Holmes et al. (1980) therefore examined the role respiration has in heart rate modification within a normal biofeedback procedure. In phase one, the subjects were asked to either increase or decrease their heart rate with the aid of biofeedback (reporting their heart rate only), and to try to maintain their regular breathing pattern (the subject's breathing rate was monitored unbeknownst to the subject). In phase two, the breathing pattern that had been used by the subject in phase one while modifying the heart rate, was presented on a monitor and the subject was told to duplicate this pattern without making any attempt to alter heart rate. It was found that in phase one, subjects who were asked to increase their heart rates showed significantly higher heart rates than those who had been asked to decrease their heart rates. In phase two it was found that those who traced the breathing pattern associated with the instructions to increase heart rate evidenced a significantly higher heart rate than those who traced respiratory patterns associated with instructions to lower heart rate. When comparing the efficacy of the two methods, there were no significant differences between the phases in heart rate control. It was concluded that a large portion of the change in heart rate associated with biofeedback is due to changes in respiratory patterning. Unfortunately this study did not include the data indicating what respiratory patterns were associated with an increase or a decrease in heart rate. As well data were not presented in regard to the degree to which heart rate could be decreased or increased above baseline measures for the subjects (i.e., could heart rate only be manipulated to increase significantly above

baseline, but not to significantly decrease below baseline as illustrated in the previous study; Holmes et al., 1979).

Cappo & Holmes (1984) investigated a claim of yogi masters (Brena, 1971; Hirai, 1975; Rama, 1976) that slow respiration in combination with prolonged exhalation is more effective in reducing arousal. Cappo & Holmes investigated the efficacy of five conditions; (a) paced breathing (6 cycles per minute) with fast inhalation (2 seconds) and slow exhalation (8 seconds), (b) paced breathing (6 cycles per minute) with equal periods of inhalation and exhalation (5 seconds), (c) paced breathing (6 cycles per minute) with a slow inhalation (8 seconds) and a fast exhalation (2 seconds), (d) an attention control group, and (e) a no treatment control, in modifying autonomic responses and self-reported anxiety in response to the threat of electric shock. As well, a no treatment/no threat control group was included. During the anticipation period (just before shock was to be delivered), the "equal" and "fast/slow" condition evidenced significantly higher skin resistance scores (lower arousal) in comparison with the control groups. During the confrontation period (time where the shock was actually to be delivered) only the "fast/slow" condition evidenced significantly higher skin resistance scores and lower reports of subjective cognitive arousal in comparison with the control groups. The "fast/slow" condition approached significantly lower scores on the subjective somatic measure. Results for differences in heart rate, systolic blood pressure and diastolic blood pressure were not significant.

Winslow and Stevens (1983) investigated the effect of paced abdominal breathing in modifying EMG response in the frontalisis muscle, in reaction to the threat of electric shock. Five subjects were trained in two different breathing patterns, and then an A-B-A-B reversal design was utilized. The first breathing pattern was paced abdominal breathing (3 cycles per minute). The second pattern was paced thoracic breathing (10 cycles per minute). It was found that in the slow abdominal breathing condition the EMG levels were not significantly lower than in the "fast" thoracic breathing condition. There are apparent

problems in this study, however. First, the EMG levels did not significantly increase during the threatening condition, indicating that the measure was insensitive to the threat (or that the threat was not threatening). Secondly, many of the subjects were unable to perform successfully the slow abdominal breathing pattern satisfactorily, and complained that it took a lot of effort to do so. Three cycles per minute appears to be extraordinarily low, and the effort required to maintain such a pace, may have counteracted any relaxation effect which may have been obtained by a less strenuous slow abdominal breathing pattern.

Respiratory Control Studies in a Clinical Population

Longo and Saal (1984) investigated the efficacy of respiratory relief therapy (a form of respiration control whereby the subject is instructed to exhale and not breathe in for as long as possible, and then to do so abdominally and deeply). This treatment was combined with gradual exposure and was compared with a gradual repeated exposure therapy group and a waiting list control on the reduction of various anxiety measures pertaining to speech phobics. The respiratory relief therapy group improved significantly better than the gradual exposure group and the waiting list control on the Personal Report of Confidence as a Speaker Inventory (Paul, 1966), the Post-Speech Questionnaire (based on Endler, Hunt, and Rosenstein's 1962 S-R Inventory of Anxiousness), Paul's (1966) Timed Behavioral Checklist for Performance Anxiety (Taken as the subject was making a pre and post-treatment speech), and pulse rate change scores. There were no significant differences between groups on skin resistance scores.

Bonn, Readhead, and Timmons (1984) investigated the efficacy of breathing training in reducing the fear symptoms of 12 agoraphobics who were confirmed hyperventilators. Two groups were compared on a variety of psychological and psychophysiological measures including frequency of panic attacks, resting breathing rate, global phobia score, somatic symptoms, and an agoraphobia score. The first group received two weekly sessions of paced-abdominal respiratory training (8 cycles per minute) followed by seven weekly sessions of in-vivo exposure. The second group received nine weekly sessions of in-vivo exposure

without respiratory training. Upon completion of treatment and at a one month follow up, both groups improved significantly on all the measures with no significant differences between groups. At a six month follow-up, however, all the measures for the in-vivo only group had worsened while those in the respiratory training/in-vivo group continued to improve. In fact, this group's scores on all measures were significantly better than those of the in-vivo only group's, and the panic attacks for all members of the respiratory training group had ceased.

Clark, Salkovskis, and Chalkey (1985) examined the efficacy of respiratory control in reducing anxiety for agoraphobics who were found to be apparent hyperventilators. Nineteen subjects were treated for two weekly sessions by first having them voluntarily hyperventilate in order for them to recognize the similarity between hyperventilation symptoms and those of panic attacks. Then an explanation of how hyperventilation induces panic was given followed by training in slow, paced breathing. Subjects were instructed not to expose themselves to the feared situation during the respiratory training period so as to control for exposure effects. Following treatment the subjects had significantly fewer panic attacks than baseline and lower scores on anxiety/depression and global distress (Marks & Mathews, 1979). Those with situational anxiety were administered a behavioural test where the subject entered the feared situation briefly (so as not to allow exposure effects) and rated their anxiety on a scale ranging from 0-100. This group improved significantly on this scale following treatment. These results must be considered tentative, however, as no control groups were employed.

Grossman, De Swart, and Defares (1985) examined a group of hyperventilators under two conditions, (a) The experimental group was trained to reduce their normal breathing rate over a period of seven sessions, and (b) the comparison control group had to replicate their normal respiratory patterns as shown at the beginning of each of the seven weekly sessions. From the diagnostic intake it was evident that the group of subjects as a whole deviated from established population

norms for the various psychological variable scores. These measures included neurotocism and neurosomatic instability (Dutch modification of Eysenk's Maudsley Personality Inventory; Wilde, 1970), State-Trait anxiety (Spielberger et al., 1970), and self esteem (Netherlands Personality Inventory; Luteijn, Starren, & Dijk, 1975). Following treatment the experimental group had improved significantly more than the comparison group on hyperventilation symptom complaints, trait anxiety, state anxiety, and neurosomatic instability; neurotocism and self-esteem measures approached significance.

Keinath-Cooze (1986) investigated the efficacy of breathing training in reducing fear symptoms of 18 highly anxious adult subjects. Two groups were compared on a number of psychological and psychophysiological measures. The first group received training in deep slow abdominal breathing. The second group, an attention control condition, consisted of group discussion about anxiety and practice in self-relaxation (sitting quietly without being given any specific technique). While no specific respiration rate was targeted for the first group, the breathing therapy was effective in reducing the respiration rate of the subjects in this group at posttreatment. In addition, the breathing therapy group showed significant decrements on the Somatic Inventory (Lehrer & Woolfolk, 1982), which according to the author, represents a reduction in hyperventilation symptomatology. There was also a significant increase of relaxation in comparison with the control group, as measured by the Hart Anxiety Scale (See Keinath-Cooze, 1986) from pretreatment to posttreatment. This measure was administered to both groups immediately before they participated in a stress induction session.

Summary

Of those studies which have utilized respiration therapy for reducing anxiety in a clinically anxious or a stress induced analogue population, there have been positive results indicating its potential usefulness. Those studies which included self-report and behavioural measures of anxiety, all showed positive results supporting the use of respiratory control. That self-report and behavioral indices of anxiety are reduced through respiratory control has been especially true for

those studies which have utilized a clinical population. A problem with these studies, however, is that they have not measured physiological indices of anxiety in most cases. While heart rate has become recognized as a reliable physiological indicator of anxiety, and has been shown to be manipulable by respiratory control none of the studies involving induced stress were able to produce significant heart rate decreases using respiratory control. All but one of the studies involving measures of skin resistance have shown positive results indicating the efficacy of respiratory control. The one study which focused on EMG frontalisis muscle activity, in response to respiratory control under induced stress did not support its utility, however, this study contained several problems leaving its conclusions tentative. Another problem with some studies utilizing clinical populations is that respiratory control therapy has been used in conjunction with other forms of therapy and the independent effects of respiratory control itself in anxiety reduction have not been made clear. Studies that have combined respiratory control with other forms of therapy, however, have found that the addition of respiratory control significantly improved anxiety reduction.

Three Part Breathing

Abdominal breathing is a common component of many anxiety reduction techniques (Bernstein & Borkovec, 1973; Benson, Beary & Carol, 1974; Meichenbaum, 1977). The emphasis in abdominal breathing is to increase breath volume, by contracting the diaphragm and consequently distending the abdomen. While learning deep abdominal breathing tends to reduce respiration rate, a specific rate is often not targeted. It has been shown that a low respiration rate may be instrumental in anxiety reduction (Bonn et al., 1984; Grossman et al., 1985).

Three Part Breathing (adapted from Foss, 1975) focuses on filling the lungs completely on inhalation by first having the subject fill the abdomen, then the mid-rib area, and finally the chest area. While use of the abdomen is advocated, it is emphasized that the subject is not to actively force the musculature of the abdomen out, rather importance is placed on allowing it to expand slowly, and therefore to relax the musculature. On exhalation the subject is encouraged to empty the lungs completely of air, in order that as much oxygen can be supplied to the body on inhalation as possible. The rate of breathing is brought down to six cycles per minute, well below the normal breathing rate (12-14 c.p.m.). This slow rate of breathing is facilitated by having the subjects take deeper breaths, with pauses added after inhalation and exhalation.

"Faulty" breathers often make inefficient use of their lungs, breathing thoracically thereby using only the upper part of their lungs. This can put additional strain on the heart as it struggles to provide oxygen to the organism, particularly in anxious or stressfull situations when the body tends to require more air. As well, thoracic breathers often immobilize the diaphragm, thereby creating tension and rigidity of the musculature in this particular area. Abdominal breathing increases the amount of oxygen brought into the lungs and mobilizes the diaphragm relative to thoracic breathing, but does not focus on using the entire lung space. Three Part Breathing serves to encourage full use of the lungs in addition to mobilizing the diaphragm.

The effect of hyperventilation is a reduction of paCO2 in the bloodstream and is often associated with anxious arousal. Three Part Breathing will increase paCO2 in the bloodstream by slowing down the rate of breathing.

For these reasons then it is believed that Three Part Breathing should be instrumental in reducing anxious arousal.

The Problem

While respiration control is often used as a component of relaxation therapy, evidence supporting it's use independently has been equivocal. Therefore, evidence is needed showing that respiration control is independently effective in reducing anxious arousal, relative to an attention control condition.

Within non-clinical populations there has been evidence that those with higher levels of fear benefit more in anxiety reduction from relaxation training in comparison with those experiencing lower levels of fear (Brandt, 1974; Glaister, 1982; Wilson & Wilson, 1970;). In addition, Lehrer (1978) and Lehrer, Shoiket, Carrington, and Woolfolk (1980) have demonstrated that physiological reductions of anxiety are more prominent in clinical populations diagnosed with high anxiety in comparison with normal subjects. As respiration control is being examined for its relaxing effects as a common component of relaxation therapy, it seems reasonable that it should be evaluated within a population where relaxation training could be expected to be effective. Effects therefore should be demonstrated for a group that is initially high in anxiety. Using high anxiety subjects would also provide a better picture of the clinical utility of respiration control.

Those experiencing social phobia tend to exhibit high cognitive, behavioural and physiological anxiety levels, particularly when confronted with social interaction (Lande, 1982; Ost et al., 1980; Kanter, 1979), and therefore could be expected to benefit from relaxation training. In fact it has been demonstrated that relaxation training has been effective in treating those with social phobia (Ost et al., 1980), particularly when the social phobics ranked high as physiological reactors (i.e., experienced high physiological arousal when confronted with social situations).

In view of the above, it would be interesting to determine if respiratory control is a useful technique in reducing anxiety for social phobics, both in general, and in response to a stressful situation.

Hypothesis

Learning deep, slow, rhythmic respiration (Three part breathing) at a rate of six cycles per minute will be effective in reducing behavioural, self-reported anxiety, and physiological arousal for a socially phobic population, both in general, and during a stressful situation.

METHOD

Subjects

Subjects were obtained through an advertisement listed in a local St. John's newspaper. Approximately 40 people responded to the advertisement. Twenty subjects were chosen from this group on a first come basis and were divided equally and randomly between the experimental and control groups. Ten people did not meet the inclusion criteria or did not desire to enter the study. Due to time restraints, the remainder of the people were referred to other sources. All subjects met the following criteria in order to be included in the study:

(1) High in social anxiety as indicated by a score of 40 or higher on the Willoughby Personality Schedule (WPS).

(2) Eighteen years of age or over.

(3) Experiencing no other psychiatric problems in immediate need of attention.

(4) Experiencing no respiratory disorders.

(5) Keeping the intake of anxiolytic drugs constant during the study, if used at all.

(6) Not receiving any other kind of psychiatric or psychotherapeutic treatment during the study.

(7) Not practicing any relaxation techniques including progressive muscle relaxation, transcendental meditation, or yoga.

(8) Presenting their major complaint as anxiety in a wide range of social situations.

Measures

The Willoughby Personality Schedule (Willoughby, 1932) is a 25 item scale which has been found useful for assessing 'hypersensitivity to interpersonal stress' (Turner, Ditomasso, & Murray, 1980). The test has been found to distinguish reliably social phobics from a control population (Turner, Milles, & DiTomasso, 1983). The test has been proven to be internally consistent (Cronbach alpha, r= 0.82) as well as having high content and construct validity as all items tended to correlate highly with one another and converged into a unitary factor (Turner et al., 1980).

The Social Situations Questionnaire (Bryant & Trower, 1974) is used to assess the subject's degree of difficulty in different social situations. The scale consists of 30 situations and asks the subject to rate the degree of difficulty they would have in entering the situation. The rating is done on a five point scale, ranging from 0 (no difficulty) to 4 (avoidance if possible).

The Fear Questionnaire (Marks & Mathews, 1979) is a short (24 item) questionnaire which queries the fifteen most common phobic complaints and associated anxiety-depression symptoms. Within the questionnaire there are four measures; (a) Main Phobia - This measure contains one item, which has the subject identify the particular phobic situation which is being treated, and then rate the degree of avoidance for that particular situation on a nine point scale ranging from 0 (Would not avoid it) to 8 (Always avoid it); (b) Global Phobia - This measure also contains one item which has the subject rate the present state of his/her phobic symptoms on a nine point scale ranging from 0 (No phobias present) to 8 (Very severely disturbing/ disabling); (c) Total Phobia - This measure contains 15 items which address the fifteen most common phobic situations. The subject is to rate these items on a nine point scale which is identical to that used for the Main Phobia measure. Within this measure, three subscores can be obtained, each composed of five items; the Agoraphobia subscore, the Blood-Injury subscore, and of particular interest to this study, the

Social subscore; (d) Anxiety-Depression - This measure contains five items which address the five most common non-phobic symptoms found in phobic patients. The subject rates the items in regard to how much they are troubled by the named symptom on a nine point scale ranging from 0 (Hardly at all) to 8 (Very severely troublesome). The test-retest reliabilities for all the scales, including the subscales, were high, ranging from 0.79 to 0.96, based on a retest interval of one week with 20 phobic patients (Marks & Mathews,1979). There was also evidence of external validity in that the total phobia and anxiety-depression scores reflect the clinical status of the patient (Marks, Hallam, Philpott, & Connolly, 1977; Ginsberg & Marks, 1977). As the Fear Questionnaire is widely used in phobic research it is highly useful for providing comparisons with other studies. In addition the questionnaire is quick and easy to administer.

The Symptom Questionnaire (Lehrer & Woolfolk, 1982) is a 36 item questionnaire which assesses anxiety symptomatology. Within the questionnaire there are three measures; (a) Somatic Anxiety - This measure contains 16 items which query somatic symptoms often found within the hyperventilation syndrome (e.g., I feel dizzy, I have difficulty swallowing); (b) Cognitive Anxiety - This measure contains 11 items which assess the degree to which subjects worry and have negative thoughts about themselves; and (c) Behavioral Anxiety - This measure contains items which assess the subject's level of social avoidance. All items are rated by the subject on a nine point scale ranging from 0 (never) to 9 (almost always). The scales demonstrated good split half reliability (Somatic Anxiety, r= .93; Cognitive Anxiety, r= .92; Behavioral Anxiety, r= .91). The scale also demonstrated excellent construct validity in that the total and subscale scores correlated well with a number of established anxiety questionnaires (see Lehrer & Woolfolk, 1982).

The Social Diary (see Appendix A) designed for this study was used to assess the frequency of the five most anxiety-arousing social activities (based on findings from the interview with the client) engaged in by the client over a one week

period, in addition to the degree of anxiety experienced during those situations. The degree of anxiety was obtained through utilization of an eleven point rating scale ranging from 0 (Calm and relaxed) to 10 (Extremely nervous and uptight). The sum of the anxiety ratings would be divided by the total number of incidents entered within each of the five situations to give a mean anxiety score for that social situation. If a particular social situation was not entered during the one week period, the client was to list an "anticipated anxiety" score, indicating the level of anxiety anticipated, had the situation been entered. The total of the mean anxiety ratings, or anticipated anxiety ratings as the case may be, for each of the five anxiety situations, is the Social Diary score, which therefore could range from 0 to 50.

The Self-Efficacy Scale (adapted from Bandura, 1977) is used to determine the subjects expectation of success on entering the five stated phobic situations listed in the Social Diary. For each situation the client is asked to rate as a percentage, (i.e., 0% - 100%), their level of confidence on entering the stated situation. Thereby, a score of 0 to 100 is obtained for each situation resulting in a total range of 0 to 500 for the entire scale.

The State Anxiety Scale: (A-State) of the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Luschene, 1970) consists of 20 items, each rated on a four point scale, ranging from 1 (not at all) to 4 (Very much so), giving a minimum score of 20 and a maximum of 80. The STAI (A State) is phrased such that it has the subjects indicate "how they are feeling now", however, for research purposes the instructions may be altered to focus on a particular time period. All the statements are in reference to the subject's feelings, or lack thereof, of apprehension, worry, or tension. Test-retest reliabilities are low for the scale (0.16 to 0.54), however, this could be expected as "a valid measure of the A State should reflect the influence of unique situational factors existing at the time of testing" (Spielberger et al., 1970, p. 9). The alpha coefficients were quite high, however, ranging from 0.86 to 0.92, indicating good internal consistency.

The Fear Thermometer (adapted from Walk, 1956; see Appendix B) requires the subject to indicate the amount of anxiety experienced during the Social Interaction Test by placing a mark across the line of a thermometer-like figure. The scale is anchored at 0 (calm and relaxed) and is maximized at 10 (extremely nervous and uptight). The line is 185 cm long. The subject's score is obtained by measuring the distance in centimeters from 0 to the mark placed on the line by the subject. The scale therefore ranges from 0-185. Walk (1956) demonstrated the scale's reliability and validity in that the scale was highly correlated with other self-report, behavioural, and physiological measures of anxiety.

The Credibility Questionnaire (see Appendix C) adapted from Borkovec & Nau (1972), consists of three, ten-point scales, designed to assess the credibility of experimental and placebo conditions. High scores on these scales indicate high subject credibility in regard to the treatment received. It is important that experimental and attention control conditions are rated equally in credibility, otherwise results may be due to differences in expectation.

The Social Interaction Test (adapted from Marzillier et al., 1976; Ost et al., 1981) involves the subjects participation in a short conversation with a stranger of the opposite sex which is videotaped for later analysis. The subject is required to initiate and maintain conversation with a stranger for five minutes. The procedure for the SIT is described in the method section. The rating scale used was Trower, Bryant and Argyle's (1978) Social Interaction Test Rating Scale, a 29-item, five point (0-4) rating scale which assesses verbal and non-verbal behaviour. A high score on this scale indicates that the subject is displaying behavioural deficits which are indicative of social anxiety or lack of social skills.

Psychophysiological Measures and Apparatus. Respiration, heart rate, and skin conductance measures were recorded during the Social Interaction Tests and the first and last treatment sessions on a Beckman model R-411 dynograph. For the treatment sessions, physiological measures were taken over a fifteen minute treatment session. Before treatment began the subject was given a five minute

adaptation period. The last minute of this adaptation period provided the baseline measure. Thereafter, each fifth minute was used for analysis, giving three physiological measurement periods following baseline. Assessment of the physiological data during the Social Interaction Test is explained fully in the procedure section.

Respiration patterns were obtained using two channels of the dynograph with Beckman type 9853A couplers. A Beckman type 7001 strain gauge belt was placed on the subjects half-way between the lowest point on the rib-bones and the highest point on the hip-bone. Heart rate was measured through a Beckman type 9857 cardiotachometer, from Beckman biopotential electrodes. Electrodermal activity was detected by Beckman biopotential (.6 cm sq., Ag/AgCl) skin electrodes, using Beckman NaCl electrode paste as the contact medium.

Procedure

Initial contact with potential subjects was made by telephone and a screening interview was scheduled for each interested person. At this initial interview potential subjects were first encouraged to discuss their phobic problems as well as to give information relevant to the inclusion criteria. During this interview the Willoughby Personality Schedule (Willoughby, 1932), The Social Situations Questionnaire (Bryant & Trower, 1974), The Symptom Questionnaire (Lehrer & Woolfolk, 1982), and the Fear Questionnaire (Marks & Mathews, 1979) were administered.

In order to tap each client's specific phobic situations, each client was asked to specify the five most anxiety-arousing situations they were experiencing, and to rate them on an 11-point (0-10) scale. If the client was deemed to be suitable, frequency of the designated five anxiety situations and the intensity of anxiety encountered therein, was assessed for a one week period prior to and after therapy respectively utilizing the Social Diary. While the Social Diary was used throughout therapy, only these two one-week periods were used in the analysis.

Data were also collected concerning subject characteristics; age, sex, medication, experience with relaxation techniques, and prior therapy.

The interview ended with a brief description of the Social Interaction Test and any questions were answered in regard to the test. The client was then, if willing, asked to fill in a consent form and to sign a participation contract specifying compliance with all aspects of the program to the best of their ability. The client was then scheduled for the first Social Interaction Test.

Subjects participated in two Social Interaction Test sessions approximately four weeks apart, one before therapy, and one afterwards. These sessions were introduced to the subjects as 'social interaction assessment' sessions, which were a necessary part of the experiment. It was explained that these sessions provided the therapist with a behavioural and physiological measure of their social anxiety. The subject participated in a short conversation with a stranger of the opposite sex which was video-taped for later analysis. The subject was seated in a room and was fitted with the equipment which recorded heart rate and skin conductance. The subject was left alone in the room for a five minute anticipation period. Before leaving the client, however, the therapist instructed the subject to initiate and maintain a conversation with the other person and to avoid making reference to the experimental situation itself.

The confederate then entered the room and sat in a chair which was approximately four feet from the subject at approximately a fourty-five degree angle. Two males and two females served as confederates for the Social Interaction Test. The subject conversed with two different confederates of the opposite sex (one during each stress test), thereby reducing any effect of familiarity. To control for any effects that particular confederates may have on the subject's anxiety level (e.g., One confederate may have been more sociable and easy going than the other), the order of appearance of the confederates (i.e., which confederate was used for the first stress test session), was balanced for each sex within each group. For example, within the control condition there are four

males. Two males converse with female confederate 'A' for the first stress test and female confederate 'B' for the second stress test. The other two males converse with confederate 'B' for the first stress test and confederate 'A' for the second stress test. Confederates practiced their roles to ensure that their attitude toward each client was as standardized as possible. They were instructed not to start the conversation after they had said hello, and were to be equally friendly and responsive to each client. If the client had not started the conversation after sixty seconds the confederate asked a standard question (See Appendix D). If there were subsequent lulls in the conversation (20 secs) the confederate intervened with a question from a standard list (See Appendix D). The confederates were blind to the subject's group membership and to which Social Interaction Test (pre or posttest) the subject was involved in.

Following the five minute conversation stress test, the subject was asked to rate the degree of anxiety felt during the conversation using the Fear Thermometer.

The subject's videotaped social behaviour was rated by an independent observer who was blind to group membership and to whether the treatment had been completed. The subject was rated on 21 of Trower et al.'s (1978) 29 items of the Social Interaction Test. Due to the nature of the Social Interaction Situation in this study, six of the items from the Social Interaction Test Rating Scale were inappropriate. Therefore, only 21 of the scale items were utilized. The items used were as follows: (1) Volume; (2) Tone; (3) Pitch; (4) Clarity; (5) Pace; (6) Speech disturbances; (7) Orientation; (8) Face; (9) Gaze; (10) Posture tonus; (11) Posture position; (12) Gesture; (13) Autistic gesture; (14) Length of speech; (15) Generality; (16) Formality; (17) Variety; (18) Feedback; (19) Meshing; (20) Turn taking; and (21) Questions.

The reliability of the Social Interaction Test was tested by having a second independent observer who was also blind to group membership, rate a random sample (25%) of the video tapes, and then calculating inter-rater agreement. Both observers were fifth year psychology majors in university.

Following the first stress test, the subject was informed of the dates and times of the treatment sessions.

The treatment program consisted of five one-hour sessions of individual training, spanning a three week period, in either the experimental or attention control condition. During the first and last session of the treatment sessions, assessment of relaxation was made (heart rate, skin conductance, and STAI (A State)), in order to test for relaxation effects under non-stressful conditions. Following discussion of homework, any problems the client may have had in the previous week, and any discussion of the rationale for the treatment the subject was about to receive, the subject was fitted with the equipment designed to assess heart-rate, respiration rate, and skin conductance. The subject was left alone for a five minute adaptation period, the last minute constituting the baseline measure. Prior to this five minute adaptation period the client had completed the STAI (A State) in regard to the anxiety felt at that particular moment. Three samples of physiological activity were taken periodically throughout the treatment to be used for comparison. At the end of the treatment session subjects again filled out the STAI (A State) in regard to how they felt at the end of the treatment session.

Following the final treatment session the subject completed the second stress test which was identical in procedure to the first stress test with one exception. Following the five minute adaptation period, each subject was reminded to try to utilize the coping skill they had practiced, when conversing in the 'social interaction assessment' session.

During a post-treatment assessment session, the subject again completed the Willoughby Personality Schedule, the Social Situations Questionnaire, the Symptom Questionnaire, and the Marks and Mathews Fear Questionnaire. The subjects then completed the Credibility Questionnaire in order to assess possible differences in credibility between the two treatments.

Subject Handouts

During the first treatment session, subjects in the experimental condition were given a handout explaining the rationale for respiration therapy as a means of reducing anxiety, entitled Anxiety Management (Appendix E). This printed rationale ensured that each of the experimental subjects received exactly the same information about respiration therapy.

Experimental subjects were given another handout during the first treatment session entitled Three Part Breathing Instructions (Appendix F), an adaptation of Keinath-Cooze's (1986) Diaphragmatic Breathing Instructions. This handout ensured a uniform practice technique among the experimental subjects, and provided a reference between sessions.

Subjects in the control condition were given a handout during the first treatment session, also entitled Anxiety Management (see Appendix G), which contained information about anxiety exclusive of any specific anxiety management instructions This handout was identical to the Anxiety Management handout given to the experimental group, with one exception; a rationale for learning to relax was presented instead of a rationale for breathing therapy. This helped to ensure that the two groups were given similar treatment and enhanced the credibility of the control condition.

Subjects in both conditions were assigned homework after each treatment session, and were asked to sign homework contracts (see Appendixes H and I) which specified when and where they were to do their homework assignments. Subjects were given 'homework charts' (see Appendixes J and K) which were to be filled out each time homework was completed. These charts were brought to the succeeding treatment session. Foss(1976) has shown that subjects rate their experience with a breathing therapy more highly when assigned homework and are required to use contracts and charts, than subjects without contracted homework (Keinath-Cooze, 1986).

Experimental and Control Conditions

The experimental program, designated as the "Respiration Therapy" program, consisted of five individual, one-hour sessions. The sessions were scheduled to best accommodate the subjects, and were held in the Psychology Clinic of Memorial University. A brief session by session description of the experimental program follows.

Session one. The session began with a discussion of social anxiety and respiration therapy (Appendix L). During the discussion the subject was encouraged to ask questions. The subject then completed the STAI (A State) and had the apparatus for physiological measurement fitted. The subject was then given the five minute adaptation period as described previously. Three Part Breathing was instructed following the baseline period (Appendix M). Immediately following treatment, the STAI (A State) was completed by the subject in regard to how they felt at the end of the three part breathing training session. Homework was assigned, consisting of practicing the breathing technique for 10 to 20 minutes twice daily. Subjects were given copies of their homework contracts and a homework completion chart. Subjects were also given the handout explaining the rationale for respiration therapy in reducing anxiety and asked to read it sometime during the day at their own convenience.

Session two. This session began with a brief discussion of any problems encountered during the homework practice. Following this discussion, subjects practiced the three-part breathing technique again, with the aid of the therapist. Subjects were also instructed to imagine themselves in the situation which they listed as most anxiety arousing, and to note any physiological reactions, with particular focus being paid to disruptions in breathing. As suggested by Foss (1976) this may illustrate to the subjects, the effect that anxiety arousing situations may have on respiration. In addition subjects were asked to voluntarily hyperventilate (30 breaths per minute for 2 minutes), in order for them to recognize the adverse physiological effects often associated with anxiety states,

that hyperventilation may bring about. As well, subjects were made aware of how slowing down the breathing rate following the voluntary hyperventilation, negated these adverse physiological effects. Subjects were required to practice the breathing technique twice daily for homework.

Session three. This session also began with a brief discussion of any problems encountered during the homework practice. Following this discussion, subjects were asked to practice three-part breathing while standing, walking, and jogging in place. This is suggested by Innocenti (1966) as a way of enhancing generalization of the technique to everyday situations. Subjects were then asked to list three social interaction situations which they anticipated entering before the next session. Subjects were then asked to actively concentrate on practicing three-part breathing shortly before entering the situation and during the situation. In a diary format, the subjects were asked to record any feelings of anxiety, or lack thereof, for the three named situations. In addition subjects were asked to continue practicing the breathing technique twice daily.

Session four. This session also began with a brief discussion of any problems encountered during the homework practice. Following the discussion, subjects were then asked to participate in a role play with the therapist, which focused on a social interaction situation which caused anxiety in the subject. Subjects were asked to pick a social interaction situation which was listed fourth or fifth on their list of personal anxiety arousal situations, in order that they could first practice during a situation relatively low in anxiety. During the role play, subjects were asked to practice slow diaphragmatic three part breathing to the best of their ability. The role play was designed to give the subjects practice in three-part breathing as a stress management technique within a stressful situation. Subjects were asked to list three social interaction situations which they anticipated entering before the next treatment session, and were asked to practice the breathing technique, and to record the results in diary format. As well, subjects were asked to continue practicing the breathing technique twice daily.

Session five. This session followed the same format as session four, however, when asked to select a situation for the role play, subjects were asked to chose an item near the top of the list of personal anxiety situations, in order for them to gain practice with the technique under highly arousing conditions. In preparation for the final 'practice' phase of three part breathing, subjects completed the STAI (A State) and were fitted with the apparatus for physiological measurement. Assessment followed the identical format used in session one, with one addition; the Credibility Questionnaire was completed. Discussion and suggestions for continued use of three-part breathing followed. Subjects were asked to continue practicing their breathing techniques.

The control program, named the 'Anxiety Management Training Program', consisted of five individual, one-hour sessions. Time and attention given to each member of the control group was equivalent to that given to those in the experimental group. The sessions were scheduled to best accommodate the subjects, and were held in the Psychology Clinic of Memorial University. A brief session by session description of the control program follows.

Session one. To begin the session subjects were involved in a discussion with the therapist pertaining to social anxiety and anxiety management training (See Appendix N). Subjects were then informed that information about social anxiety and relaxation will help them to increase their ability to deal with anxiety. Discussion of the clients particular anxiety arousal situations, and non-specific coping strategies then took place. Subjects were then told that by merely taking time and concentrating, relaxation may be achieved, and can be used to deal with stress. Subjects then completed the STAI (A State), and had the apparatus for physiological measurement fitted. Assessment followed the identical format used in session one for the experimental group. Following the adaptation period the 'self-relaxation' training period was started. Following assessment, homework was assigned, consisting of practicing relaxation for ten to twenty minutes twice daily. Subjects were given copies of their homework contracts and a homework completion chart.

Session two. This session was identical in nature to that of session two for the experimental group, (substituting self-trained relaxation for three part breathing), with one exception. For the control condition subjects did not voluntarily hyperventilate.

Sessions three to five. These sessions were identical in nature to sessions three to five for the experimental group (substituting self-trained relaxation for three part breathing).

Follow-up Assessment

One month after session five a follow-up interview was held with both experimental and control subjects. Following a discussion of the client's progress, the subjects completed the Willoughby Personality Schedule (Willoughby, 1932), the Social Situations Questionnaire (Bryant & Trower, 1974), the Symptom Questionnaire (Lehrer & Woolfolk, 1982), and the Fear Questionnaire (Marks & Mathews, 1979). Following completion of the questionnaires, the subjects were debriefed of the nature of the experiment. Control subjects were given the opportunity for instruction in the experimental procedure. If subjects felt a need for further therapy, referrals were made to other sources.

RESULTS

The research design in this study was a pretest-posttest control group design controlling for non-specific variables such as expectancy. Data were analyzed using the Statistical Package for Social Sciences (Nie, Hull, Jenkins, Steinbrenner, & Brent, 1983). Results relevant to the hypotheses are presented first for self-report measures, then for behavioural measures, and finally for physiological measures. All analysis of variance tables are presented in Appendix O.

Subject Characteristics

Subjects were randomly assigned to either the experimental or control condition. One-way analyses of variance (ANOVAs) performed on age, sex, current drug usage, educational level, and use of previous psychological treatment revealed that there were no significant differences between the groups on these variables. Table 1 presents the data from this analysis.

Pre-treatment Measures

Although subjects were assigned randomly to the two conditions, one-way ANOVAs between groups were computed for all pretest measures to check on their initial comparability. Tables 2, 3, and 4 present the data from these analyses. The two groups were similar on all variables except for the total phobia score of the Fear Questionnaire, $F(1,18)=6.75$, $p<.05$, and respiration rate during the social interaction test(interaction phase), $F(1,15)=5.$ $p<.05$. The control group's mean initial total phobia score (65.4) was significantly higher than the experimental group's (43.5). The control group's mean initial respiration rate within the interaction phase of the SIT (23.8) was significantly higher than the experimental group's (17.3). Thus subsequent analyses of these variables included a covariate adjustment for the difference in initial scores.

Credibility of Conditions

In order to draw unequivocal conclusions about differences between the groups, it is essential that the groups have equivalent treatment credibility.

The scores for the credibility ratings were summed across the three subscales

Table 1

Between Group Comparisons on Demographic Variables

Measure	Experimental	Control	F (1,18)	p
SEX				
No. of Males	2	3	0.24	.63
No. of Females	8	7		
AGE				
Mean	35.2	30.6	0.97	.34
S.D.	10.2	10.5		
EDUCATION (years)				
Mean	12.6	12.3	0.65	.43
S.D.	0.8	0.8		
PRIOR TREATMENT USED	N=7	N=7	0.90	.36
CURRENT USE OF MEDICATION	N=5	N=2	1.98	.18

Table 2

Between Group Comparisons on Initial Self-Report Measures

Measure	Experimental mean	Experimental s.d.	Control mean	Control s.d.	F (1,18)	p
WILLOUGHBY PERSONALITY SCHEDULE	63.2	15.9	70.9	13.1	1.25	.28
SOCIAL SITUATIONS QUESTIONNAIRE	65.7	24.0	75.8	12.7	1.25	.28
FEAR QUESTIONNAIRE						
Main phobia	6.4	1.4	6.3	1.9	0.10	.89
Global phobia	6.2	1.8	4.3	2.1	4.30	.059
Total phobia	43.5	13.6	65.4	21.3	6.74	.02
Anx./ dep.	23.7	7.9	25.1	9.1	0.11	.74
SYMPTOM QUESTIONNAIRE						
Cognitive	52.3	10.5	54.1	15.0	0.08	.77
Somatic	57.6	11.0	57.1	22.0	0.00	.95
Behavioural	47.8	12.4	50.3	17.0	0.13	.71
SOCIAL DIARY	28.6	7.8	32.6	7.5	1.35	.26
FEAR THERMOMETER	112.2	58.7	137.6	27.7	1.53	.23
STAI	45.2	7.7	48.2	7.4	0.79	.39
SELF EFFICACY	278.6	71.5	239.4	60.0	1.51	.24

Table 3

Between Group Comparisons on Initial Behavioural Measures

Measure	Experimental mean	Experimental s.d.	Control mean	Control s.d.	F (1,18)	p
VOICE QUALITY	7.2	2.1	9.3	3.1	2.79	.114
NON-VERBAL	8.1	2.5	9.4	2.4	1.22	.286
CONVERSATION	10.7	5.4	13.9	5.4	1.56	.230
SIT TOTAL	26.0	8.9	32.6	9.4	2.35	.145

Table 4

Between Group Comparisons on Initial Physiological Measures

Measure	Experimental		Control		F	p
	mean	s.d.	mean	s.d.		
HEART RATE (Beats per min.)						
Session 1 baseline	85.4	14.2	89.6	25.2	0.16	.693
SIT Anticipation Phase	107.6	12.1	101.3	25.8	0.34	.571
SIT Interaction Phase	112.1	9.8	99.9	23.8	1.60	.231
RESPIRATION RATE (Cycles per min.)						
Session 1 Baseline	14.8	5.1	19.8	5.3	3.69	.075
SIT Anticipation Phase	17.3	3.6	20.0	4.0	2.09	.169
SIT Interaction Phase	17.4	3.5	23.8	7.2	5.52	.033
SKIN CONDUCTANCE (Responses per 5 min.)						
Session 1 Baseline	58.9	36.7	50.8	25.2	0.27	.614
SIT Anticipation Phase	68.7	33.0	57.1	36.0	0.48	.501
SIT Interaction Phase	93.4	40.2	103.6	60.3	0.17	.684

resulting in a single score with a possible range of 0-30. The mean scores for the experimental and control groups were 27.00 and 26.56 respectively, indicating that both groups felt their treatments were highly credible. In addition, a one-way ANOVA revealed that these two means were not significantly different, $F(1,15)=.27$, $p=.61$. It is therefore unlikely that the between group differences found were due to different levels of expectation.

Self-Report Measures

It was predicted that the experimental condition would be superior to the control condition in decreasing various self-report measures of anxiety. To test this prediction, a 2 (group) by 3 (session) repeated measures multivariate analysis of variance (MANOVA) was computed for each dependent variable, with the exception of the social diary, the fear thermometer, and the self-efficacy scales. These three measures were obtained only at pretest and posttest and therefore a 2 (group) by 2 (session) repeated measures MANOVA was computed. Table 5 presents the results from this analysis. Analyses revealed a significant group x session interaction effect for one variable; the global phobia scale of the Fear Questionnaire, $F(1, 16)=3.32$, $p=.049$. In partial support of the hypothesis, this finding demonstrated that the experimental condition was more effective than the control condition in reducing the clients' perception of how disturbing or disabling their phobias were. In addition, the group x session interaction for the Somatic subscale within The Symptom Questionnaire approached significance, $F(1,16)=2.57$, $p<.10$, in partial support of the hypothesis (It can be argued that $F=2.57$ is statistically significant at $p<.05$ as the hypothesis is unidirectional in nature and therefore the F test is one-tailed, i.e., the hypothesis is that the experimental condition will reduce somatic arousal - see Ley, 1979). The remaining self-report measures failed to support the hypothesis of superior effects for the experimental group.

Main effects for the session factor were significant on all the self report measures. This finding suggests that both treatments were effective in decreasing both social anxiety and anxiety in general at termination of treatment or follow

Table 5

Self-Report Means for Experimental and Control Conditions

Measure	Experimental		Control		F	p
	mean	s.d.	mean	s.d.	(1,16)	
WILLOUGHBY P.S.						
pre	61.3	15.2	71.0	13.1	0.10	.90
post	43.0	18.6	49.7	21.5		
follow-up	35.8	18.4	43.8	23.0		
SOCIAL SITUATIONS QUESTIONNAIRE						
pre	62.1	23.6	73.3	13.7	0.13	.88
post	38.8	19.9	46.3	19.7		
follow-up	28.7	24.5	40.1	24.7		
FEAR QUESTIONNAIRE						
Main phobia						
pre	6.4	1.4	6.1	2.0	1.30	.29
post	2.6	1.1	2.7	1.7		
follow-up	1.7	0.9	2.8	1.6		
Global phobia						
pre	6.0	1.9	4.6	1.9	3.30	.049
post	2.6	0.7	2.4	1.4		
follow-up	1.9	1.3	2.4	1.6		
Total phobia						
pre	39.1	13.0	58.7	20.1	2.13	.14
post	22.2	9.2	26.3	18.4		
follow-up	19.2	10.7	25.2	19.8		
Anx./dep.						
pre	22.1	8.9	24.4	9.7	0.29	.75
post	9.4	8.8	11.6	6.5		
follow-up	6.0	5.5	11.1	8.8		

up. Newman Keuls analyses of the session factor for pretreatment, posttreatment, and follow-up revealed significant differences for the pretreatment-posttreatment session factor and the pretreatment-follow-up session factor. There was no significant change in the session factor for posttreatment-follow-up.

Behavioural Measures

The subject's overt social behaviour was rated by an independent observer on 21 of 29 items of the Social Interaction Test. The test is comprised of three subscales; Voice Quality, Non-Verbal Communication, and Conversation. Reliability of the rating data was tested by having a second independent observer rate a random sample (25%) of the video tapes. The inter-rater agreement was calculated using the intra-class correlation coefficient (Bartko and Carpenter, 1976) for each item separately.

Nine of the 21 calculated correlation coefficients were significant at the $p < .05$ level. These correlations ranged from $r = .65$ to $r = .92$ with a mean $r = .75$. Haynes (1978) suggests that with complex coding scales, such as the one used in the present research, inter-rater reliability coefficients of .7 to .9 are achieved at best, and should be used as a criterion level. Two of the correlation coefficients were lower than the criterion set by Haynes, however, as these correlations were only slightly lower than the set criterion, were obtained from a very small subject population where high correlations would be hard to obtain, and were significant at the $p < .05$ level, it was decided that these coefficients were sufficiently high. The nine items used were as follows: Volume and Speech Disturbance within the Voice Quality subscale; Gaze, Gesture, and Autistic Gesture within the Non-Verbal Communication subscale; and Generality, Non-Verbal Grammar, Turn-taking, and Feedback within the Conversation subscale. It was decided that only these nine measures would be used in the final analysis.

It was predicted that the experimental group would be superior to the control condition in decreasing subscale scores (Voice Quality, Non-Verbal Communication, and Conversation) within the Social Interaction Test. To test

this prediction, a 2 (group) by 2 (session) repeated measures MANOVA was computed for each dependent variable. Analyses revealed no significant group x session interaction effects. Table 6 presents the results from this analysis.

There were main effects for the session (pretreatment-posttreatment-followup) factor on all the dependent variables indicating that both treatments facilitated an improvement in these areas.

Psychophysiological Measures

Physiological activity was assessed during the respective "relaxation training session" portions within the first and last sessions of each treatment and during the Social Interaction Test (including a five minute anticipation phase prior to the test). It was predicted that the experimental condition would be more effective in decreasing the levels of physiological activity (heart rate, respiration rate, and the frequency of spontaneous skin conductance responses).

Relaxation Training Sessions. The physiological data for the four five-minute periods within sessions one and five are presented graphically in figures 1 to 6. It was assumed that during the final five minutes (period 4), the subject would have achieved maximum relaxation. Therefore, only period 1 (baseline measure) and period 4 (final five minute period) were used for analyses. It was predicted that the experimental group would be more successful in decreasing physiological activity within a single session in comparison with the control group. To test this hypothesis a 2 (group) x 2 (period) repeated measures MANOVA was computed for each physiological variable. Table 7 presents the results from this analysis. Analyses revealed significant group x period interaction effects for respiration rate within session 1, $F(1,16)= 6.78$, $p<.05$, and within session 5, $F(1,17)=7.81$, $p<.05$, indicating that the treatment program was effective in significantly reducing the respiration rate in the experimental group. The remainder of the physiological measures, however, failed to support the hypotheses of superior effects for the experimental group.

Table 6

Behavioural Means for Experimental and Control Groups

Measure	Experimental		Control		F	p
	mean	s.d.	mean	s.d.	(1,16)	
VOICE QUALITY						
pre	7.2	2.1	9.3	3.1	2.00	.176
post	5.0	2.6	4.8	2.1		
NON-VERBAL						
pre	8.1	2.5	9.4	2.4	1.21	.288
post	6.2	2.2	5.9	3.2		
CONVERSATION						
pre	10.7	5.4	13.9	5.4	0.50	.501
post	6.0	3.3	6.6	2.8		
SIT RATING SCALE TOTAL						
pre	26.0	8.9	32.6	9.4	1.30	.275
post	17.2	6.5	17.3	5.7		

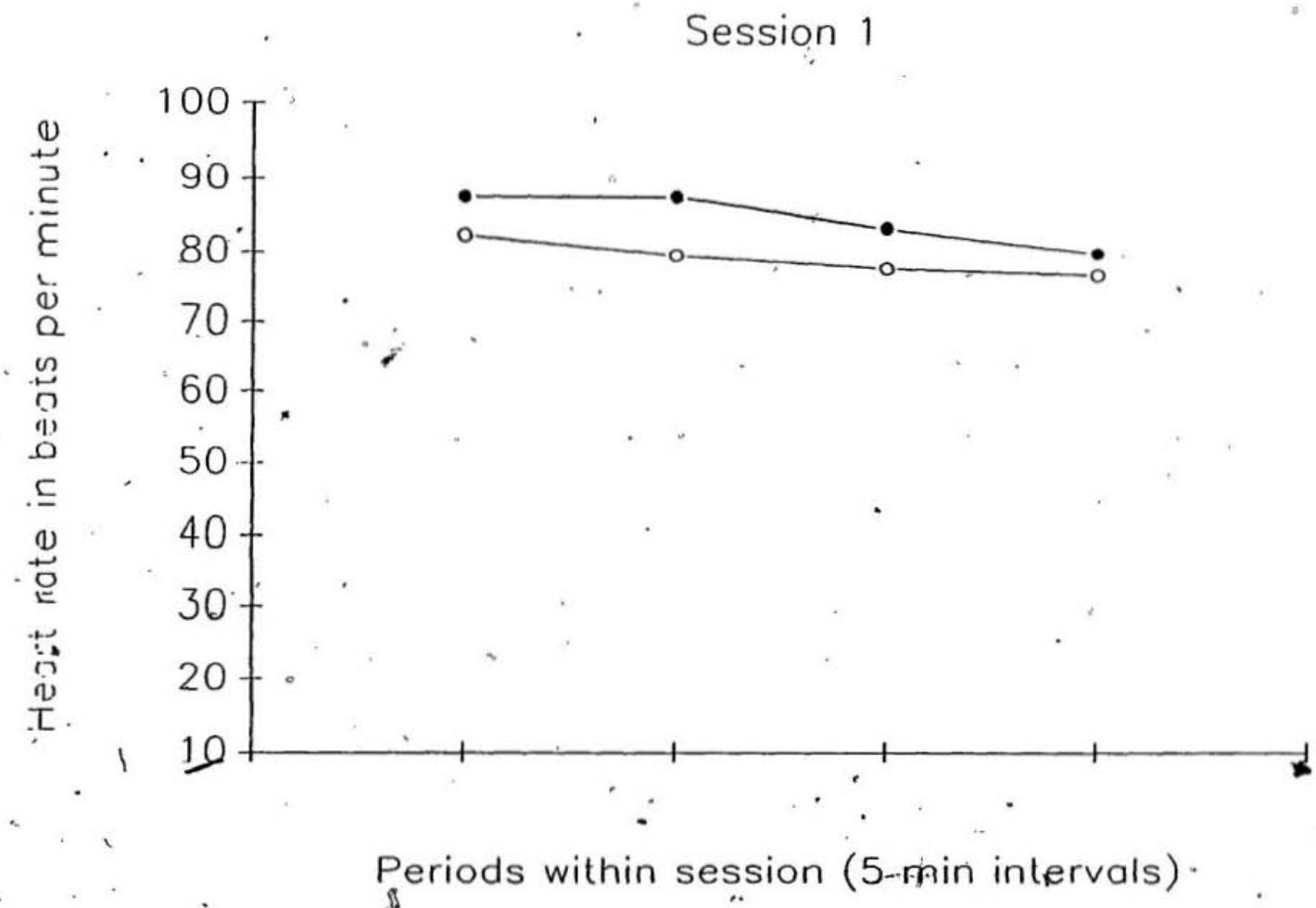

Figure 1 Mean heart rates for experimental (o — o) and control (• — •) conditions across four periods within session one

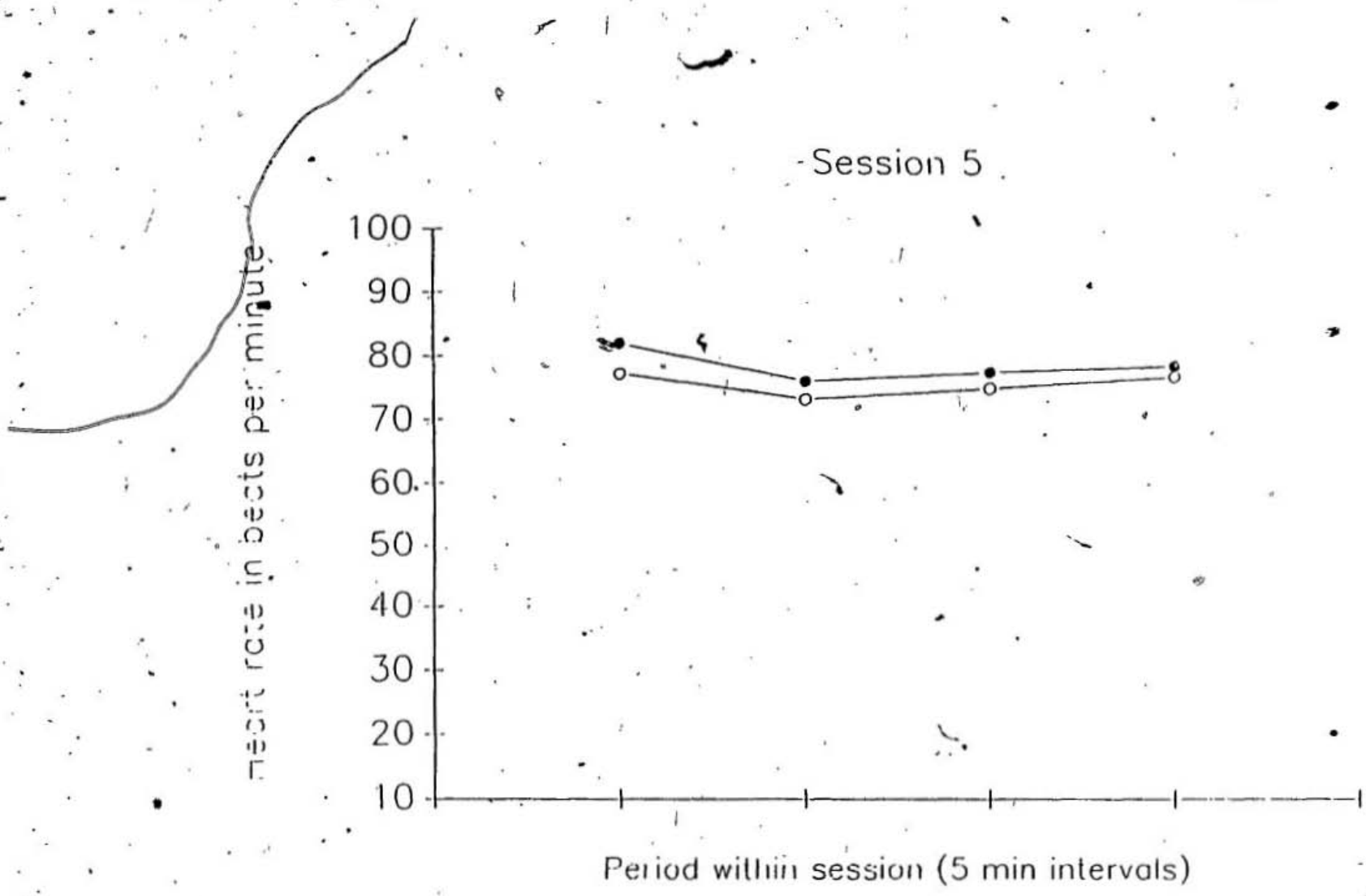

Figure 2 Mean heart rates for experimental (o — o) and control (• — •) conditions across four periods within session five

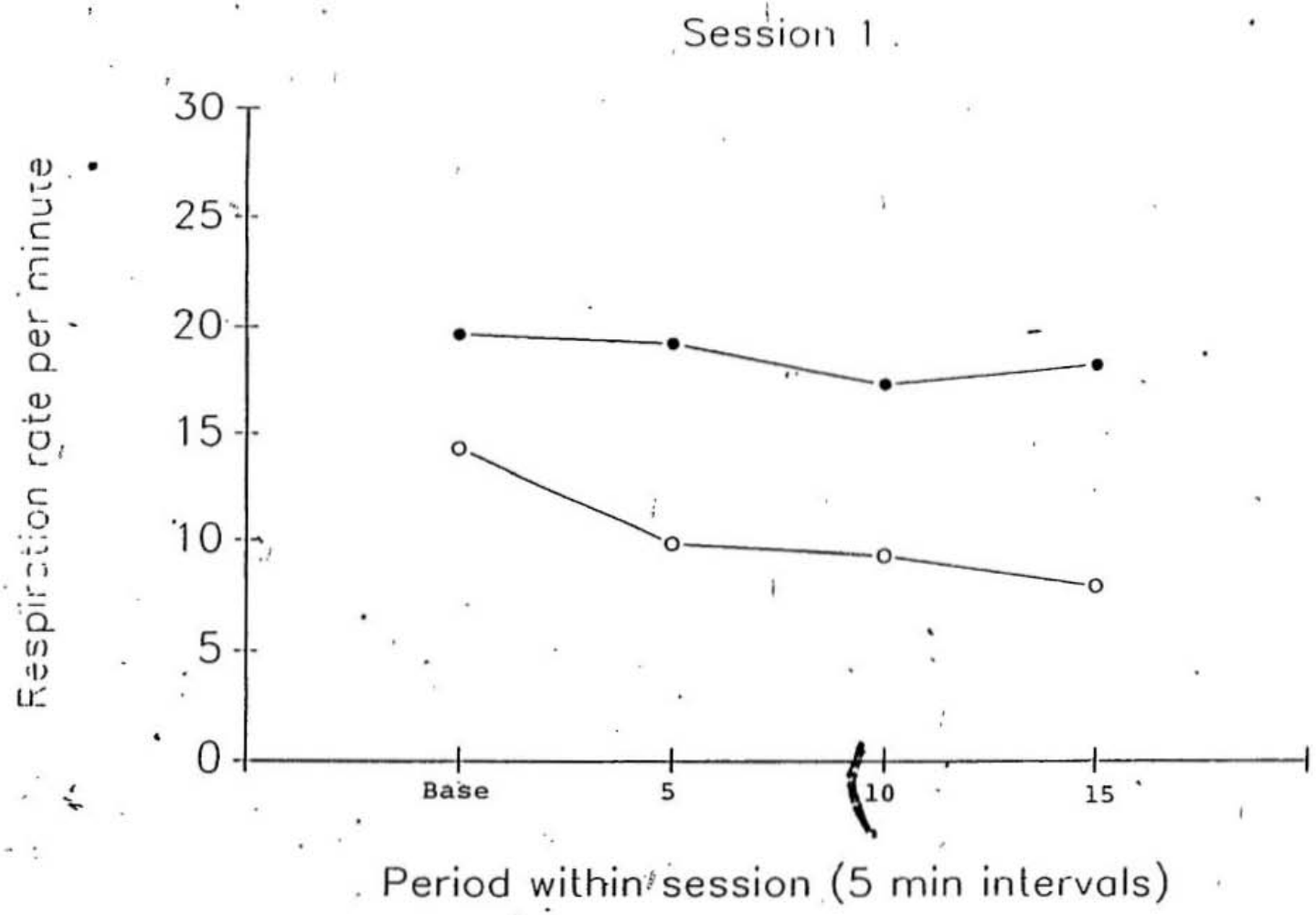

Figure 3 Mean respiration rates for experimental (o — o) and control (• — •) conditions across four periods within session one

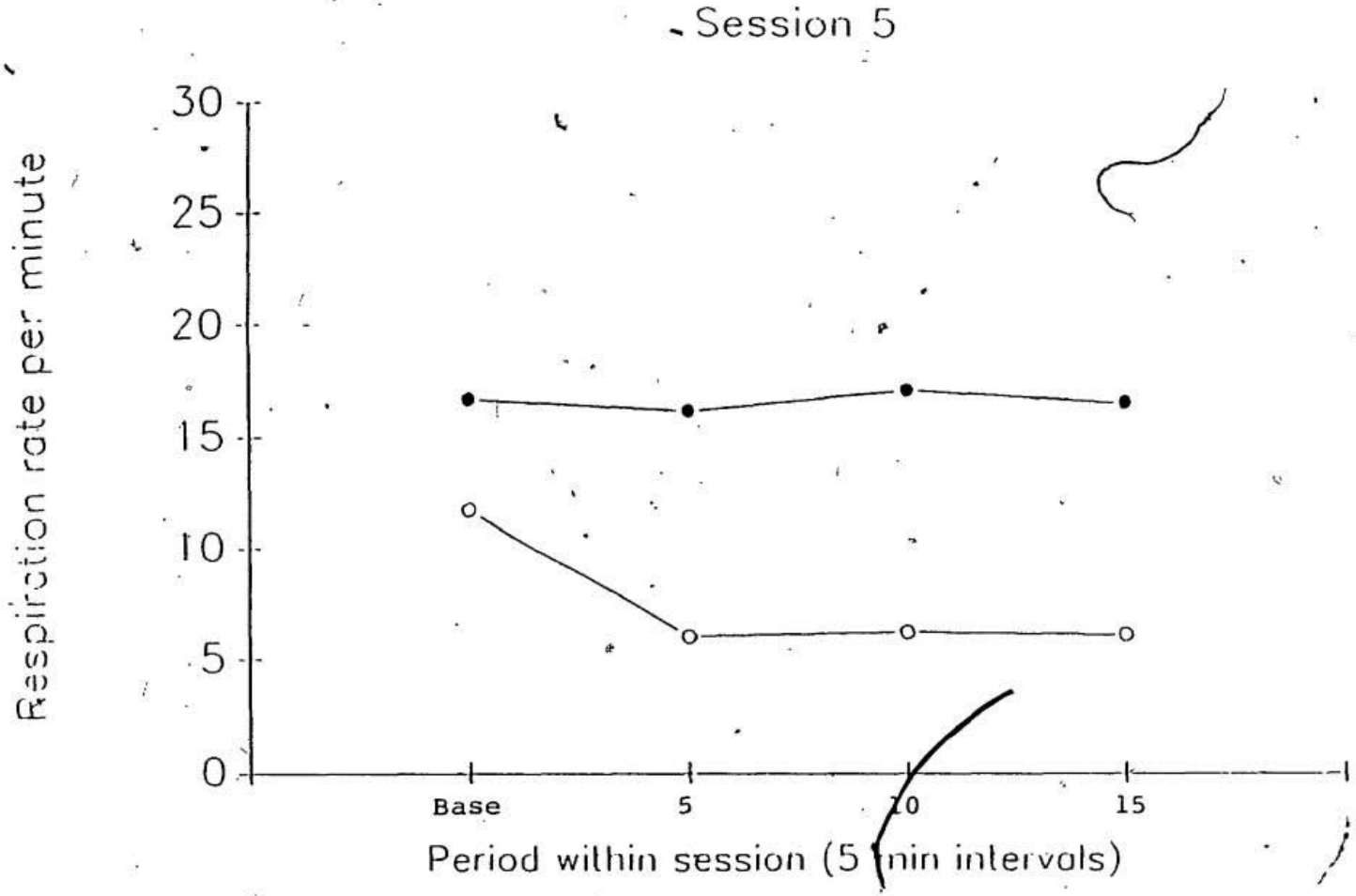

Figure 4 Mean respiration rates for experimental (o — o) and control (• --- •) conditions across four periods within session five

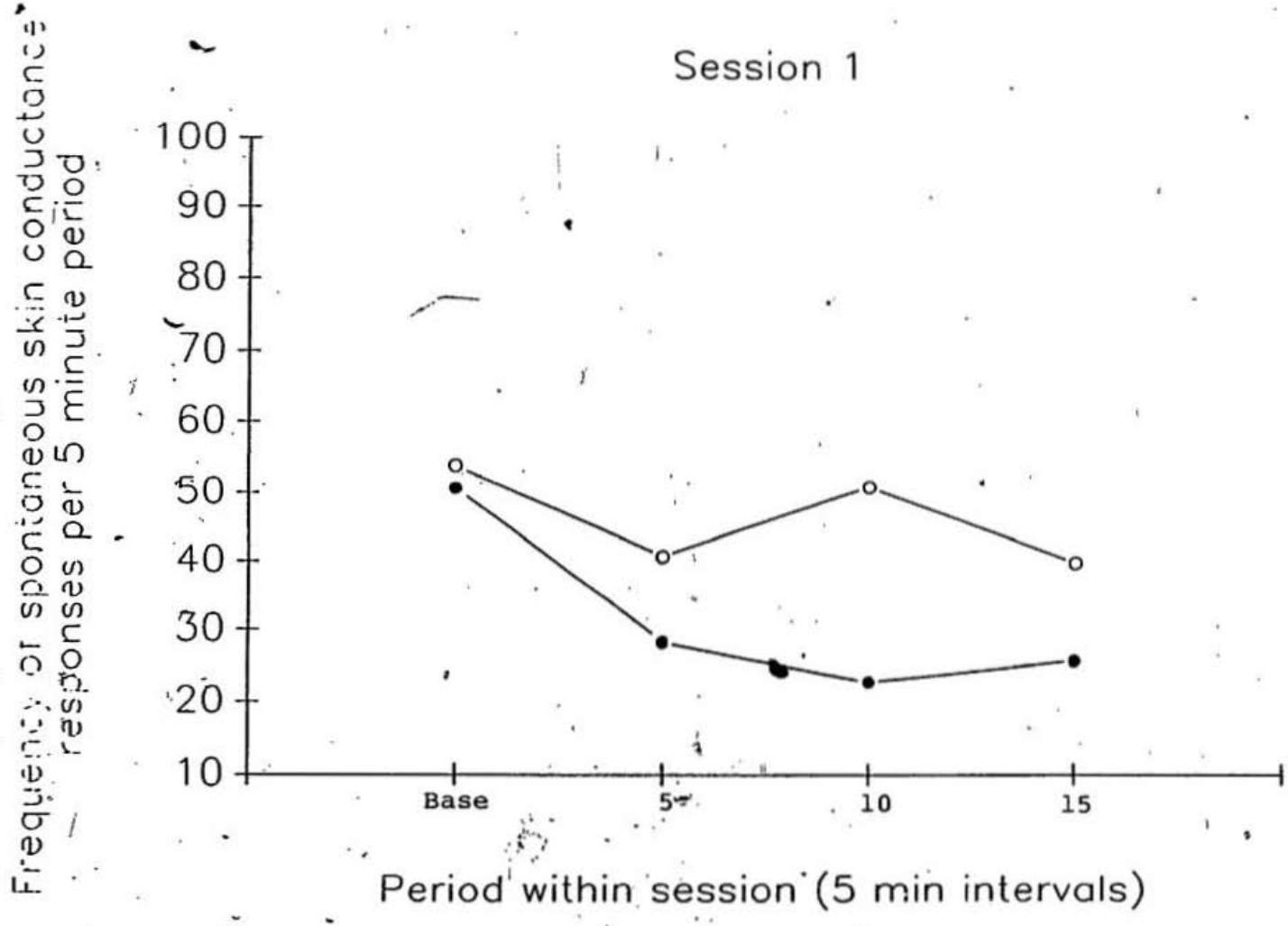

Figure 5 Mean rate of spontaneous skin conductance responses for experimental (o — o) and control (• — •) conditions across four periods within session one

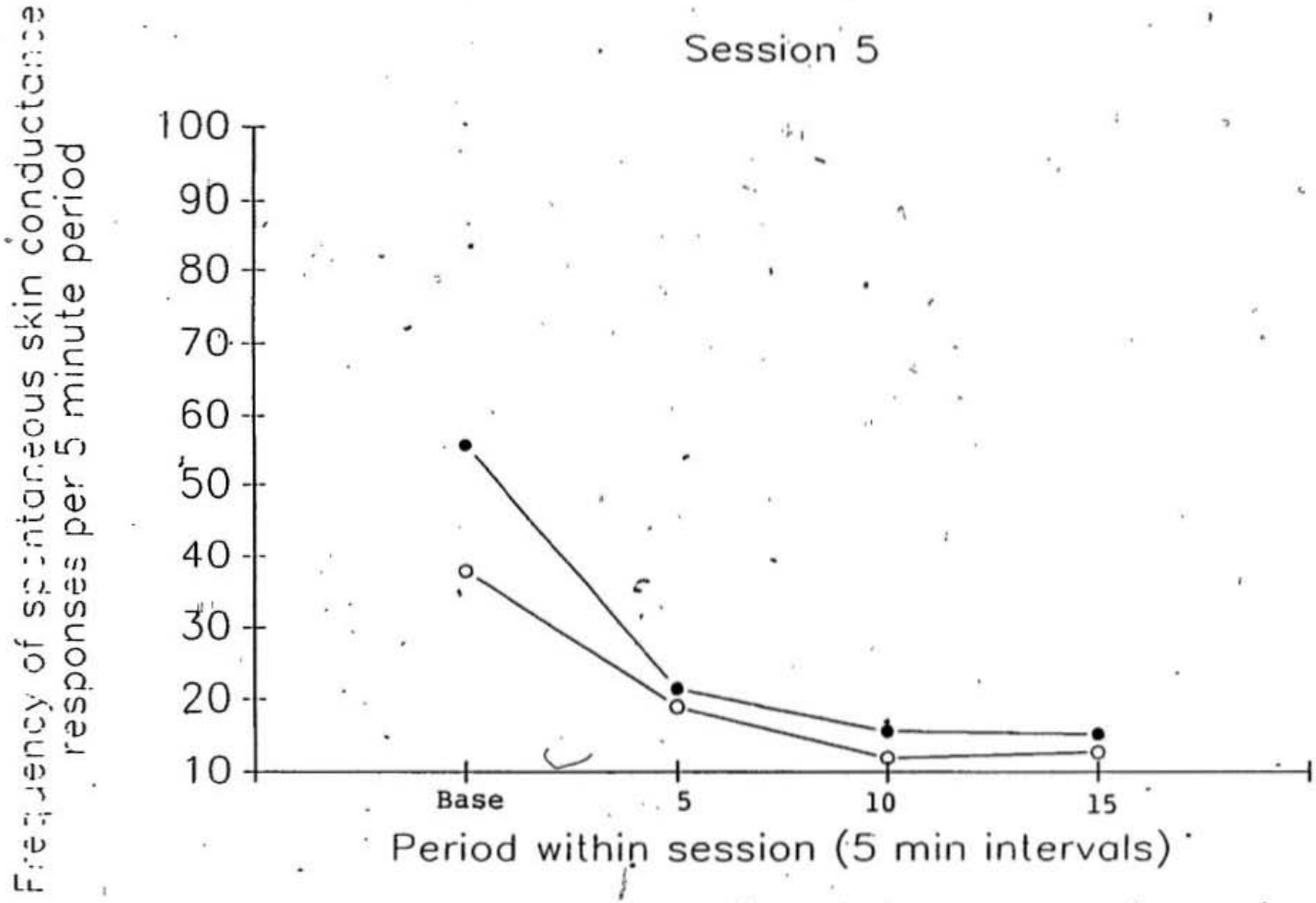

Figure 6 Mean rate of spontaneous skin conductance responses for experimental (o — o) and control (• — •) conditions across four periods within session five

Table 7

Heart Rate, Respiration Rate, and Skin Conductance Measures for Experimental and Control Groups for the Treatment Sessions

Measure	Experimental		Control		F	p
	mean	s.d.	mean	s.d.		
HEART RATE (Beats per min.)						
Session 1						
period 1	82.6	15.8	87.4	24.2	0.06	.810
period 4	76.7	17.0	79.9	19.1		
Session 5						
period 1	77.3	13.7	84.3	16.1	2.31	.148
period 4	77.0	15.4	80.7	13.1		
RESPIRATION RATE (Cycles per min.)						
Session 1						
Period 1	14.4	4.9	19.7	5.0	6.8	.019
Period 4	8.0	3.2	18.4	4.8		
Session 5						
Period 1	12.5	5.3	16.7	4.7	7.8	.012
Period 4	7.0	3.1	16.6	4.2		
SKIN CONDUCTANCE (responses per 5 min.)						
Session 1						
Period 1	54.0	37.3	50.8	25.2	0.76	.398
Period 4	40.0	31.0	25.9	27.2		
Session 5						
Period 1	39.0	23.1	56.1	21.0	1.86	.190
Period 4	13.5	19.9	18.6	25.0		

Analyses also revealed main effects for the period factor (period 1-period 4) for the frequency of skin conductance responses within both session 1 and session 5 suggesting that both treatments were effective in decreasing these responses over a short period of time (15 minutes). The remaining physiological measures did not reveal significant main effects for the period factor.

In order to assess the level of physiological relaxation from session 1 to session 5 without the benefit of the "relaxation period" the period 1 baseline scores were compared between groups and sessions utilizing a 2 (group) x 2 (session) repeated measures MANOVA. Analyses revealed no significant interactions, although the group x session interaction for skin conductance responses approached significance, $F(1,15)=3.14, p<.10$ in partial support of the hypothesis (Again, it can be argued that this finding is significant at the $p<.05$ level - see Ley, 1979).

Social Interaction Test. In order to determine whether the SIT was in fact stressful, a 2 (groups) x 2 (period) repeated measures MANOVA was utilized in comparing baseline scores of the physiological variables obtained during the first treatment session with anticipation and interaction phase scores of the SIT.

A problem with taking baseline measurement of physiological variables on a different day is the great deal of variability that physiological variables display over time. This variability may lead to an underestimation or an overestimation of changes in physiological arousal due to the SIT, as the changes may, or may not, simply be a result of natural variation. It did not seem feasible, however, to obtain a baseline measure immediately prior to the SIT. At this time subjects would have been fully aware of the potentially stressfull situation they were about to enter. This would naturally tend to increase their physiological arousal above normal levels, making it an inappropriate period of time for baseline measurement.

If the SIT was stressful, the physiological measures should show a significant increase during the anticipation and interaction phase in comparison with scores

obtained under the non-stressful baseline condition. Main effects for the period (baseline, SIT phase) factor were found for heart rate-anticipation phase and for all physiological variables-interaction phase. No main effects were found for respiration rate and spontaneous skin conductance responses for the anticipation phase.

Subjects were assessed for physiological reactivity during both the anticipation phase and the interaction phase of the Social Interaction Test. To test the hypothesis that the experimental condition was superior in decreasing physiological reactivity a 2 (group) x 2 (session) repeated measures MANOVA was computed separately for each of the two phases. Table 8 presents the data from this analysis. Analyses revealed no significant group x session interaction effects, although the group x session interaction for respiration rate during the anticipation phase of the Social Interaction Test approached significance, $F(1,15) = 3.8, p < .10$ (Again, it can be argued that this finding is significant at the $p < .05$ level - see Ley, 1979).

Analyses revealed significant session (pretreatment-posttreatment) effects on the heart rate measure for the anticipation and interaction phases, and the respiration rate for the anticipation phase. There were no significant session effects for the remaining physiological measures.

Table 8

Heart Rate, Respiration Rate, and Skin Conductance Measures for Experimental and Control Groups for the Social Interaction Test

Measure	Experimental mean	Experimental s.d.	Control mean	Control s.d.	F	p
HEART RATE (Beats per min.)						
Anticipation Phase						
Session 1	107.6	12.2	98.3	25.4	0.17	.684
Session 2	97.6	9.6	91.5	15.7		
Interaction Phase						
Session 1	112.1	9.8	97.4	23.1	1.55	.235
Session 2	99.4	11.7	94.0	15.1		
RESPIRATION RATE (cycles per min.)						
Anticipation Phase						
Session 1	16.9	3.7	19.8	3.8	3.80	.068
Session 2	11.1	5.4	17.6	4.2		
Interaction Phase						
Session 1	17.0	6.2	23.3	6.8	0.85	.370
Session 2	17.0	6.2	20.8	5.9		
SKIN CONDUCTANCE (Responses per 5 min.)						
Anticipation Phase						
Session 1	64.0	34.4	57.1	36.0	0.71	.413
Session 2	53.8	36.2	56.8	37.6		
Interaction Phase						
Session 1	89.3	40.1	103.6	60.3	0.42	.526
Session 2	95.5	70.7	94.8	31.1		

DISCUSSION

Discussion of the Results

It was hypothesized that the inclusion of training in deep, slow, rhythmic respiration at a rate of six cycles per minute contributes to reducing behavioural, physiological, and self-reported anxiety in a socially phobic population, both in general, and during a stressful situation. To test this hypothesis two behavior therapy treatment programs were compared in the treatment of social phobia. The experimental therapy program consisted primarily of paced diaphragmatic breathing instruction in conjunction with imaginal exposure, role playing, and in-vivo homework. The control program was identical in nature, with one exception; unstructured "Self-relaxation" training was provided in lieu of the training of paced diaphragmatic breathing. By and large, the results did not support the hypotheses. Both treatment programs were apparently highly and equally effective in the reduction of behavioural, somatic and self-reported social anxiety as measured by many of the indices used in this study. Only one significant difference was revealed between the two groups, in partial support of the hypothesis. The experimental program was more effective than the control program in reducing phobic symptomatology as measured by the Global Phobia scale in the Fear Questionnaire.

Before considering the results further, it is necessary to ascertain whether the experimental treatment was successful in significantly reducing respiration rate. A boundary condition of the hypothesis is that the respiration rate of the subjects in the experimental group be significantly lowered below that of the control group's. If any conclusions are to be made in regard to the efficacy of slow diaphragmatic breathing in anxiety reduction, it is necessary that this condition be met.

The respiration rate for the experimental group was significantly lower than the control group's within the monitored treatment session at the conclusion of the treatment program. The mean respiration rate of the experimental group by the

end of the final treatment session was 6.1 breaths per minute, while that of the control group's was 16.6 breaths per minute.

It is also important to show that the experimental group successfully reduced its respiration rate during the stressful situation (Social Interaction Test) if any conclusions are to be made regarding the efficacy of slow diaphragmatic breathing utilized within a stressful situation.

The experimental group's respiration rate was significantly lower than the control group's within the anticipation phase of the SIT at the $p < .10$ level. There were no significant differences between the groups within the interaction phase of the SIT. During the interaction phase the subjects were largely responsible for carrying the conversation making it difficult to simultaneously monitor respiration. This likely accounts for the experimental group's failure to reduce respiration rate during this phase, in comparison with the control group. While stronger results would have been preferred within the anticipation phase it can be reasonably inferred that the experimental manipulation was successful in decreasing respiration rate immediately prior to the stressful situation. This inference is stronger if one accepts Ley's (1979) argument (see Ley, 1979 for criticisms of the argument) that the F test is one-tailed in this instance, and is therefore significant at the $p < .05$ Level.

In both the treatment sessions and the Social Interaction Test it is reasonable to infer, therefore, that the experimental manipulation was successful in creating the boundary conditions (i.e., lowered rate of respiration), albeit at a marginally significant level within the SIT.

There is another boundary condition which must be met concerning the hypothesis that the experimental group be more effective in anxiety reduction within a stressful situation. If the efficacy of slow diaphragmatic breathing for anxiety reduction in a stressful situation is to be examined, it must be shown that the situation used to test such a hypothesis in this study (SIT), was indeed stressful.

Heart rate increased significantly above baseline levels within the anticipation phase of the SIT for both groups. While respiration rate and and the frequency of spontaneous skin conductance responses did increase above baseline levels within the anticipation phase, the change was not significant. All physiological measures increased significantly above baseline levels within the interaction phase, suggesting that this phase was particularly stressful. It seems reasonable therefore to assume that the SIT was indeed stressful, thereby meeting the boundary condition for testing the hypothesis that paced respiration is effective within a stressful situation.

As these boundary conditions were met, an important question is, why did the successful training of paced respiration not facilitate additional anxiety reduction in comparison with the control condition, as hypothesized.

It may have been the case that the control treatment package was too powerful. Both treatment packages included imaginal exposure, role playing, and in-vivo exposure homework assignments in addition to the respective relaxation training components. These components alone have proven to be effective in treating phobic disorders (Bellack & Morrison, 1982; Emmelkamp, 1982). Utilization of such components may have left no room for improvement (i.e., a ceiling effect may have been present).

The results indicate that both groups were apparently highly effective in the reduction of social anxiety. Main effects for the session factor (pretreatment-posttreatment-followup) were found to be significant for all self-report and behavioural measures and for several of the physiological measures. These findings suggest that both treatment packages were effective in (a) increasing the subject's ability to enter social situations and to do so with a concurrent decrease in anxiety (as reflected by the self-report data), (b) increasing subject's verbal and non-verbal conversational skills (as reflected by the behavioural data), and (c) decreasing the subject's physiological arousal under both stressful and non-stressful conditions (as reflected by the physiological data).

It may be argued that familiarity (i.e., with both the therapist and the testing situation) may have led to the positive results found in regard to the SIT and the recorded treatment sessions. Within the SIT, which involved both physiological and behavioural measurement, the subject would certainly have become more familiar with the video equipment, the physiological monitors, and the test situation itself. They would not, however, have become familiar with the confederate with whom they were having conversation, as each subject talked with different confederates over the two sessions. It seems reasonable to assume that conversation with a stranger would have been the most stressful component for a social phobic and that this component is primarily responsible for the incurred stress. It might be argued that conversing with a stranger in the first SIT might make it easier to do so with another stranger in the second SIT, regardless of the fact that the strangers were different people, due to the beneficial effects of exposure. Reviewing the evidence on exposure duration, Emmelkamp (1982) found that brief periods of exposure (such as the period of time used in the SIT) are often detrimental, rather than beneficial when dealing with phobic subjects. For these reasons, it seems unlikely that familiarity would have been responsible for the significant decreases in physiological and behavioural anxiety.

Within the 'nonstressful' treatment sessions it seems unlikely that the subject would have become more familiar with the therapist over the span of time which was utilized to assess physiological arousal. In both treatment packages physiological arousal was assessed over a twenty minute period. Because this assessment period was obtained at the end of the second meeting with the therapist it seems reasonable to assume that such a brief period of time would not greatly enhance the familiarity of the therapist to the subject. For this reason it seems unlikely that familiarity would be responsible for the decrements found in physiological arousal within the recorded treatment sessions.

It may also be argued that demand characteristics (i.e., subjects desiring to meet

the therapist's expectations) may have lead to the positive results for both groups. This is quite plausible for the self-report data. In regard to the behavioural measures it seems resonable to infer that such is not the case. The behavioural variables were measures of social skills. These social skills were not trained in the treatment sessions. The subject would not have known that the therapist was expecting such change, and therefore could not have been responding to therapist expectations when positive changes were made. It also seems reasonable to infer that demand characteristics cannot be responsible for the positive physiological findings in both groups. The therapist never instructed the subject that specific decreases in heart rate or skin conductance were being sought. Even if subjects could have directly manipulated their heart rate and skin conductance responses, they would not have been aware that the therapist desired such changes.

It seems reasonable to infer that neither familiarity nor demand characteristics were responsible for the positive changes found in anxiety reduction for both groups, and that the treatment components themselves were effective in reducing social anxiety. This might indicate that the control treatment package was too powerful. Past research has shown that the addition of a breathing therapy to an in-vivo exposure therapy program does proyide additive effects in anxiety reduction (Longo & Saal, 1984; Bonn, Readhead, and Timmons, 1984). The present study does not support these findings. It should be added, however, that in the Bonn, Readhead, and Timmons (1984) study there were no significant differences in anxiety reduction between a treatment group which provided breathing therapy plus in-vivo exposure and a control group which provided only in-vivo exposure, immediately following completion of treatment. It was only at a 6 month follow-up wherein significant differences were found between the groups in favour of the experimental condition. In light of this finding it may be beneficial to complete a longer term follow-up study to determine whether the experimental therapy program in this study will be more successful in the long run.

Another possible shortcoming, may have been that the experimental subjects may have not made slow diaphragmatic breathing a habitual process, i.e., they may have only been breathing slowly and deeply immediately prior to anxious situations and during homework exercises. In the case of chronic hyperventilators it would seem important that permanent changes be made. Magarian (1982) points out that with chronic hyperventilation, minor changes in respiration, such as a sigh or a minimal reduction in the already lowered PaCO2 are enough to create hyperventilation symptomatology. Hyperventilation symptomatology has been shown to be extremely similar to panic attack symptomatology. It is possible that significant differences were not found between the groups in regard to their phobic symptoms because of insufficient change of a habitual respiration rate. Chronic hyperventilation may elevate other systems of physiological arousal to the point where brief reductions of respiration rate may be ineffective. It may not be enough to simply have the client practice slow respiration immediately prior to or during a stressful situation. It is probable that the respiration rate of these anxious subjects had been high for an extended period of time. If this were true it is likely that such a habitual respiration pattern would be resistant to change over a short period of time. Five sessions of training over a three week period may have been insufficient in bringing about more permanent changes. Lum (1976) has reported that a year may be required to bring about effective changes in rapid thoracic breathing.

Another major concern was the difference in respiration rate between the groups at the session one baseline and at the initial SIT interaction phase. While the difference at the session one baseline was not significant, there was a notable difference between the means. As mentioned previously, the normal breathing rate ranges from 12-14 cycles per minute. The experimental group's mean breathing rate (14.8 c.p.m) borders the high normal rate, while the control group's mean (19.8 c.p.m) suggests hyperventilation. For the SIT interaction phase the initial mean respiration rate for the control group was significantly higher than that of the experimental group. It is plausible that the experimental group's respiratory

pattern as a whole did not make it amenable to a respiratory therapy. The control group, however, may have benefited, based on their initial high respiration rate. If the groups had been selected for high initial respiration rates, the experimental group's mean scores would have increased, and consequently better results might have been obtained.

Stroufe (1971) and Wood and Obrist (1964) have shown that increasing respiration depth, and not rate, is instrumental in reducing heart rate. While deep abdominal breathing was instructed during the treatment sessions, it was not directly monitored. It is possible that the experimental group may have been breathing shallowly despite the fact that the respiration rate was decreased. This may account for the poor results in regard to heart rate decrement for the experimental group.

One explanation for the lack of significant findings, may have been the nature of the subject population. Ost et al. (1980) have demonstrated that, when confronted with social interaction, only those ranked high as physiological reactors showed significant improvement with relaxation therapy. Some of the subjects in this study were also exhibiting cognitive anxiety, low self-esteem, and a deficit in social skills, factors which also largely contribute to social anxiety. In a study by Turner and Beidel (1985) it was revealed that 80 % of social phobics display two main response patterns: those who are characterized by high negative cognitions and high physiological reactivity and those who are characterized by high negative cognitions and low physiological reactivity. Over 40% of the total socially phobic population from this study were low physiological reactors. The therapy program in this study did not directly deal with cognitive deficits. If Turner and Beidel's findings are representative of the entire population, a physiologically focused treatment might only have been of benefit to 60% of the sample. It may have been beneficial to select a group whose symptomatology was primarily physiological in nature, in order to determine the relative effects of two physiological treatments (Breathing therapy and self relaxation).

Liebowitz et al. (1986) make reference to two distinct classes of social phobics: primary and secondary social phobics. Those who suffer from primary social phobia "fear scrutiny and evaluation by others, and their anxiety is confined to such situations or anticipation of such situations" (Liebowitz et al., 1986, p. 729). Those who suffer from secondary social phobia, however, have developed social fears secondary to panic attacks. In most cases these people have been experiencing panic attacks over an extended period of time, and have come to fear experiencing a panic attack in a social situation. Munjack, Brown & McDowell (1987) found that somatic symptomatology was found with significantly greater intensity in the secondary social phobics and that secondary social phobics primarily fear the onset of panic. Primary social phobics, however, are primarily afraid of negative evaluation. Munjack et al. suggest that a physiologically oriented treatment focusing on the panic attacks may be more suitable for secondary social phobics. It may have been beneficial for this study if only secondary social phobics were selected. The presence of primary social phobics in the study population may have masked any benefits the physiologically oriented experimental condition may have provided.

A final possibility is that instructing self-relaxation is sufficient in reducing stress and anxiety. The control subjects, while not given specific instructions about how to relax, were probably able to relax by merely sitting quietly for a period of time. Pollack and Zeiner (1979) found that merely sitting quietly is sufficient in promoting relaxation. The control group practiced self-relaxation twice daily and was therefore likely to have developed their own relaxation methods. While not systematically recorded, many of the control subjects mentioned how they might "slow down their breathing", "take deep breaths", "think pleasant thoughts", and so forth. Each of these methods may have been successful in stress reduction, reducing the likelihood of significant differences between the experimental and control groups.

There were several findings which partially supported the hypothesis. Subjects

in the experimental condition showed a significant decrease in score on the Global Phobia Scale within the Fear Questionnaire. According to Marks & Mathews (1979), a lower score on this measure indicates a decrease in distress and avoidance resultant from the client's phobias. It may be that therapy inducing a lower respiration rate may increase the subject's level of comfort in situations which create anxiety, and may decrease the degree of avoidance of those situations.

Subjects in the experimental condition also showed a greater decrease in score on the Somatic Inventory of the Symptom Questionnaire in comparison with the control group, significant at the $p<.10$ level. Lehrer and Woolfolk state that the Somatic Inventory reflects hyperventilation symptomatology. Only two of the 16 items on the Somatic Inventory directly mention breathing. It is therefore unlikely that subject's expectations regarding breathing therapy influenced their scores. A more likely explanation is that changes in the subjects respiration rate were responsible for the concurrent changes in hyperventilation symptomatology. Douglas, Lindsay, & Brooks (1988) have demonstrated that physiological questionnaires are accurate predictors of physiological anxiety, strengthening the finding that the experimental condition may have been more effective in reducing somatic anxiety. This explanation seems even more likely if one accepts Ley's (1979) argument (see Ley, 1979 for criticisms of the argument) that the F test is one-tailed in this instance, and is therefore significant at the $p<.05$ Level.

Comparing period one baselines between sessions one and five, a larger decrement in spontaneous skin conductance responses was evidenced for the experimental group in comparison with the control group, significant at the $p<.10$ level. A decrease in this measure indicates a decrease in sympathetic activity of the autonomic nervous system (Venables & Christie,1973 see Harris et al, 1976). Heightened autonomic nervous system activity has proven to be a reliable index of stress (Harris et al., 1976) and therefore a decrease in the SSCR's would seem to indicate a reduction of stress. It may be that the reduced rate of

respiration directly led to the reduction of the SSCR's over the treatment period. Once again, the indication becomes stronger if one accepts Ley's (1979) argument that the F value is significant at $p<.05$ in this instance.

Limitations of the Study

It may be that the program was not long enough to produce significant treatment effects. As mentioned previously, the baseline levels between sessions one and five were not significantly different between the two groups. More time and specific concentration on the breathing mechanics, including the monitoring of respiration depth, may be required in order to bring about more permanent respiration alterations.

A one month follow up assessment was obtained for both groups. No significant changes were found between posttreatment and follow-up. It should be mentioned that on follow-up, the experimental group revealed non-significant decrements on the mean rating of each variable from posttreatment. For the control group there was only a non-significant decrement on the mean ratings for approximately half the variables. In addition, in each case where both groups showed decrements, the change was greater for the experimental group. Given time, these differences may become statistically significant. Past research has shown that lengthy follow-ups may be required in the proper examination of the efficacy of a breathing therapy (Bonn, Readhead, & Timmons, 1984). Therefore, a follow-up over a greater period of time may provide more useful information.

It should be noted that on follow-up, it appeared that those who had been taught the breathing therapy were more likely to have continued to practice their relaxation method. This was not objectively assessed, however, but was obtained through discussion with the subjects during the follow up session. Having a precise method for relaxing may facilitate a greater likelihood of compliance. It should also be pointed out that the only two drop-outs were members of the control group. It is possible that the lack of a specific technique may have led to these drop-outs.

Finally, it may have been that experimenter bias was not controlled for, as the experimenter was the therapist for each group, and therefore was not blind to the hypothesis. Given the equal credibility rating of the two groups implies that there was no strong experimenter bias.

Conclusions

In conclusion, both treatment packages which included imaginal exposure, role playing, in-vivo homework and in the case of the experimental group, respiration therapy, were apparently highly effective in reducing behavioural, somatic, and self-reported social anxiety. By and large, respiration therapy did not provide significantly additive effects in anxiety reduction. The addition of respiration therapy provided only one significant additive effect: a greater reduction in Global Phobia on the Fear Questionnaire. There is also an indication that the experimental group was superior in reducing somatic symptomatology, as evidenced by marginally significant decrements on the Symptom Questionnaire and in the frequency of spontaneous skin conductance responses between treatment sessions. In no case did the control group demonstrate superiority, even at a marginally-significant level. Respiration therapy was evaluated in this study as one component of a multifaceted behavioural therapy package. No assessment can be made, therefore, of its use independently of other behavioural treatment techniques. From this study, however, there is no evidence that the addition of respiration therapy to a behavioural program which offers imaginal exposure, role-playing, and in-vivo homework assignments, provides additive effects in anxiety reduction.

Implications for Research

Several opportunities for further research are suggested by this study. Breathing therapy has proven effective with those who are confirmed hyperventilators in regard to reducing panic attacks and agoraphobic symptomatology (Bonn et al., 1984; Clark et al., 1985). Research might be done on social phobics who are confirmed hyperventilators or who primarily suffer with physiological symptomatology. Breathing therapy is a physiologically oriented

mode of change, and might therefore be more effective for a population whose anxiety is primarily physiological in nature.

It is important that research be conducted wherein breathing therapy is evaluated independently of other treatment methods. In the present study, the effects of exposure and role play may have masked the positive effects of the breathing therapy.

A more intensive breathing therapy program may have been more effective. Rigorous instruction in deep breathing and monitoring of respiration depth in addition to rate might provide more long-standing changes in respiration patterns. Keinath-Cooze (1986) suggested that providing visual or auditory feedback to the subject may prove useful in promoting respiratory pattern changes. Holmes et al. (1978) have shown that subjects are able to replicate relaxed breathing patterns which are presented on a video monitor.

Research needs to be done evaluating the long term implications of a breathing therapy with social phobics. Bonn et al. (1984) found that subjects who received breathing therapy in conjunction with in vivo exposure differed significantly from subjects who received in vivo exposure alone, only at a six month follow up period. The follow up period in the present study was relatively close to the final session of treatment. It is likely that the poor respiratory patterns in many of the subjects are habitual and long standing in nature. These habitual patterns are likely resistant to change thereby requiring practice of proper breathing over a long period of time. Provided the experimental group continue to practice their breathing techniques, a longer term follow up may provide more positive results in support of breathing therapy.

Finally, breathing therapy might be compared with other traditional components of relaxation therapy (e.g., progressive muscle relaxation) in order to examine the relative merits of using such a component. In that breathing therapy may be more easily, and less conspicuously, implemented in comparison with progressive muscle relaxation, it seems important to research its utility.

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Appendix A

SOCIAL DIARY

Feared Situation	Date and Time	Duration (How Long)	Degree of Anxiety (0-10)	Degree of Avoidance (0-10)

Appendix B

CREDIBILITY QUESTIONNAIRE
from Borkovec & Nau (1972)

1. How powerful and effective do you believe this treatment to be?

1 2 3 4 5 6 7 8 9 10

2. How much improvement do you expect in your ability to cope with social interaction?

1 2 3 4 5 6 7 8 9 10

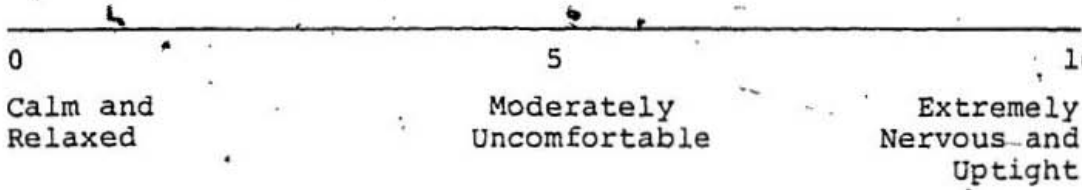
3. How willing would you be to recommend this treatment to a friend with social interaction problems?

1 2 3 4 5 6 7 8 9 10

Appendix C

FEAR THERMOMETER

Indicate on the line below the degree of anxiety felt in the conversational situation.



Appendix D

Standard Questions for Use by Confederates Within the SIT

The following questions were used within the SIT (if necessary) in the order that follows:

1) It sure has been a cold, snowy winter this year. How have you been finding it?

2) This issue about the Sprung Greenhouse sure has been in the papers a lot lately. What do you think about it?

3) That piece of art on the wall sure looks peculiar. What do you think of it?

4) I sure had a hectic weekend. How was yours?

Appendix E

ANXIETY MANAGEMENT (Experimental Group)

When entering social situations where social interaction is to take place, most people experience some degree of nervousness, particularly when meeting someone for the first time. For some people this nervousness is soon overcome as the social interaction progresses, however, for others the nervousness may continue and may even worsen to the point where social interaction becomes very uncomfortable. While it is not possible to be totally rid of these feelings of nervousness during social interaction, it is desirable to minimize the frequency and intensity of such feelings so that social interaction can be made comfortable. People who fear social interaction often experience particular bodily changes and sensations when entering social situations. These sensations include increased breathing rate, increased heart rate, and increased perspiration in the palms to name a few. These bodily changes are common anxiety reactions which are also known as "fight or flight" responses. When faced with dangerous situations these responses aid us in some active response. In everyday social interaction, however, it is not often desirable to fight, nor is it always possible to run away. One is often left in a situation where one must try to act calmly and coolly, while inside one's body is churning with emotion. If this situation is encountered frequently, there is a lot of wear and tear on the body, which can result in a variety of physical disorders including ulcers, high blood pressure and cardiac trouble.

The individual who suffers from social anxiety may experience an anxiety "feedback loop" that perpetuates the anxiety reaction. In response to social interaction the individual may experience one or more of the above mentioned bodily reactions. The bodily reaction may then stress the individual further, thereby becoming a stressor in itself, which will thereby intensify the bodily reaction, and a vicious circle is created. It makes sense then, that if we could control these bodily responses, we could gain some control over our anxiety. Respiration control is one method where we can gain some control over our bodily

reactions. While it is very difficult indeed to voluntarily slow down our heart rates or to prevent ourselves from sweating (beyond what our deodorant can do, which we don't often put in the palms of our hands), we can relatively easily bring our respiration under voluntary control.

Voluntary respiration control is perhaps one of the oldest stress management techniques known. It is a technique which is utilized to reduce anxiety and promote relaxation in practices such as Yoga, Zen Meditation, and more recently progressive relaxation. Important advantages of using this technique are ease of learning, freedom from side effects which often occur with use of medication, and its easy access; respiration control can be done almost anywhere at anytime.

We shall be concerned with learning a method of respiration control known as "Three Part Breathing". This method combines the training of total use of the lungs for breathing, with emphasis on diaphragmatic breathing, as well as having the subject slow down the rate of breathing to a particular level. Faulty breathers often make inefficient use of their lungs breathing thoracically, and thereby use only the upper part of their lungs. This type of breathing has been shown to be related to feelings of anxiety and may even bring about the "fight or flight" response which was mentioned earlier. Thoracic breathing can put additional strain on the heart as it struggles to provide enough oxygen to your body, particularly when you are in anxious or stressful situations. As well thoracic breathing often immobilizes the diaphragm, thereby creating tension and rigidity of the musculature in this particular area. Three part breathing then will serve to encourage full use of the lungs and to mobilize the diaphragm.

A major part of this program consists of practicing the breathing techniques you are about to learn. It must be kept in mind that the way in which you breathe is a deeply ingrained habit. It will therefore take practice to break this habit, and to make "Three Part Breathing" a natural process. As this process becomes more natural, however, it will help you decrease the severity of your physiological responses to stressful situations.

Appendix F

THREE PART BREATHING INSTRUCTIONS

There are several things to keep in mind when practicing your breathing exercises. Don't worry if the techniques seem awkward at first, with practice they will become automatic. Below are listed some helpful hints which you will find useful and which should be incorporated into your daily practice.

1. The place in which you practice your relaxation exercises is important. It should be well ventilated and free from all distractions., If necessary put a sign on the door and unplug the phone. You should try to practice in the same place at the same times each day.

2. You should not practice soon after a meal, a cigarette, or coffee/tea/cola.

3. Practice ten to twenty minutes twice a day.

4. Don't wear restricting garments.

5. The main object is to make full use of your lungs when breathing, with particular emphasis on use of the abdomen. Place one hand on the abdomen, and the other hand on your chest. When you inhale, the abdomen should swell into your hand, then the midribs should rise slightly, and finally your chest should rise slightly.

6. The rhythm is important. Inhalation should flow smoothly into a relaxed exhalation. Exhalation should last slightly longer than inhalation. There should be a brief pause after inhalation and exhalation.

7. Exhalation should never be forced. Say "relax" to yourself as you exhale.

8. Work on technique first. When you have this down pat, try to decrease your rate of breathing. The ideal rate is approximately 6 cycles per minute.

9. Check your breathing at all possible opportunities throughout the day.

10. Use this technique as a coping strategy whenever you begin to feel anxious, or during stressful situations.

11. As you practice your exercises you may find that you are either carried away by your thoughts or you are making a deliberate attempt not to think. It is best to observe your thoughts passively and then let them float on by and gently correct your awareness to the breathing process.

Appendix G

ANXIETY MANAGEMENT (Control Group)

When entering social situations where social interaction is to take place, most people experience some degree of nervousness, particularly when meeting someone for the first time. For some people this nervousness is soon overcome as the social interaction progresses, however, for others the nervousness may continue and may even worsen to the point where social interaction becomes very uncomfortable. While it is neither possible nor desirable to be rid of these feelings of nervousness during social interaction, it is desirable to minimize the frequency and intensity of such feelings so that social interaction can be made comfortable. People who fear social interaction often experience particular bodily changes and sensations when entering social situations. These sensations include increased breathing rate, increased heart rate, and increased perspiration in the palms to name a few. These bodily changes are common anxiety reactions which are also known as "fight or flight" responses. When faced with dangerous situations these responses aid us in some active response. In every day social interaction, however, it is not often desirable to fight, nor is it always possible to run away. One is often left in a situation where one must try to act calmly and coolly, while inside one's body is churning with emotion. If this situation is encountered frequently, there is a lot of wear and tear on the body, which can result in a variety of physical disorders including ulcers, high blood pressure and cardiac trouble.

Possibly one of the easiest and most effective techniques of stress management is to simply identify and keep track of stress-promoting situations and note how we react to them. Becoming aware of these situations is the first step in overcoming their impact. When you know which situations are stressful, you increase your motivation to do something about how you react to them. How we deal with these situations then depends both on the situation itself and our own coping styles. These strategies may be simple or complex, but there are virtually unlimited strategies available to the imaginative mind.

People with social phobia suffer from anxiety in social situations to a far greater extent than other people because their reaction to stress often results in a form of anxiety which seems to perpetuate itself. The individual who suffers from social anxiety may be experiencing an anxiety "feedback loop". In response to social interaction the individual may experience one or more of the above mentioned bodily reactions. The bodily reaction may then stress the individual further, thereby becoming a stressor in itself, which will thereby intensify the bodily reaction, and a vicious circle is created. It makes sense then, that if we could control these bodily responses, we could gain some control over our anxiety.

Learning to relax then is an important component of anxiety management. Relaxation has been shown to produce a lasting reduction in stress-related symptoms if practiced for ten to twenty minutes twice a day. Relaxation decreases physical arousal to stressors. There are many ways to relax but each method has in common removing yourself from all sources of disturbance and just sitting quietly. No specific technique has been proven to be superior. Many people are uncomfortable with quietness, having been bombarded with stimulation every waking minute of their lives. They have not learned how to just sit and relax. An excellent way to relax is just to let it happen at its own pace, maintaining a passive attitude. Everyone is capable of this skill.

Appendix H

HOMEWORK CONTRACT (Experimental Group)

I, _____ agree to practice my breathing exercises for 10 to 20 minutes two times per day. I will practice: _____ (place) at _____ and _____ (times) each day.

In addition, I will keep a diary when and where I feel anxious and how I deal with the situation.

_____

(Signature)

Appendix I

HOMEWORK CONTRACT (Control Group)

I, _____ agree to practice relaxing for 10 to 20 minutes two times per day. I will Practice: _____ (place) at _____ and _____ (times) each day.

In addition, I will keep a diary when and where I feel anxious and how I deal with the situation.

_____

(Signature)

HOMEWORK CHART (Experimental Group)

Breathing Exercises

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15	Day 16

Anxiety Diary

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15	Day 16

ASSIGNMENT COMPLETION CHART

Place a star (*) in the appropriate box each time you practice your breathing techniques (twice a day) and each time you fill out your Anxiety Diary (at least once a day).

Appendix K

HOMEWORK CHART (Control Group)

Relaxation Exercises

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15	Day 16

Anxiety Diary

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15	Day 16

ASSIGNMENT COMPLETION CHART

Place a star (*) in the appropriate box each time you practice your breathing techniques (twice a day) and each time you fill out your Anxiety Diary (at least once a day).

Appendix L

INITIAL DISCUSSION FOR EXPERIMENTAL GROUP

When most people enter a social situation where social interaction is to take place, they experience some degree of nervousness, particularly if they are meeting someone for the first time. For some people this nervousness is soon overcome as the social interaction progresses, however, for others, possibly such as yourself, the nervousness may continue and possibly even worsen to the point where social interaction becomes very uncomfortable. People who fear social interaction often experience particular bodily changes and sensations when entering social situations. Would you describe to me some of the sensations or feelings and thoughts you experience when you enter the social situations which you have listed as anxiety arousing?

Would you also describe to me the usual way in which you cope with these sensations and feelings?

Those who suffer from social anxiety may experience an anxiety "feedback loop" that perpetuates the anxiety reaction. In response to social interaction the person may experience bodily sensations, such as the ones you have listed (hopefully). This bodily reaction may stress the person further, becoming stressful in and of itself, which would then intensify the bodily reaction, and a vicious circle is created. It makes sense then, to try to control these bodily reactions. Respiration control is one method where we can gain some control over our bodily reaction. While it would be very difficult to slow our heart rate down or to stop sweating, it is relatively easy to slow down our respiration rate and to increase respiration depth. Right now I'd like you to keep track of how many breaths you take, without altering your normal breathing pattern, in order that we can get a baseline of your normal respiration rate. When I tell you to begin, start counting the number of breaths you take. (Time for a minute)

(Relate to the subject the normal breathing rate [12-14 cycles per minute], and explain that during stressfull situations their respiration rate is bound to be even higher.)

Respiration control is perhaps one of the oldest stress management techniques around, being used in such practices as Yoga, Meditation, and Progressive Relaxation. An advantage of the technique is the ease with which it can be learned. Right now see if you can lower your rate of breathing in comparison to the rate you just did. When I tell you to begin, try to slow your breathing rate down and keep track of the number of breaths you take. (Time for a minute).

(Discuss the result, i.e., any sensations that accompanied the change, any difficulties that were met, etc.)

The particular method of respiration control we are going to use for this treatment is called "Three Part Breathing". This method combines the training of total use of the lungs for breathing, with emphasis on diaphragmatic breathing (the lower stomach area), as well as having you slow down your rate of breathing to a particular level. "Faulty" breathers often make inefficient use of their lungs by breathing thoracically (only using the upper chest), and thereby only using the upper part of their lungs. This type of breathing has been shown to be related to feelings of anxiety. This type of breathing also often immobilizes the diaphragm creating tension and rigidity of the musculature in this area (demonstrate). Three part breathing then will serve to facilitate full use of the lungs and to mobilize and relax the musculature of the diaphragm.

Right now then I'd like us to get started with practicing this technique. Before we do are there any questions?

Appendix M

THREE PART BREATHING INSTRUCTIONS (In session)

In the breathing therapy I am about to teach you , the eventual aim will be to have you slow down your rate of breathing to about 6 cycles or breaths per minute. Before focusing on this aspect, however, it is important that you first learn how to breathe properly so as to facilitate a more relaxed style of breathing which will allow a slower rate of breathing to occur more comfortably.

Many of us breathe shallowly from the upper chest area only, particularly when we are tense or anxious. Because we often do this not much air is taken in and we are consequently forced to take breaths more frequently. To alter this we want to breathe more deeply into the abdomen or the tummy area, to allow more room for air.

I want to begin by having you place one hand on your abdomen here (show) and the other hand on your chest here (show) in order for you to feel the expansion and contraction of the separate [redacted] which accompany your breathing. (Wait a minute). Now I want you to focus on your abdomen and breathe deeply down into your tummy area so that you fill it completely raising your lower hand. Now do it again and this time when your abdomen is full, let the mid-ribs swing out and up a bit, and then finally allow the upper chest to expand. When you exhale reverse the process by first letting the air go from the upper chest area, thereby lowering your upper hand first, then from the mid-ribs, and then finally from your belly.

It is important that when you breathe in you do not quickly suck the air in, but rather that you draw the air in gradually, slowly expanding the tummy area. When you breathe in deeply do not thrust your stomach out, rather let your stomach rise slowly with the air being drawn in, completely filling in the space you are creating. Imagine that the air is water flowing into a pot which is slowly

expanding, filling it from the bottom up, right to the brim. When you exhale, remember to exhale the air from your chest first, and then from your mid-ribs, and finally from your abdomen. When you exhale it is important that you allow all the air to escape, so as to allow fresh new air to enter your lungs. This will allow you to take longer breaths, thereby slowing down your rate of breathing, and will facilitate your relaxation.

Again then let's try it together. Breathe deeply, slowly allowing your tummy to expand and just let the air flow in. Slowly it moves your mid-ribs up and out, and then finally allow the chest to expand without forcing or thrusting it out, and allow in more air. Now, slowly exhale by first letting your chest contract, and then your mid-ribs, and finally your tummy, letting all the air out, making room for more fresh air. (Repeat this process once more)

When you have become comfortable with this style of breathing and have established a rhythm, add a slight pause after each inhalation, before exhaling. Inhale by allowing the stomach to expand, then the mid-ribs and finally the chest, and then hold (1 second), and then slowly exhale. As well, I want you to add an even longer pause after the exhalation before inhaling again. Do not pause so long that it becomes uncomfortable, just pause as long as is comfortable for you. These pauses will help you slow down your breathing even more and deepen your relaxation. Let's try it together then. Slowly allow the air to flow in causing the abdomen to expand, then the mid-ribs, and finally the chest. Now hold (1 sec.) and then slowly let the air out completely by first contracting the chest, and then the mid-ribs, and finally the tummy. When all the air is out hold it for as long as is comfortable and then begin the process all over again.

Now that we have established how to breathe properly, we will focus on breathing more slowly. We'll start off by breathing at ten cycles or breaths per minute, which is just slightly lower than the average. This means that we'll be breathing in and out once every six seconds. I want you to inhale deeply and pause over the first two seconds, and then for the last four seconds I want you to

exhale and pause. I will indicate when you are to breathe in and when you are to breathe out. Remember to breathe diaphragmatically and deeply as you have learned.

Okay, let's begin. Breathe in deeply and hold (two secs). And now exhale slowly and hold (four secs). Again inhale and hold (two secs). Now let the air all out slowly and hold (four secs). (Do for one minute).

(Ask questions about how it felt, and give a two minute break)

Before we slow the breathing down further I want to do the ten c.p.m. breathing again one more time. (Same process followed by a two minute break)

Now we are going to bring the breathing rate down to six cycles per minute, which will allow us to breathe more deeply, and naturally more slowly, and will therefore deepen the relaxation. This means that we will be breathing in and out once every ten seconds. I want you to inhale and pause over the first four seconds, and then for the last six seconds I want you to exhale and pause. Again I will indicate to you when you are to breathe in and when you are to breathe out. Try to fill your lungs completely, without forcing your abdomen or chest, and then to slowly let the air out.

Lets begin. Breathe in deeply and hold (four secs). And now exhale slowly and hold (six secs). Again inhale and hold (four secs) and then let all the air out slowly and hold (six secs). (Continue for one minute)

(Ask questions about how it felt, and give a two minute break)

(Repeat the process for 6 c.p.m.)

Appendix N

INITIAL DISCUSSION FOR THE CONTROL GROUP

When most people enter a social situation where social interaction is to take place, they experience some degree of nervousness, particularly if they are meeting someone for the first time. For some people this nervousness is soon overcome as the social interaction progresses, however, for others, possibly such as yourself, the nervousness may continue and possibly even worsen to the point where social interaction becomes very uncomfortable. People who fear social interaction often experience particular bodily changes and sensations when entering social situations. Would you describe to me some of the sensations or feelings and thoughts you experience when you enter the social situations which you have listed as anxiety arousing?

Would you also describe to me the usual way in which you cope with these sensations and feelings?

Those who suffer from social anxiety may experience an anxiety "feedback loop" that perpetuates the anxiety reaction. In response to social interaction the person may experience bodily sensations, such as the ones you have listed (hopefully). This bodily reaction may stress the person further, becoming stressful in and of itself, which would then intensify the bodily reaction, and a vicious circle is created. It makes sense then, to try to control these bodily reactions. Focusing on the relaxation of particular body areas can bring about reductions of body stress. Right now I'd like you to focus your attention on the tensions within your body. Where are you experiencing tension right now? Now, sitting quietly I'd like you to try to relax away that tension.

(Discuss the result, i.e., any sensations that accompanied the focus on relaxation, any difficulties that were met, etc.)

There are many ways to relax, but each method has in common removing yourself from all sources of disturbance and just sitting quietly. What I'd like you to do now then, is to try to empty your mind of all distracting thoughts and just sit quietly and relax for the next fifteen minutes.

Appendix O
ANALYSIS OF VARIANCE TABLES

1. Oneway Analysis of Variance Between Groups on Demographic Measures.

2. Oneway Analysis of Variance Between Groups on Initial Self-Report Variables.

3. Two (Group) by Three (Session) Repeated Measures Multiple Analysis of Variance on Self-Report Variables Using Sequential Sum of Squares.

4. Two (Groups) by Two (Session) Repeated Measures Multiple Analysis of Variance on Self-Report Variables Using Sequential Sum of Squares.

5. Oneway Analysis of Variance Between Groups on Initial Physiological Measures within Treatment Sessions.

6. Two (Group) by Two (Period) Repeated Measures Multiple Analysis of Variance on Physiological Variables Within Treatment Sessions using Sequential Sum of Squares.

7. Oneway Analysis of Variance Between Groups on Initial Physiological Measures within the Social Interaction Test.

8. Two (Group) by Two (Session) Repeated Measures Multiple Analysis of Variance on Physiological Variables within the SIT using Sequential Sum of Squares.

9. Oneway Analysis of Variance Between Groups on Initial Behavioural Measures.

10. Two (Group) by Two (session) Repeated Measures Multiple Analysis of Variance on Behavioural Variables using Sequential Sum of Squares.

TABLE O-1

Oneway Analysis Of Variance Between Groups on Demographic Measures

Variable and Source of Variation	D.F.	S.S.	M.S.	F	p
AGE					
Between Groups	1	105.80	105.80	0.97	.337
Within Groups	18	1956.00	108.67		
Total	19	2061.80			
EDUCATION (Years)					
Between Groups	1	0.45	0.45	0.65	.430
Within Groups	18	12.50	0.69		
Total	19	12.95			
DRUG USAGE (1 = used 2= not used)					
Between Groups	1	0.45	0.45	1.98	.177
Within Groups	18	4.10	0.23		
Total	19	4.55			
SEX (1 = male 2 = female)					
Between Groups	1	0.05	0.05	0.24	.628
Within Groups	18	3.70	0.21		
Total	19	3.75			
PSYCHOLOGICAL TREATMENT (1 = prior use 2 = no prior use)					
Between Groups	1	0.20	0.20	0.90	.350
Within Groups	18	4.00	0.22		
Total	19	4.20			

TABLE O-2

Oneway Analysis of Variance Between Groups on Initial Self-Report Variables

Variable and Source of Variation	D.F.	S.S.	M.S.	F	p
WILLOUGHBY P.S					
Between Groups	1	264.50	264.50	1.28	.281
Within Groups	16	3392.44	212.03		
Total	17	3656.94			
SOCIAL SITUATIONS QUESTIONNAIRE					
Between Groups	1	460.06	460.06	1.25	.280
Within Groups	16	5885.56	367.85		
Total	17	6345.61			
FEAR QUESTIONNAIRE					
Main Phobia					
Between Groups	1	0.06	0.06	0.02	.891
Within Groups	16	46.22	2.89		
Total	17	46.28			
Global Phobia					
Between Groups	1	16.06	16.06	4.31	.054
Within Groups	16	59.56	3.72		
Total	17	75.61			
Total Phobia					
Between Groups	1	2156.06	2156.06	6.75	.020
Within Groups	16	5114.44	319.65		
Total	17	7270.50			
Anx./Dep.					
Between Groups	1	8.00	8.00	0.11	.744
Within Groups	16	1158.44	72.40		
Total	17	1166.44			

TABLE O-2 (Cont'd)

Oneway Analysis of Variance Between

Groups on Initial Self-Report Measures

Variable and Source of Variation	D.F.	S.S.	M.S.	F	p
SYMPTOM QUESTIONNAIRE					
Somatic					
Between Groups	1	1.39	1.39	0.00	.947
Within Groups	16	4828.89	301.81		
Total	17	4830.28			
Cognitive					
Between Groups	1	14.22	14.22	0.08	.775
Within Groups	16	2682.89	167.68		
Total	17	2697.11			
Behavioural					
Between Groups	1	50.00	50.00	0.81	.380
Within Groups	16	982.00	61.38		
Total	17	3552.94			
SOCIAL DIARY					
Between Groups	1	50.00	50.00	0.81	.380
Within Groups	16	982.00	61.38		
Total	17	1032.00			
FEAR THERMOMETER					
Between Groups	1	1701.39	1701.39	0.76	.396
Within Groups	16	35838.22	2239.89		
Total	17	37539.61			
STAI					
Between Groups	1	45.00	45.00	0.79	.387
Within Groups	18	1029.20	57.18		
Total	19	1074.20			
SELF EFFICACY					
Between Groups	1	59.73	59.73	1.23	.288
Within Groups	13	632.00	48.62		
Total	14	691.73			

TABLE O-3

Two (Group) By Three (Session) Repeated Measures

Multiple Analysis of Variance on Self-report Variables

Using Sequential Sum of Squares

Variable and Source of Variation	D.F.	S.S.	M.S.	F	p
WILLOUGHBY P.S.					
Within Cells	32	3130.07	97.81		
Session	2	6796.26	3398.13	34.74	.000
Group by Session	2	20.30	10.70	0.10	.902
SOCIAL SITUATIONS QUESTIONNAIRE					
Within Cells	32	5081.70	158.80		
Session	2	10839.37	5419.69	34.13	.000
Group by Session	2	41.59	20.80	0.13	.878
FEAR QUESTIONNAIRE					
Main Phobia					
Within Cells	32	60.81	1.90		
Session	2	180.26	90.13	47.43	.000
Group by Session	2	4.93	2.46	1.30	.288
Global Phobia					
Within Cells	32	44.96	1.41		
Session	2	105.04	52.52	37.38	.000
Group by Session	2	9.33	4.67	3.32	.049
Agoraphobia					
Within Cells	32	855.70	26.74		
Session	2	774.93	387.46	14.49	.000
Group by Session	2	128.70	64.35	2.41	.106

TABLE O-3(Cont'd)

Two (Group) By Three (Session) Repeated Measures

Multiple Analysis of Variance on Self-report Variables

Using Sequential Sum of Squares

Variable and Source of Variation	D.F.	S.S.	M.S.	F	p
FEAR QUEST. (CONT'D)					
Blood/Injury					
Within Cells	32	905.85	28.31		
Session	2	277.15	138.57	4.90	.014
Group by Session	2	114.33	57.17	2.02	.149
Social Phobia					
Within Cells	32	971.56	30.36		
Session	2	1983.44	991.72	32.66	.000
Group by Session	2	13.00	6.50	0.21	.808
Total Phobia					
Within Cells	32	4793.63	149.80		
Session	2	7926.26	3963.13	26.46	.000
Group by Session	2	638.78	319.19	2.13	.135
Anx./Dep.					
Within Cells	32	1406.74	43.96		
Session	2	2302.78	1151.39	26.19	.000
Group by Session	2	25.15	12.57	0.29	.753
SYMPTOM QUESTIONNAIRE					
Somatic					
Within Cells	32	5671.26	177.23		
Session	2	8940.26	4470.13	25.22	.000
Group by Session	2	911.15	455.57	2.57	.092
Cognitive					
Within Cells	32	4290.15	134.07		
Session	2	6674.04	333.02	24.89	.000
Group by Session	2	157.87	78.91	0.59	.561
Behavioural					
Within Cells	32	4387.41	137.11		
Session	2	6532.15	3266.07	23.82	.000
Group by Session	2	43.11	21.56	0.16	.855

TABLE O-4

Two (Group) By Two (Session) Repeated Measures

Multiple Analysis of Variance on Self-report Variables

Using Sequential Sum of Squares

Variable and Source of Variation	D.F.	S.S.	M.S.	F	p
SOCIAL DIARY					
Within Cells	18	638.85	35.49		
Session	1	1199.02	1199.02	33.78	.000
Group by Session	1	0.62	0.62	0.02	.896
FEAR THERMOMETER					
Within Cells	18	24036.25	1335.35		
Session	1	29648.03	29648.03	22.20	.000
Group by Session	1	27.23	27.23	0.02	.888
STAI (Session 1)					
Within Cells	18	433.25	24.07		
Session	1	1334.02	1334.02	55.42	.000
Group by Session	1	0.23	0.23	0.01	.924
STAI (Session 5))					
Within Cells	18	679.05	37.72		
Session	1	378.22	378.22	10.03	.005
Group by Session	1	55.23	55.23	1.46	.242
SELF EFFICACY					
Within Cells	15	313.00	20.87		
Session	1	819.06	819.06	39.25	.000
Group by Session	1	11.53	11.53	0.55	.469

TABLE O-5

Oneway Analysis of Variance Between Groups on Initial Physiological Measures within Treatment Sessions

Variable and Source of Variation	D.F.	S.S.	M.S.	F	p
HEART RATE					
Between Groups	1	65.74	65.74	0.16	.693
Within Groups	13	5225.59	401.97		
Total	14	5291.33			
RESPIRATION RATE					
Between Groups	1	100.00	100.00	3.69	.075
Within Groups	14	379.00	27.07		
Total	15	479.00			
SKIN CONDUCTANCE					
Between Groups	1	264.06	264.06	0.27	.614
Within Groups	14	13852.38	989.46		
Total	15	14116.44			

TABLE O-6

Two (Group) By Two (Period) Repeated Measures

Multiple Analysis of Variance on Physiological Variables

Within Treatment Sessions Using Sequential Sum of Squares

Variable and Source of Variation	D.F.	S.S.	M.S.	F	p
HEART RATE					
Session 1					
Within Cells	15	1476.44	98.43		
Period	1	379.61	379.61	3.86	.068
Group by Period	1	5.50	5.50	0.06	.816
Session 5					
Within Cells	16	173.00	10.81		
Period	1	36.00	36.0	3.33	.087
Group by Period	1	25.00	25.00	2.31	.148
RESPIRATION RATE					
Session 1					
Within Cells	16	144.89	9.06		
Period	1	132.25	132.25	14.60	.002
Group by Period	1	61.36	61.36	6.78	.019
Session 5					
Within Cells	17	149.69	8.81		
Period	1	74.57	74.57	8.47	.010
Group by Period	1	68.78	68.78	7.81	.012
SKIN CONDUCTANCE					
Session 1					
Within Cells	15	4961.44	330.76		
Period	1	3200.33	3200.33	9.68	.007
Group by Period	1	250.44	250.44	0.76	.398
Session 5					
Within Cells	17	3139.36	184.67		
Period	1	9416.85	9416.85	50.99	.000
Group by Period	1	344.22	344.22	1.86	.190

TABLE 0-7

Oneway Analysis of Variance Between Groups on Initial Physiological Measures within the Social Interaction Test

Variable and Source of Variation	D.F.	S.S.	M.S.	F	p
HEART RATE					
Anticipation Phase					
Between Groups	1	138.29	138.29	0.34	.571
Within Groups	12	4879.14	406.60		
Total	13	5017.43			
Interaction Phase					
Between Groups	1	528.29	528.29	1.60	.231
Within Groups	12	3973.71	331.14		
Total	13	4502.00			
RESPIRATION RATE					
Anticipation Phase					
Between Groups	1	30.12	30.12	2.09	.169
Within Groups	15	216.00	14.40		
Total	16	246.12			
Interaction Phase					
Between Groups	1	168.40	168.40	5.52	.033
Within Groups	15	457.72	30.51		
Total	16	626.12			
SKIN CONDUCTANCE					
Anticipation Phase					
Between Groups	1	564.18	564.18	0.48	.501
Within Groups	15	17764.88	1184.33		
Total	16	18329.06			
Interaction Phase					
Between Groups	1	438.96	438.96	0.17	.684
Within Groups	15	38330.09	2555.34		
Total	16	38769.06			

TABLE O-8

Two (Group) by Two (Session) Repeated Measures Multiple Analysis of Variance on Physiological Variables within the SIT using Sequential Sum of Squares

Variable and Source of Variation	D.F.	S.S.	M.S.	F	p
HEART RATE					
Anticipation Phase					
Within Cells	13	1475.75	113.52		
Session	1	523.72	523.72	4.61	.050
Group by Session	1	19.72	19.72	0.17	.684
Interaction Phase					
Within Cells	13	1367.65	105.20		
Session	1	483.21	483.21	4.59	.050
Group by Session	1	162.81	162.81	1.55	.235
RESPIRATION RATE					
Anticipation Phase					
Within Cells	17	135.58	7.98		
Session	1	152.42	152.42	19.11	.000
Group by Session	1	30.32	30.32	3.80	.068
Interaction Phase					
Within Cells	17	310.11	18.24		
Session	1	15.47	15.47	0.85	.370
Group by Session	1	15.47	15.47	0.85	.370
SKIN CONDUCTANCE					
Anticipation Phase					
Within Cells	16	4866.74	304.17		
Session	1	248.51	248.51	0.82	.379
Group by Session	1	2124.51	14.51	0.71	.413
Interaction Phase					
Within Cells	16	19240.24	1202.51		
Session	1	15.90	15.90	0.01	.910
Group by Session	1	505.01	505.01	0.42	.526

TABLE O-9

Oneway Analysis of Variance Between

Groups on Initial Behavioural Measures

Variable and Source of Variation	D.F.	S.S.	M.S.	F	p
VOICE QUALITY					
Between Groups	1	18.68	18.68	2.79	.114
Within Groups	16	107.10	6.69		
Total	17	125.78			
NON-VERBAL					
Between Groups	1	7.23	7.23	1.22	.286
Within Groups	16	94.78	5.92		
Total	17	102.00			
CONVERSATION					
Between Groups	1	44.80	44.80	1.56	.230
Within Groups	16	460.98	28.81		
Total	17	505.78			
SIT TOTAL					
Between Groups	1	195.07	195.07	2.35	.145
Within Groups	16	1327.88	82.99		
Total	17	1522.94			

TABLE O-10

Two (Group) by Two (Session) Repeated Measures

Multiple Analysis of Variance on Behavioural Variables

using Sequential Sum of Squares

Variable and Source of Variation	D.F.	S.S.	M.S.	F	p
VOICE QUALITY					
Within Cells	16	93.80	5.86		
Session	1	99.76	99.76	17.02	.001
Group by Session	1	11.76	11.76	2.01	.176
NON-VERBAL					
Within Cells	16	75.45	4.72		
Session	1	64.80	64.80	13.74	.002
Group by Session	1	5.69	5.69	1.21	.288
CONVERSATION					
Within Cells	16	487.80	30.49		
Session	1	317.34	317.34	10.41	.005
Group by Session	1	14.45	14.45	0.47	.501
SIT TOTAL					
Within Cells	16	1201.74	75.11		
Session	1	1298.73	1298.73	17.29	.001
Group by Session	1	96.07	96.07	1.28	.275