AN EVALUATION OF A BEHAVIOURAL TREATMENT PROGRAMME DIRECTED AT REDUCING PAIN ANTICIPATION VERSUS ONE DIRECTED AT USING DISTRACTION AS A COPING STRATEGY IN PATIENTS WITH DISPROPORTIONATE DENTAL ANXIETY

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BY

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A Thesis Submitted to the School of Graduate Studies
in Partial Fulfilment of Requirements for the Degree of
Master of Science

Department of Psychology
Memorial University of Newfoundland
February, 1986

St. John's Newfoundland

ISBN 0-315-30999-7

ABSTRACT

Many studies investigating dental anxiety have concluded that dentally anxious individuals anticipate more pain than they actually experience during dental treatment. In view of this, a four week treatment programme based on relaxation and exposure in imagination was varied to include training in reconstruing pain anticipation realistically (experimental group) or distraction and thought stopping techniques to deal with anxiety responses (control group). A comparison was made of the relative efficacy of the two approaches.

Twelve disproportionately dentally anxious individuals who answered a newspaper advertisement were selected on the basis of their scores on a dental anxiety scale. The clients were divided equally into two groups matched for age, level of dental anxiety and length of time since last dental visit. The programmes were carried out on a weekly basis by a clinical psychology graduate student and a clinical psychologist. Outcome was evaluated on the basis of dental anxiety scale scores, a measure of general anxiety, expectations of pain, and expectations of being able to keep a dental appointment, as well as actually visiting a dentist. Both programmes brought significant decreases in dental anxiety and pain expectations, with all subjects making an appointment and attending this initial visit. The inclusion of pain anticipation information, however, did not enhance treatment to the degree expected. On a measure of general anxiety, members of the experimental group rated themselves as less behaviourally avoidant at programme completion. This was thought to augur better for future dental visits

ACKNOWLEDGEMENTS

Sincere thanks and appreciation to Dr. Andrée Liddell, my thesis supervisor, for her collaboration and encouragement. Thanks, also, to thesis committee members Dr. Christopher Bilsbury and Dr. John Evans for their helpful suggestions, and to the School of Graduate Studies for its financial support.

I am grateful for the efficient typing ability of Donna Budgell and to Patricia Murray and Gloria Cabaluna for their special consideration.

To Jack Lawson and Elizabeth Perry I extend "honourariums" of the highest order for their always available Scribe and statistics help. Jack - thanks for the figures!

The ongoing support of Stephanie Michael and Elizabeth Perry will invariably be remembered with fond appreciation. Mary Walsh-Doran: for your teachings in perseverance, I will always be indebted.

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The first extensive study of dental anxiety, an American national survey conducted in 1955, estimated the incidence of dental phobia at close to 5% of the general population (Freidson and Feldman, 1958). More recent studies suggested that two to three times as many people avoid dental treatment because of fear (Gatchel, Ingersoll, Bowman, Robertson and Walker, 1983; Scott and Hirschman, 1982). Ayer, Domoto, Gale, Joy and Melamed (1983) reported 10 to 12 million Americans as dental phobics while another 35 million were estimated to experience excessive anxiety about dental visits. In the light of these overwhelming statistics, fear of dentistry is an interesting topic of study for psychologists as well as dentists. Although basically similar to other fears and treated successfully by techniques used with other phobias, it differs from many anxiety-related problems. For instance, Melamed (1979) suggested that a degree of dental apprehension is realistic since there exists a "rational" component which stems from varying levels of discomfort that *might* be experienced during dental visits. Therefore, dental fear seems unlike other clinical fears which are "irrational" in the sense that the circumstances involved (e.g., tests, speeches, many insects and small animals) are not objectively harmful (Melamed, 1979).

The literature on which this investigation is based was reviewed in two parts. The first section examines the apprehension of pain felt by dentally anxious individuals and discusses these apprehensions in terms of anticipatory anxiety, pain expectations, pain perception and memory of dental pain. The second section reviews behavioural treatments for dental anxiety.

Apprehension of Dental Pain

Anticipatory Anxiety / Pain Expectations

In recent years much of the psychological literature directed at studying dentistry, as a source of stress, demonstrated the important role of anticipatory anxiety. In a factor analysis of the Dental Fear Survey (Kleinknecht, Klepac and Alexander, 1973) based on responses obtained from 933 individuals, Kleinknecht, McGlynn, Thorndike and Harkavy (1984) identified three stable and reliable factors which contributed to dental fear. "Patterns of dental avoidance and anticipatory anxiety" was recognized as the first factor (accounting for 24.35% of total variance). The second and third factors, accounting for 24.95% and 18.53% of the variance respectively, were "fear related to specific dental stimuli and procedures" and "physiological arousal during dental treatment." These results showed that the three modes of anxiety responding were in evidence. More importantly, anticipatory anxiety was shown to play a prominent role in the cognition of dentally anxious individuals.

Jackson (1978) carried out a study which investigated responses from 657 participants based on an analysis of the Jackson Dental Fear Survey, a 60 item questionnaire which was subsequently reduced to eight factors (high stress events, low stress events, put-downs, cavity probing, anticipation, drill and clean, lack of control, nitrous oxide). He concluded that excessive fear experienced by phobic patients as compared to non-phobics (college students, scheduled dental patients, dental hygienists and dentists) centered around the anticipation of dental procedures.

More recently, Blackwood and Liddell (1985) reported that high and prolonged levels of anticipatory anxiety were found in individuals with disproportionate dental anxiety. Their study, which involved 60 students of both sexes investigated cognitive factors related to dental fear. Significant differences in anxiety levels between high and low fear participants were found under the first two conditions listed in the Corah Dental Anxiety Scale (DAS) (Corah, 1969): (a) day before the appointment, and (b) in the waiting room, but not in the other two conditions (waiting for the drill, waiting for teeth to be cleaned). These findings indicated that individuals with dental anxiety worry longer about dental treatment than those with low anxiety levels.

Other studies indicated that dental patients, in general, possess heightened anticipation of pain with regards to dental treatment. Kleinknecht and Bernstein (1978) assessed 128 patients on multiple measures, among which estimates of expected pain and ratings of actual pain experienced were taken. Findings indicated that patients, in general, expect more pain than they actually experience. Discrepancy between the expected intensity of sensations and the actual intensity experienced is again evident in Lindsay, Wege and Yates' (1984) study in which 29 individuals received an injection and drilling procedure. Participants overestimated the levels of discomfort, apprehension and intensity of sensations they actually experienced.

Further studies suggested, however, that many of those who expect excessive pain during dental treatment suffer from or experience dental anxiety (Jackson, 1978; Kent, 1984; Kleinknecht and Bernstein, 1978; Lindsay et al., 1984; Wardle, 1982; Wardle, 1984). Wardle (1982) found the most common reason given for

dental fear was anticipated pain (i.e., inaccurate and negative expectations regarding pain). When administered scales designed to rate anticipated anxiety, anticipated pain and actual pain experienced during treatment 33% of 120 volunteer participants (regular and nonregular attenders visiting cooperating clinics) gave expected pain as the sole reason for their fear. An additional 44% explained their dental fear as due to fear of pain along with fear of unpleasantness. Fearless patients (those who exhibited no anxiety in the waiting room) showed accurate expectations toward dental pain (i.e., many less fearless than fearful patients expected treatment to be painful). In a similar study, Wardle (1984) again investigated the relationship between anticipated pain and actual pain experienced as regards dental treatment. Based on responses from 25 women and 26 men, findings indicated that fearful patients expected dental treatment to be painful, thus displaying inaccurate and negative expectations about treatment. The fearless patients, however, had accurate expectations, anticipating little or no pain.

Comparable results were illustrated by Kent (1984) who looked at 76 patients attending the dentist for (a) a check-up or (b) a filling or extraction. By using the Corah DAS (Corah, 1969) to determine level of anxiety and 100 point scales to rate expected pain and actual pain experienced he found that highly anxious patients expected more pain than they actually experienced for drilling and extraction procedures than low anxiety individuals. The low anxiety patients were accurate in their expectations no matter which treatment they were to undergo.

Based on these studies, it is suggested that anticipation of pain plays an

important role in dental anxiety and this aspect should be considered when designing a treatment programme.

Pain Perception

A number of reports suggested that an individual's perception of pain is influenced by the level of anxiety felt by that person. In a review of studies investigating the relationship between pain and anxiety, Sternbach (1968) concluded that the greater a person's anxiety, the greater her/his reaction towards pain. Lautch (1971) found that dental phobics exhibited lower pain thresholds than control subjects. More recent studies, also, found that anxious patients are more sharply aware of or sensitive to discomfort and pain than those who are not anxious (Forgione and Clark, 1974; Green and Green, 1984; Liddell and May, 1984; Seymour, 1983; Woolgrove, 1983) and that anxiety primarily determines the amount of pain experienced during dental treatment (Foreman, 1979). These findings are directly related to those of pain expectation. If highly anxious people anticipate pain it is possibly due to the fact that their sensitivity to pain is greater than those of less anxious individuals.

Memory of Dental Pain

Many dentally anxious people cite a past painful dental experience as responsible for their fear (Lautch, 1971; Liddell and May, 1984). Kent (1985) found that the memory of dental pain (measured three months after dental treatment) is more closely associated with expected pain than experienced pain and that this finding holds particularly for highly anxious dental patients. Kent (1985) suggested that the difference between ratings of experienced and

remembered pain may be due to a reconstructive process that makes memory consistent with an individual's level of anxiety. In this way, dental anxiety is maintained as the memory of pain is reconstructed to a level greater than that actually experienced. In turn, this reconstruction serves to heighten expectations of pain as the next visit approaches. If, indeed, this cyclical process is ongoing, it is imperative that dentally anxious individuals be provided with skills that will enable them to combat their anxiety. Repeated exposure to comfortable dental experiences would allow the cycle of increased anxiety, heightened memory for pain, and heightened expectation of pain to be eliminated.

Summary

Anticipatory anxiety, especially anticipation of pain prior to dental treatment, was shown to be a prominent factor in maintaining dental anxiety. This finding, along with a proposed relationship between memory for dental pain and anticipated pain, serves to encourage variations in therapy which may make present psychological treatments more effective. Other results, thought to be directly related, found anxious patients as more sensitive to pain or as having lower pain thresholds than nonanxious patients.

Behavioural Treatments

In this review of behavioural treatments for dentally anxious adults, 26 studies which encompass various treatment techniques were examined. Included within these 26 investigations are 9 uncontrolled studies (see Table 1) and 17 controlled studies (see Table 2). Tables 1 and 2 summarize treatments and type

TABLE 1: Summary tabulation of uncontrolled behavioural treatment studies of dental anxiety

AUTHOR	TREATMENT	SESSIONS AND SETTING	SUBJECTS	OUTCOME
Beck, Kaul, Russell (1978)	cue-controlled relaxation	4 60-minute sessions setting: progressed from psychologist's office to dental chair	10 women with dental anxiety treated in groups of 5	- 8/10 or 80% saw dentist within 6 months
Berggren, Carlsson (1984a)	psychophysiological therapy (relaxation, biofeedback, desensitization)	Mean (# dependent on patients) = 6.3 15- to 30-minute sessions setting: as above	19 females, 5 males with severe fear treated individually*	- 21/24 or 88% completed dental treatment
Carlsson, Linde, Ohman (1980)	as above	Range = 4-11 sessions Mean (# dependent on patients) = 7.2 60-minute sessions setting: as above	8 females, 2 males with extreme fear treated individually*	- dental treatment possible for all

TABLE 1: Summary tabulation of uncontrolled behavioural treatment studies of dental anxiety (con't)

AUTHOR	TREATMENT	SESSIONS AND SETTING	SUBJECTS	OUTCOME
Eigenbrode, Affalter (1976)	relaxation plus emotive imagery with aggressive behavior to overcome fear	14 60-minute sessions setting: as above	1 male	- completed dental treatment
Kleinknecht, Bernstein (1979)	symbolic modeling, graded exposure in imagination, self-paced practice (in vivo)	less than 4 hours of therapist time setting: psychology office	1 female, 1 male (single case studies)	- both completed regular treatment at 1 year follow-up
Klepac (1975)	relaxation, systematic desensitization and pain tolerance**	1 session: hierarchy 8-12 sessions: relaxation 12-20 sessions: desensitization 6 sessions: pain tolerance setting: psychology office	5 dental avoiders treated individually*	- 3 visited dentist with success after relaxation - 2 visited dentist with success after added sessions in pain tolerance

TABLE 1: Summary tabulation of uncontrolled behavioural treatment studies of dental anxiety (con't)

AUTHOR	TREATMENT	SESSIONS AND SETTING	SUBJECTS	OUTCOME
Pinkham, Schroeder (1975)	visual imagery and "in vivo" desensitization	4 sessions in psychology office	1 female	- dental treatment tolerated successfully
Sheridan (1978)	narratives (diversion) with autosuggestive lead-in	1 session during dental treatment	134 subjects (not necessarily anxious) treated individually	- 92% stated tape dominated and distracted them from treatment
Wynne (1974)	"in vivo" desensitization and relaxation	12 30-minute sessions in dental office	1 male	- dental treatment completed

* group study but participants treated individually

** received only by two of the five participants in this study

TABLE 2: Summary tabulation of controlled behavioural treatment studies of dental anxiety

AUTHOR	TREATMENT	TYPE OF CONTROL	SESSIONS AND SETTING	SUBJECTS	OUTCOME
Berggren, Linde (1984)	Behavior therapy (B.T.): Desensitization and Biofeedback	General anesthetic (G.A.)	1 session of G.A. Number of B.T. sessions is not clear from study Setting: dental clinic (B.T.) hospital (G.A.)	99 phobics treated individually*	- B.T. more effective than G.A. as shown by greater decrease on Corah DAS, more programme completions, fewer broken appointments
Bernstein, Kleinknecht (1982)	Participant Modeling vs. Symbolic Modeling vs. Graded Exposure (as in standard systematic desensitization)	Attention Placebo and Exposure to non-threatening dental experience	8 60-minute sessions in psychology office	26 female, 7 male avoiders treated individually*	- all groups showed a significant reduction in state anxiety and anticipated pain from pre- to post-test - at 2 year follow-up: 50% - 87.5% returned to dentist - highest return shown in Participant Modeling group

TABLE 2: Summary tabulation of controlled behavioural treatment studies of dental anxiety (con't)

AUTHOR	TREATMENT	TYPE OF CONTROL	SESSIONS AND SETTING	SUBJECTS	OUTCOME
Corah, Gale, Illig (1978b)	Relaxation vs. Perceived Control vs. Distraction	Untreated control group	study required each subject to make 2 dental visits: 1) normal restoration 2) experimental condition	80 subjects (from general population, needing 2 fillings) treated individually*	- decrease in anxiety from visit 1 to visit 2 for Relaxation Group - subjects liked relaxation and distraction
Corah, Gale, Pace, Seyrek (1981)	Muscle Relaxation vs. Muscle Relaxation with conversational tone and pace vs. Travelogue	Untreated control group	as above	40 females, 40 males (requiring fillings) treated individually*	- consistent decrease in stress during second visit only in Standard Muscle Relaxation Group - content more important than style

TABLE 2: Summary tabulation of controlled behavioural treatment studies of dental anxiety (con't)

AUTHOR	TREATMENT	TYPE OF CONTROL	SESSIONS AND SETTING	SUBJECTS	OUTCOME
Denney, Rupert, Burish (1983)	GSR biofeedback vs. Desensitization vs. GSR biofeedback plus Desensitization	Untreated control group	4 45-minute sessions setting: unclear	45 fearful patients treated in groups	- all treatments successful in decreasing dental anxiety - combination treatment produced best results
Gauthier, Savard, Hallé, Dufour (1984)	Flooding vs. Coping Skills	Cross-over design	4 2-hour sessions at psychology clinic	14 subjects (who avoided for at least 2 years and refused an injection) treated in groups of 3 or 4	- flooding and coping skills were found equally effective in (a) increasing approach behaviour (b) decreasing subjective anxiety and (c) increasing perceived self-efficacy - combining the treatments showed further improvement which was maintained at 4-month follow-up

TABLE 2: Summary tabulation of controlled behavioural treatment studies of dental anxiety (con't)

AUTHOR	TREATMENT	TYPE OF CONTROL	SESSION AND SETTING	SUBJECTS	OUTCOME
Moran, Layng, Pursell (1976)	"in vivo" Emotive Imagery (pleasant descriptions) vs. Neutral Imagery (numbers)	Blank condition (silence)	1 session in dental office	27 females (for cleaning) treated individually*	- significantly less discomfort under "in vivo" emotive imagery
Illig, Corah, Cale (1978)	Perceived Control vs. Distraction vs. Relaxation	Untreated control group	study required each subject to make 2 dental visits: 1) normal restoration 2) experimental condition	30 females, 30 males (needing fillings) treated individually*	- Relaxation and Distraction = less perceived discomfort during treatment - no significant difference between Perceived Control and Control
Klepac, Hauge, Dowling, McDonald (1981)	Relaxation vs. Cognitive Coping Skills vs. Exposure to Stress vs. Combinations	Untreated control group	2, 4 or 6 30-minute sessions (depending on treatment) in laboratory	72 students (with above average fear) treated individually*	- cognitive coping skills and the interaction between relaxation and exposure to stress increased tolerance to arm shock - arm shock results did not generalize to tooth shock

TABLE 2: Summary tabulation of controlled behavioural treatment studies of dental anxiety (con't)

AUTHOR	TREATMENT	TYPE OF CONTROL	SESSIONS AND SETTING	SUBJECTS	OUTCOME
Lamb, Strand (1980)	14 minute Muscle Relaxation tape, 15 minutes before dental treatment	Untreated control group	1 session at dental office	25 female, 14 male regular dental patients treated individually*	- significant decrease in state anxiety from waiting room to contact with dentist for Relaxation Group
Mathews, Rezin (1977)	4 Flooding groups: 1) high arousal/ coping 2) high arousal/no coping 3) low arousal/ coping 4) low arousal/no coping	Relaxation control	4 60-minute sessions setting: unclear	50 adults treated individually*	- decrease in anxiety was found for the low fear situation/no coping rehearsal - effective is material which is realistic and of moderate intensity
McAmmond, Davidson, Kovitz (1971)	Relaxation vs. Hypnosis	Untreated control group	7 15-minute sessions setting: unclear	22 females, 5 males treated in groups	- at 5 month follow-up: more dental situation approach behavior for Hypnosis subjects

TABLE 2: Summary tabulation of controlled behavioural treatment studies of dental anxiety (con't)

AUTHOR	TREATMENT	TYPE OF CONTROL	SESSIONS AND SETTING	SUBJECTS	OUTCOME
Miller, Murphy, Miller (1978)	EMG feedback vs. Relaxation	"relax as best you can" condition	10 20-minute sessions in psychology office	17 females, 4 males with dental anxiety	- decrease in EMG levels for feedback and relaxation - both treatments significantly different from control
Moses, Hollandsworth (1981)	Education vs. Coping Skills plus Application Training vs. Education, Coping Skills and Application Training	Attention-Placebo	1 session (Range = 1-3 1/2 hours) in psychology office	20 female, 4 male dental phobics treated in groups	- education is insufficient alone - significantly more subjects from the 3 treatment groups scheduled appointments - significantly more subjects from the 2 treatments with coping skills kept their appointments

TABLE 2: Summary tabulation of controlled behavioural treatment studies of dental and anxiety (con't)

AUTHOR	TREATMENT	TYPE OF CONTROL	SESSIONS AND SETTING	SUBJECTS	OUTCOME
Shaw, Thoresen (1974)	Systematic Desensitization vs. Social Modeling with covert practice	Placebo Control and Waiting List Control	Maximum of 10 60-minute sessions (Range = 6.1 - 8.5 hours) in psychology office	27 female, 9 male dental avoiders treated individually*	- Modeling and Systematic Desensitization were significantly better than the 2 control groups - 78% of Modeling Group finished dental treatment as compared to 44% of Systematic Desensitization Group
Wardle (1983)	Sensation Information vs. Distraction vs. Perceived Control	Untreated control group	1 session in dental chair	39 females, 34 males visiting dentist treated individually*	- sensation information group showed significantly less anxiety and pain than controls - perceived control group showed significantly less pain than controls

TABLE 2: Summary tabulation of controlled behavioural treatment studies of dental and anxiety (con't)

AUTHOR	TREATMENT	TYPE OF CONTROL	SESSION AND SETTING	SUBJECTS	OUTCOME
Wroblewski, Jacob, Rehm (1977)	Symbolic Modeling and audiotaped Relaxation vs. Symbolic Modeling	Attention-Placebo	7 45-minute sessions setting: unclear	19 female, 8 male avoiders treated in groups	- significantly more of the Modeling plus Relaxation Group than the other 2 groups made a dental appointment - significantly more of the Modeling plus Relaxation Group than the other 2 groups underwent dental treatment

* group study; participants treated individually

of control group (if any) used, number of treatment sessions, the setting in which treatment took place, number and description of subjects, how subjects were treated (i.e., individual or group treatment) and treatment outcome.

Uncontrolled Studies

Four of the uncontrolled studies were presented as single case studies (Eigenbrode and Affalter, 1976; Kleinknecht and Bernstein, 1979; Pinkham and Schroeder, 1975; and Wynne, 1974), four as group studies with clients treated individually (Berggren and Carlsson, 1984a; Carlsson, Linde and Ohman, 1980; Klepac, 1975; and Sheridan, 1978), and one as a group study with clients treated in a group context (Beck, Kaul and Russell, 1978).

Therapies used varied from single procedures such as cue-controlled relaxation (Beck et al., 1978) and distraction (Sheridan, 1978) to treatment packages which combined procedures: relaxation, biofeedback and desensitization (Berggren and Carlsson, 1984a; Carlsson et al., 1980), relaxation and emotive imagery (Eigenbrode and Affalter, 1976), modeling, imaginal exposure and "in vivo" practice (Kleinkneckt and Bernstein, 1979), relaxation and systematic desensitization (Klepac, 1975), visual imagery and "in vivo" desensitization (Pinkham and Schroeder, 1975), and relaxation plus "in vivo" desensitization (Wynne, 1974). All treatments were reported as having successful outcomes.

The number of sessions ranged from 1 to 14 hourly meetings or 6 to 20^{+} 30-minute sessions (see Table 1 for details). Three of the treatment programmes were carried out solely in a psychologist's office, four held initial sessions in a psychologist's office and latter sessions in a dental office, while two programmes were carried out solely in a dental office.

Of the uncontrolled studies, all reported favourable results with significant numbers of clients completing dental treatment after intervention (see Table 1 for details).

Controlled Studies

Of the controlled studies, 12 were presented as group studies with clients treated individually (Berggren and Linde, 1984; Bernstein and Kleinknecht, 1982; Corah, Gale and Illig, 1978b; Corah, Gale, Pace and Seyrek, 1981; Horan, Layng and Pursell, 1976; Illig, Corah and Gale, 1978; Klepac, Hauge, Dowling and McDonald, 1981; Lamb and Strand, 1980; Mathews and Rezin, 1977; Miller, Murphy and Miller, 1978; Shaw and Thoresen, 1974; and Wardle, 1983) and five as group studies with clients treated in a group context (Denney, Rupert and Burish, 1983; Gauthier, Savard, Hallé and Dufour, 1984; McAmmond, Davidson and Kovitz, 1971; Moses and Hollandsworth, 1981; and Wroblewski, Jacob and Rehm, 1977). Seven of the treatment programmes were carried out at dental clinics, six were conducted in a psychologist's office, and one in a laboratory while three studies did not specify where treatment was conducted. Successful programmes have been carried out in all treatment settings. This would suggest that the actual treatment setting has little effect on treatment itself.

Therapies used and number and length of sessions vary widely and are listed in Table 2. Table 2 also lists the outcome for each of the controlled studies. Many forms of behavior therapy proved effective means for treating dental anxiety. Significant results were obtained using "in vivo" emotive imagery (Horan et al., 1976), distraction (Illig et al., 1978), modeling (Bernstein and Kleinknecht, 1982; Shaw and Thoresen, 1974), types of flooding (Gauthier et al.,

1984; Mathews and Rezin, 1977), hypnosis (McAmmond et al., 1971), biofeedback (Berggren and Linde, 1984; Denney et al., 1983; Miller et al., 1978), treatment providing coping skills (Gauthier et al., 1984; Moses and Hollandsworth, 1981) and systematic desensitization (Berggren and Linde, 1984; Denney et al., 1983; Shaw and Thoresen, 1974). Relaxation has been frequently used as a treatment procedure, alone or in combination with other treatment strategies. Clearly, outcomes of a positive nature were related to this form of treatment as seen in six of these controlled studies (see Table 2) (Corah et al., 1978b; Corah et al., 1981; Illig et al., 1978; Lamb and Strand, 1980; Miller et al., 1978; Wroblewski et al., 1977). On the other hand, although Klepac et al. (1981) found an increase in tolerance for arm shock from pretest to posttest in a cognitive coping skills condition and a condition combining relaxation and exposure to stress (arm shock), the results did not generalize to tooth shock. The findings suggested that an increase in unrelated pain tolerance proved ineffective in increasing pain tolerance for dental treatment and, in turn, decreasing dental anxiety.

Summary

A wide variety of behavioural treatments or combinations of such treatments have generally proven successful in reducing dental anxiety. Clearly, relaxation therapy has demonstrated its effect alone or in combination with other treatment components. It would appear that treatment outcome has remained relatively unaffected by actual length of treatment programmes or treatment settings.

Rationale for Present Study

Although recent studies have supported the premise that individuals who experience a significant degree of dental anxiety also possess inaccurate and negative expectations as regards dental pain (i.e., expect more pain than actually experienced during treatment), there have been no attempts at treatment directed to specifically change these inaccurate pain expectations. The vast majority of cited behavioural studies have attempted to decrease physiological symptoms related to the fear response or to distract patients from them. Although these have proven beneficial in their own right, a treatment which includes a component directed at reducing the anticipation of pain by changing inaccurate expectations would be expected to provide enhanced treatment effects.

Therefore, after consideration of the pain anticipation literature and past treatment studies, this research was undertaken to evaluate the usefulness of a treatment programme specifically targeted to reduce pain anticipation in dentally anxious individuals.

METHOD

Design

The main hypothesis to be tested was that a treatment programme directed at dealing *specifically* with anticipation of pain in dentally anxious individuals would alleviate dental anxiety more effectively than a treatment which did not.

To test the hypothesis, a behavioural treatment based on relaxation and exposure in imagination was designed and varied to include training in reconstruing pain anticipation realistically (experimental group) or distraction and thought stopping techniques to deal with anxiety responses (control group). The comparison of the two treatments was viewed as a two-factor experiment with repeated measurements on one factor (pre/posttreatment) (Winer, 1962).

Subjects

Participants were obtained by an advertisement (see Appendix A) which was placed in local newspapers, posted around the city and university campus, and circulated by Psychology professors to their respective classes.

Initial interviews took place individually at the Memorial University of Newfoundland Psychology Clinic and were arranged for all 17 respondents. Of these 17, three did not attend and were found to be no longer interested in treatment when contacted. Twelve (11 females, 1 male) of the 14 clients who were initially interviewed participated in the study; two remaining clients were unable to attend the scheduled treatment sessions because of previous

commitments. These two respondents were put on the clinic waiting list.

All interviewed respondents met the criterion for inclusion in the study; a score of 13 or above on the Corah Dental Anxiety Scale (DAS) (Corah, 1969) (see Appendix B and evaluation section for details). This cutoff is over one standard deviation above the mean which was established by Corah's original sample and is supported by Corah, Gale and Illig (1978a) as a cutoff point indicating problematic dental anxiety.

The 12 participants were divided equally and assigned to one of two treatment conditions. These groups were matched for age, level of dental anxiety (based on DAS), and time since last dental visit. Some accomodations were made in order for all clients to attend. Subjects were asked to commit themselves by attending all sessions and carrying out all homework assigned. Included within this was the expectation that they schedule a dental appointment at the appropriate point during the programme and, in turn, attend the appointment on its set date.

Therapists

Two therapists were involved in the treatments. One therapist carried out all initial interviews. Both therapists shared responsibilities during the treatment sessions.

Evaluation

During the initial interview a number of assessment measures were taken.

These included measures of pain anticipation, dental anxiety, and general anxiety:

Pretreatment Measures

Pain Anticipation. Pain anticipation was measured by use of Discan scaling (Singh and Bilsbury, 1984a, 1984b, 1985). The Discan is a method of repeated pair comparisons used to estimate levels of subjective experience in individuals and to assess their trend (clinical improvement) over time. This method of evaluation serves to eliminate a number of problems found when using conventional rating scales. Discans eliminate error due to anchoring bias, reduce chance error in response, have local control (reference levels are specific to the group) thus reducing error due to response set bias, have an internal reliability check and a high degree of precision.

The interactional card form of Type RCS-B was used, enabling individual scores from one to 14 to be collected. Comparison choices were presented at random based on a table of randomization for Discan presentation. The Discan Scale used was of Power Two with four levels. Replication of repeated comparisons appeared on levels 1 and 2b accounting for an internal reliability of 0.88, thus reducing the error probability (the chance of consistent responding, at random) to 0.12. The reliability of consistent responding may range from 0.20 (no replications) to 0.95 (all possible repeated comparisons are administered). The 0.88 level of reliability as regards consistent responding was chosen, in this study, as a compromise; the number of paired comparisons administered to each individual client and the time involved in this administration was kept at a reasonable level, while still enabling the internal reliability of response on these comparisons to be enhanced to the 0.88 level. The ability to increase the

reliability of responses by an internal consistency check is part of the Discan methodology which supports the use of Discans over rating scales which have no inbuilt reliability and cannot control for the possible inconsistency of responses.

Reference levels for the Expectation of Pain Discan (see Appendix C) were modified from a standard set of reference levels designed for the measurement of pain by Merskey (cited in Singh and Bilsbury, 1985). In addition, in order to better design the necessary set of preconstructed reference levels specific to pain anticipation as regards dental treatment, a pilot study was conducted. Twenty subjects (18 females, 2 male), ranging in age from 19 to 56 years ($\bar{x} = 23.4$), with Corah DAS scores ranging from six to 17 (12, low to average dental anxiety; 8, high dental anxiety), individually participated in the Max-Min procedure (see Singh and Bilsbury, 1984a, 1984b, 1985) for the formulation of four reference levels specific to pain expectations regarding dental treatment. Once the four descriptions of varying levels of subjective pain expectations were collected from all subjects, one Discan was designed by tallying the frequency of responses for each reference level and using the three most frequent responses at each level to design the standard set of reference levels used in the study. All features from the modified Mersky version of the Discan were subsumed under responses from the subjects indicating consistency between the two sets of pain descriptions.

Dental Anxiety. Dental anxiety was measured by the Corah DAS (Corah, 1969) (see Appendix B). A self-report measure of dental anxiety, the Corah DAS was used because of its brevity and demonstrated psychometric properties of reliability and validity (Berggren and Carlsson, 1984b, 1985; Corah, 1969; Corah et al., 1978a). Individual scores on this four question inventory may range from four

to 20. A score of 13 or above is indicative of above average or high dental anxiety (Corah et al., 1978a) and was therefore used as the cutoff in this research.

A second Discan (Singh and Bilsbury, 1984a, 1984b, 1985), labelled Expectation of Approach was also administered. This Discan, developed by grading approach on a four point continuum, was designed to investigate perceived ability to visit the dentist (see Appendix D).

General Anxiety. The Lehrer and Woolfolk Symptom Questionnaire (see Appendix E) is a 36-item inventory, with reported reliability and validity, designed to measure the general mode of anxiety response (Lehrer and Woolfolk, 1982). In addition to a total score, it enables cognitive, behavioural and somatic anxiety scores to be derived independently.

Measures During Treatment

Discans. The Expectation of Pain and the Expectation of Approach Discans were administered weekly at each of the treatment sessions in order to monitor progress in the clients.

Appointment Making. After Session 2 of the programme, clients were required to make a dental appointment for as soon as possible after programme completion. Assessment was based on a three point rating: ability to make appointment by Session 3, ability to make appointment by Session 4, or inability to make a dental appointment. Confirmation of these appointments was made by one of the therapists who called each patient's clinic to check the date and time of her/his respective appointment.

Posttreatment Measures

Treatment was evaluated at two points: immediately after treatment (Posttreatment 1) and after each client's dental visit (Posttreatment 2).

Posttreatment 1. At the completion of the final session of each treatment programme all measures carried out during pretreatment evaluation were repeated to enable pre/ post comparisons.

Posttreatment 2. Clients who had not visited the dentist over the previous six months were expected to attend a dental appointment as soon as possible after the completion of their respective treatment programme. Those who had seen a dentist over the previous six months were expected to return within six months of their last visit. Clients were provided with Proof of Attendance Forms (see Appendix F) to be signed by their dentist (if clients preferred they, instead, provided a copy of their receipt as proof of attendance). Participants were also given a Corah DAS which was to be completed as soon as possible after their dental visit.

Procedure

Each programme consisted of four consecutive weekly sessions, approximately two hours in length. The two programmes were run concurrently on consecutive evenings.

Four individual make-up sessions were arranged for various clients who found difficulty attending the groups. Two of these make-up sessions were arranged in each of the programmes (experimental and control). In addition, one client from the control group missed a session and did not make it up.

Detailed descriptions of treatment sessions for both groups are provided below. Agendas outlining these sessions are found in Appendix G.

Treatment Session 1

Experimental Group. The three component (cognitive, somatic, motoric) model of anxiety was discussed and implications of pain anticipation, in view of this paradigm, were presented. The rationale put forth, with regards to cognitive aspects of anxiety, was that dental anxiety can be reduced by understanding that anticipation of pain is a large component of dental fear and that this anticipation can be reconstrued in a realistic manner. To alleviate the somatic component of anxiety, progressive muscle relaxation training of the 17 muscle group type (Bernstein and Borkovec, 1973) was conducted. This was given a pain anticipation verbal set with special emphasis on the fact that a circular process is ongoing: when pain is anticipated, you become tense; when an individual is tense, the body reacts by becoming more susceptible to pain. The relaxation training was explained as a method of controlling tension levels and thus safeguarding oneself from pain.

Control Group. The rationale given was that dental anxiety can be reduced by teaching methods of dealing with the anxiety responses experienced as a result of dental fear. The three channels (cognitive, somatic, motoric) of anxiety response were explained and discussed in relation to this verbal set. Clients were informed that they would be taught distraction and thought stopping techniques to help them deal with the cognitive aspect of their anxiety. To aid relief of somatic anxiety, progressive muscle relaxation training of the 17 muscle group type (Bernstein and Borkovec, 1973) was carried out. This was introduced as a

means of coping with the physiological anxiety response, giving special emphasis to the point that relaxation is antagonistic with tension and both cannot be experienced at the same time.

Both Groups. All clients were reminded that, at the next session, they would be asked to make a dental appointment. Written copies outlining the relaxation exercises (see Appendix H) were distributed and participants were asked to practice these exercises twice daily for 15 minutes throughout the continuation of their treatment programme. Evaluation was carried out at the conclusion of the session (see section *Measures During Treatment*).

Treatment Session 2

Both Groups. Homework was discussed. The relaxation training procedure was reviewed and then conducted to test for improvement or problems with the technique. The power of imagination and its usefulness in therapy was discussed.

Experimental Group. Negative cognitions regarding the anticipation of pain were discussed. Participants were asked to determine the worst pain they had actually experienced (e.g., labour pains, surgery, dental treatment) and next received a presentation on pain expectations as related to dental anxiety. The basic procedure used to investigate this area (i.e., rate pain expected before treatment, rate pain experienced immediately after treatment) was outlined for the participants. Discussion reiterated the explicit message that dentally anxious individuals expect significantly more pain than they actually experience. This was compared to the finding that people who are not dentally anxious are more likely to show little discrepancy between expected and experienced pain. It was impressed on the clients that the difference between expected and experienced

pain in dentally anxious people was an important realization for them to make. Clients were encouraged to expose themselves to pain thoughts but, at the same time, to remember two important points: (a) they expect much more pain than they will experience, and (b) if they become tense their bodies will react by experiencing more pain. The group next received an introduction as to the purpose and usefulness of exposure in imagination and was exposed in imagination to a scene which involved making a dental appointment (see Appendix I). This was set on a schedule of two minutes relaxation, two minutes exposure and two minutes relaxation. Group members were encouraged to keep in mind the information they had received on pain anticipation. Any problems were discussed and the exposure was repeated twice more (see agenda 1 in Appendix G for presentation details).

Control Group. Negative cognitions regarding anxiety about dental treatment were discussed under the rubric of frightening thoughts. The group was instructed and given practice in applying various methods of distraction and thought stopping to eliminate negative thoughts. These techniques included imagining a pleasant scene, concentrating on a favorite tune, counting backwards by 3's or 7's from 100, and snapping an elastic band against their wrists. Clients were encouraged (a) to use their distraction techniques whenever they had negative thoughts regarding the dentist, and (b) to remember that tension and relaxation are antagonistic with each other. The group next received an introduction as to the purpose and usefulness of exposure in imagination and was exposed in imagination to a scene which involved making a dental appointment (as above). This was carried out in the same format as the experimental group

except participants were encouraged to use their distraction techniques as a coping skill during the exposure.

Both Groups. The groups were assigned homework which entailed practice of exposure in imagination (i.e., making a dental appointment) and relaxation, as carried out in the session. Clients were asked to actually make a dental appointment and return with the date and time at the next session. Evaluation was carried out as in the previous session.

Treatment Sessions 3 and 4

Experimental Group. Homework was reviewed. The use of relaxation as related to pain, the power of imagination and the importance of the pain anticipation information were reiterated.

Control Group. Homework was reviewed. The antagonistic actions of relaxation and tension, the power of imagination and the use of distraction techniques as coping skills were reiterated.

Both Groups. The groups were told to use the respective skills they had developed throughout their programmes during exposure in imagination to two scenes based on questions from the Corah DAS. Session 3 involved scenes based on the first two questions of the Corah DAS: (a) visiting the dentist tomorrow, and (b) sitting in the waiting room. Session 4 dealt with scenes based on the final two questions from the Corah DAS: (a) waiting for the drill, and (b) waiting for their teeth to be cleaned (see Appendix G for presentation details). Problems and improvement were discussed. Homework involved practicing relaxation and exposure of the above scenes in imagination. Session 3 required clients to make a dental appointment if not having already done so. In Session 4, patients' feelings

about attending the dentist were discussed. Envelopes, stamped and addressed to the clinic, were handed out along with both a Corah DAS form to be completed after the dental visit and the Proof of Attendance Form to be signed by the dentist and returned. Posttreatment 1 evaluation was completed.

RESULTS

Characteristics of Samples

Total Sample

Characteristics of the total sample are listed in Table 3. Pretreatment data for all subjects, based on the Corah DAS (Corah, 1969), Lehrer and Woolfolk Symptom Questionnaire (Lehrer and Woolfolk, 1982) and Discans (Singh and Bilsbury, 1984a, 1984b, 1985) are described in Table 4. Subjects' average age was 31.58 years (SD = 7.50). The mean Expectation of Approach score was 4.83 (SD = 4.75). Mean total, somatic, cognitive and behavioural scores of general anxiety were 78.92 (SD = 55.56), 24.58 (SD = 21.28), 33.50 (SD = 20.63), and 20.83 (SD = 16.93), respectively.

Severity of dental anxiety was indicated by the average Corah DAS score, the mean number of months since last dental visit, and the mean score found to represent expectation of pain: 17.33 (SD = 1.72), 23.46 months (SD = 27.24), and 9.0 (SD = 4.69), respectively.

TABLE 3: Characteristics and dental history of samples investigated

	SAMPLE		
	EXPERIMENTAL n=6	CONTROL n=6	TOTAL N=12
A. PERSONAL CHARACTERISTIC:			
1. GENDER	FEMALE: 6 MALE: 0	FEMALE: 5 MALE: 1	FEMALE: 11 MALE: 1
2. AGE	M = 30.83 SD = 8.52 RANGE = 21-43	M = 32.33 SD = 7.06 RANGE = 23-42	M = 31.58 SD = 7.50 RANGE = 21-43
3. EDUCATIONAL STATUS	≤High School: 1 >High School: 5	≤High School: 1 >High School: 5	≤High School: 2 >High School: 10
4. MARITAL STATUS	Married: 4 Single: 2	Married: 5 Single: 1	Married: 9 Single: 3
5. PAST PSYCHOLOGICAL/ PSYCHIATRIC TREATMENT	YES: 1 NO: 5	YES: 2 NO: 4	YES: 3 NO: 9
B. DENTAL HISTORY:			
1. MONTHS SINCE LAST DENTAL VISIT	M = 15.92 SD = 22.04 RANGE = 0.5-60	M = 31.00 SD = 31.79 RANGE = 3-84	M = 23.46 SD = 27.24 RANGE = 0.5-84
2. PERCEIVED FAMILY HISTORY OF DENTAL ANXIETY	YES: 2 NO: 4	YES: 2 NO: 4	YES: 4 NO: 8

TABLE 4: Mean scores for experimental and control groups on pretreatment measures

PRETREATMENT MEASURE	SAMPLE								
	EXPERIMENTAL n=6			CONTROL n=6			TOTAL N=12		
	M	SD	RANGE	M	SD	RANGE	M	SD	RANGE
CORAH DAS (x/20)	17.33	2.34	13-20	17.33	1.03	16-18	17.33	1.72	13-20
LEHRER AND WOOLFOLK SYMPTOM QUESTIONNAIRE									
- TOTAL (x/288)	72.50	70.59	22-214	85.33	41.36	33-135	78.92	55.56	22-214
- SOMATIC (x/128)	22.33	25.47	4-73	26.83	18.32	12-55	24.58	21.28	4-73
- COGNITIVE (x/88)	28.17	25.64	14-80	38.83	14.53	17-56	33.50	20.63	14-80
- BEHAVIOURAL (x/72)	22.00	21.22	4-61	19.67	13.29	4-38	20.83	16.93	4-61
EXPECTATION OF PAIN DISCAN (x/14)	8.00	5.10	1-14	10.00	4.47	1-13	9.00	4.69	1-14
EXPECTATION OF APPROACH DISCAN (x/14)	5.33	4.84	1-14	4.33	5.05	1-14	4.83	4.75	1-14

Comparison of Groups

The groups were compared on the characteristics listed in Table 3. There was no significant difference between the groups in terms of gender (Fisher, $p = .50$, n.s.), marital status (Fisher, $p = .64$, n.s.), educational status (Fisher, $p = 1.05$, n.s.) or past psychological/ psychiatric treatment (Fisher, $p = .64$, n.s.). Using the Mann-Whitney test, based on Auble's (1953) method for calculating T (*Extended Tables of the Mann-Whitney Statistic*), no significant differences were found between the groups for age ($T = 37$, two-tailed, n.s.). Neither were significant differences found between the groups in terms of dental history: family history of dental anxiety (Fisher, $p = 1.00$, n.s.) and number of months since last dental visit ($T = 35$, two-tailed, n.s.).

Analysis of the data presented in Table 4 found no significant differences, when comparing the two groups, on any pretreatment measure: initial scores on the Corah DAS ($T = 37$, two-tailed, n.s.), Lehrer and Woolfolk Symptom Questionnaire ($T = 33.5$, two-tailed, n.s.), Expectation of Pain Discan ($T = 35.5$, two-tailed, n.s.) and Expectation of Approach Discan ($T = 35.5$, two-tailed, n.s.). From these findings, it can be concluded that the samples were comparable in terms of age, gender, marital status, educational status, past psychological/ psychiatric treatment, dental history, and scores on all pretreatment measures.

Treatment Results

Main effects (Group, Time) and the Group × Time interaction, based on each evaluative measure, were analyzed by use of the ANOVA (two-factor experiment with repeated measures on one factor). Raw data in the form of subjects' individual results can be found in Appendix J. All measures which were listed in Table 4, as well as actual ability to make a dental appointment, were evaluated after treatment programme completion. Dental anxiety, however, was evaluated at two points posttreatment: immediately after programme completion (Posttreatment 1) and after the dental visit (Posttreatment 2).

Pain Anticipation

Scores from the Expectation of Pain Discan showed a significant decrease in pain anticipation ($F_{1,10} = 20.37$, $p < .01$) from Pretreatment to Posttreatment 1 across groups (see Figure 1). No significant Group difference ($F_{1,10} = 1.01$, n.s.) nor Group × Time interaction effect ($F_{1,10} = 0.09$, n.s.) was found (see Table 5).

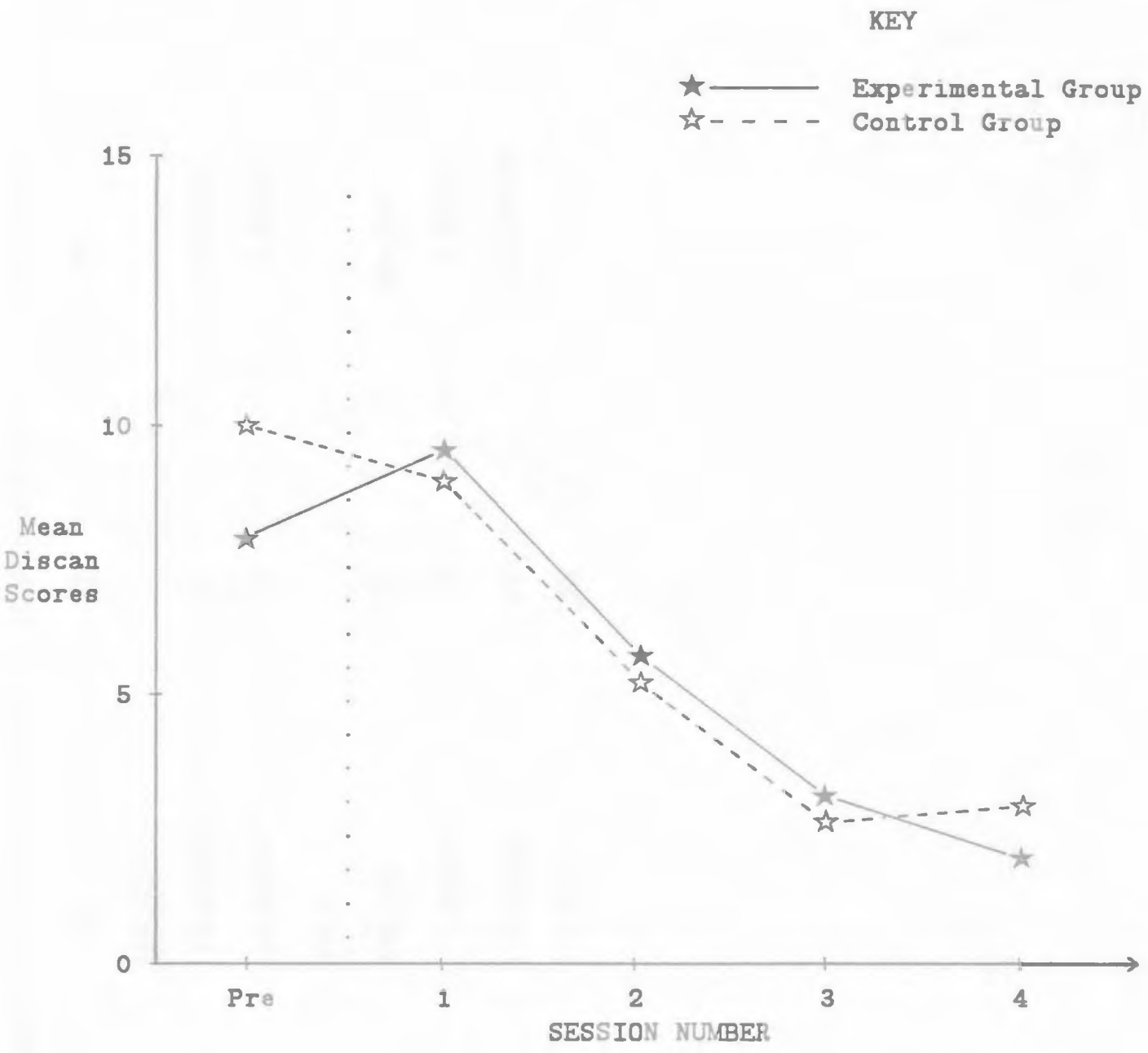

Figure 1: Distribution of mean scores for the expectation of pain discan before, during and at the end of treatment.

TABLE 5: ANOVA summary table for the expectation of pain discan (pain anticipation)

SOURCE	SS	df	MS	F
Between Subjects	164.125			
Group	15.04166	1	15.04166	1.01
Subjects	149.08334	10	14.908334	
Within Subjects	350.5			
Time	234.375	1	234.375	20.37**
Group x Time	1.04164	1	1.04164	
Time x Subjects	115.08336	10	11.508336	0.09
Total	514.625	23		

* $p < .05$

** $p < .01$

Dental Anxiety

Table 6 shows a significant decrease in Corah DAS scores ($F_{1,10} = 56.90$, $p < .01$), across both treatment groups, from Pretreatment to Posttreatment 1 evaluation. There was no significant difference between the groups ($F_{1,10} = .14$, n.s.) nor a Group × Time interaction ($F_{1,10} = .24$, n.s.). In addition, Corah DAS scores decreased significantly from Pretreatment to Posttreatment 2 ($F_{2,20} = 39.49$, $p < .01$) (see Table 7 and Figure 2). No significant Group difference ($F_{1,10} = .85$, n.s.) nor Group × Time interaction effect ($F_{2,20} = .71$, n.s.) was revealed.

There were no significant differences found on the Expectation of Approach Discan scores which investigated perceived ability to attend dental treatment (see Table 8 and Figure 3): Group ($F_{1,10} = .01$, n.s.) or Time ($F_{1,10} = 3.75$, n.s.) main effects or the Group × Time interaction ($F_{1,10} = .29$, n.s.)

TABLE 6: ANOVA summary table for dental anxiety immediately after treatment (Posttreatment 1)

SOURCE	SS	df	MS	F
Between Subjects	73.125			
Group	1.0416	1	1.0416	0.14
Subjects	72.0834	10	7.20834	
Within Subjects	291.5			
Time	247.0416	1	247.0416	56.90**
Group x Time	1.0418	1	1.0418	0.24
Time x Subjects	43.4166	10	4.34166	
Total	364.625	23		

* $p < .05$

** $p < .01$

TABLE 7: ANOVA summary table for dental anxiety after dental treatment (Posttreatment 2)

SOURCE	SS	df	MS	F
Between Subjects	115.33			
Group	9.0	1	9.0	0.85
Subjects	106.33	10	10.633	
Within Subjects	508.67			
Time	400.16	2	200.08	39.49**
Group x Time	7.17	2	3.585	0.71
Time x Subjects	101.34	20	5.067	
Total	624.0	35		

* $p < .05$

** $p < .01$

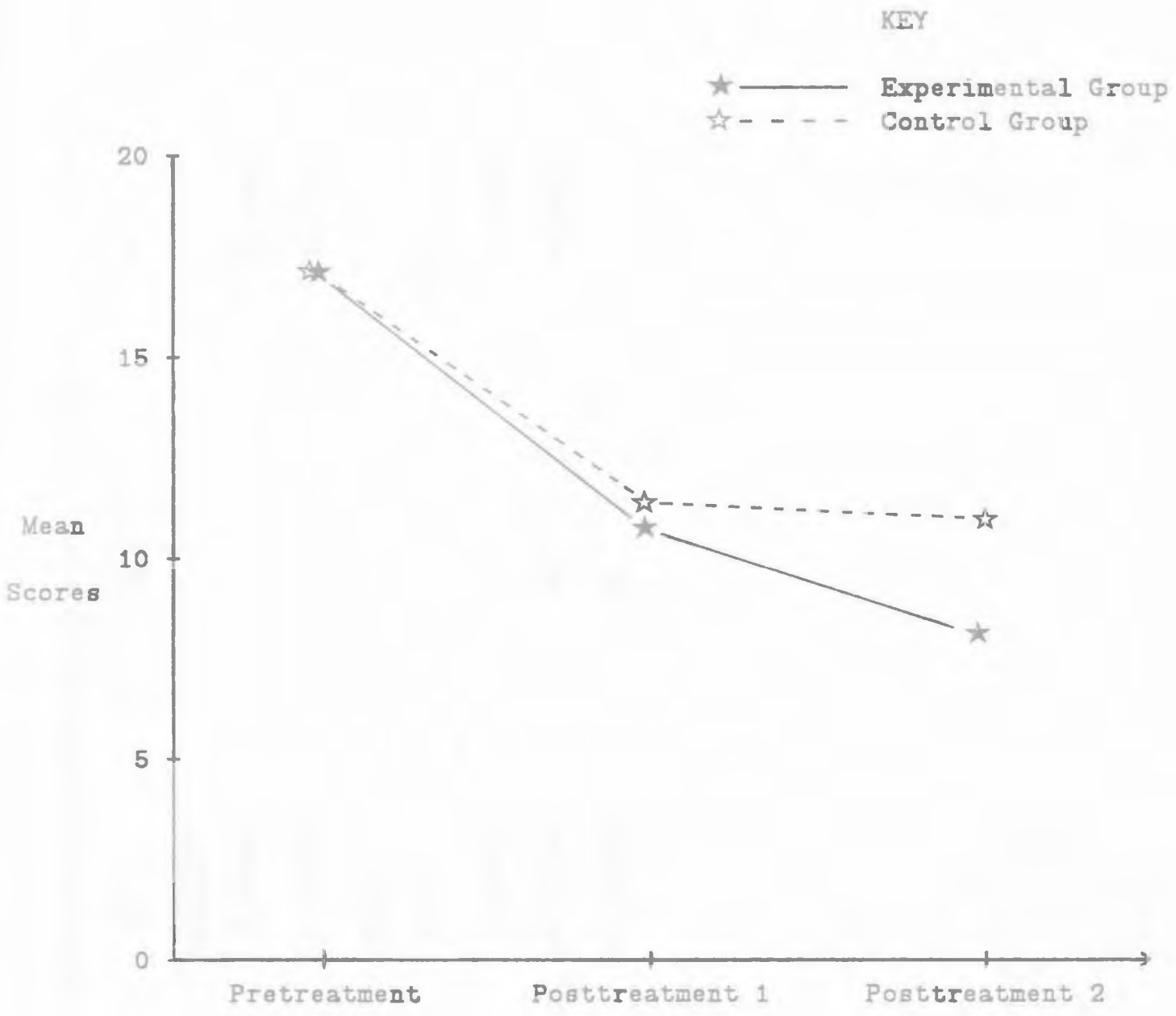

Figure 2: Mean Corah dental anxiety scores before treatment, at the end of treatment and after keeping a dental appointment.

TABLE 8: ANOVA summary table for the expectation of approach discan

SOURCE	SS	df	MS	F
Between Subjects	125.33334			
Group	0.16667	1	0.16667	0.01
Subjects	125.16667	10	12.516667	
Within Subjects	202.0			
Time	54.0	1	54.0	3.75
Group x Time	4.16667	1	4.16667	0.29
Time x Subjects	143.83333	10	14.383333	
Total	327.33334	23		

* $p < .05$

** $p < .01$

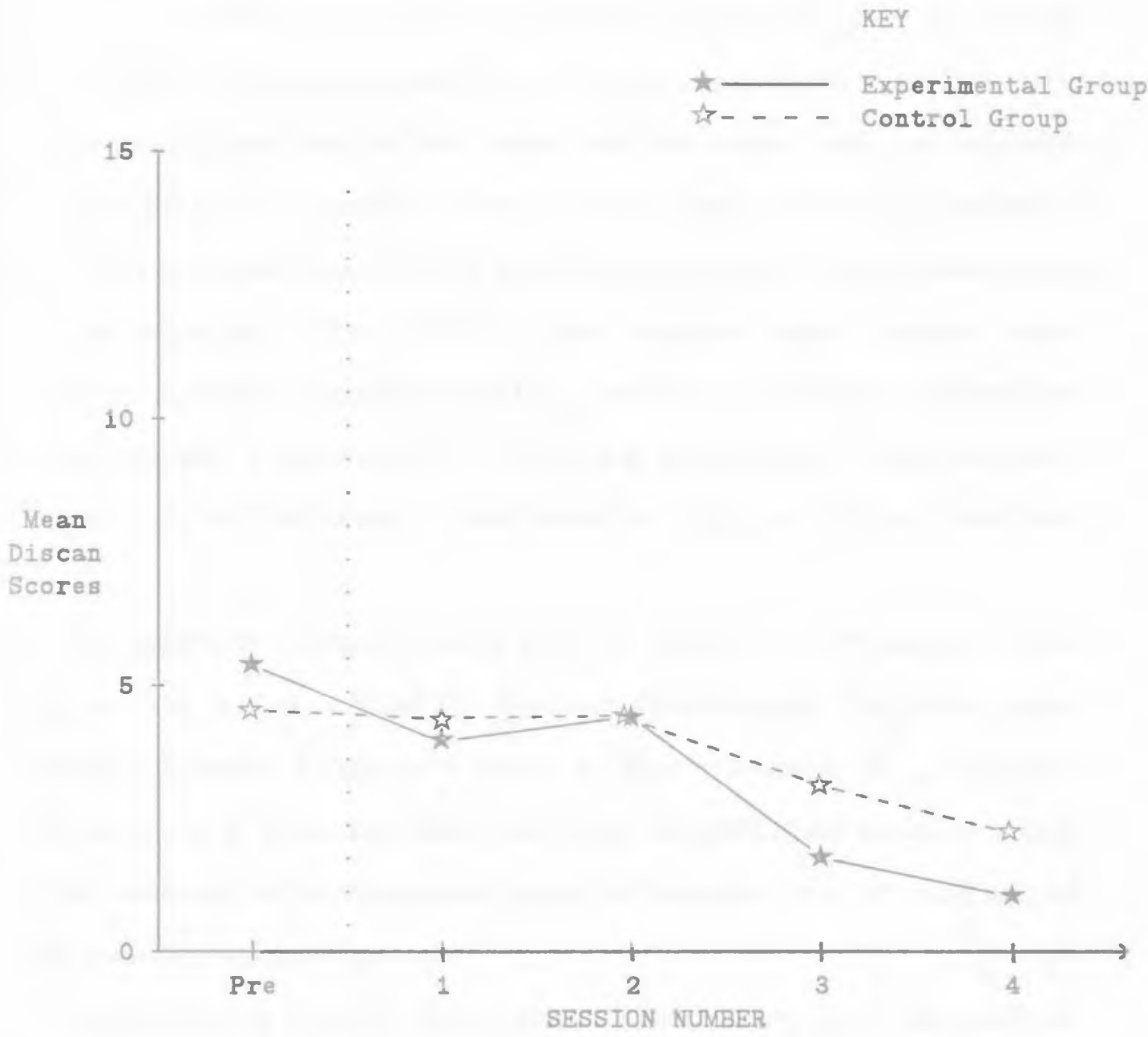

Figure 3: Distribution of mean scores for the expectation of approach discan before, during and at the end of treatment.

General Anxiety

Analysis of Symptom Questionnaire-Total scores found no significant differences before and after treatment ($F_{1,10} = .56$, n.s.) on this measure; neither were significant effects revealed between treatment groups ($F_{1,10} = .45$, n.s.) nor for the Group × Time interaction ($F_{1,10} = 2.46$, n.s.) (see Table 9 and Figure 4).

Symptom Questionnaire-Total scores were next broken down into subscores (cognitive, behavioural, somatic). These subscores were worked as a percentage of total scores and found nine of the 12 participating subjects to rate highest on the cognitive subsection. The ANOVA which examined these Cognitive scores identified a significant overall decrease ($F_{1,10} = 5.89$, $p < .05$) from Pretreatment to Posttreatment 1 (see Figure 5). There was no significant Group difference ($F_{1,10} = 1.45$, n.s.) or Group × Time interaction ($F_{1,10} = 1.14$, n.s.) (see Table 10).

No significant Group difference ($F_{1,10} = 0.04$, n.s.) or Time main effect ($F_{1,10} = 2.44$, n.s.) was found for Symptom Questionnaire- Behaviour scores. There was, however, a significant Group × Time interaction ($F_{1,10} = 6.61$, $p < .05$) as shown in Table 11. Behaviour scores decreased from before treatment to after treatment in the experimental group but increased over the same interval in the control group (see Figure 6).

Analysis of the Symptom Questionnaire-Somatic scores found no significant differences (see Table 12) on either factor: Group ($F_{1,10} = .22$, n.s.), Time ($F_{1,10} = 1.98$, n.s.), Group × Time interaction ($F_{1,10} = .22$, n.s.) (see Figure 7).

TABLE 9: ANOVA summary table for general anxiety (total scores)

SOURCE	SS	df	MS	F
Between Subjects	64632.13			
Group	2752.04	1	2752.04	0.45
Subjects	61880.09	10	6188.009	
Within Subjects	2342.5			
Time	100.04	1	100.04	0.56
Group x Time	442.05	1	442.05	2.46
Time x Subjects	1800.41	10	180.041	
Total	66974.63	23		

* $p < .05$

** $p < .01$

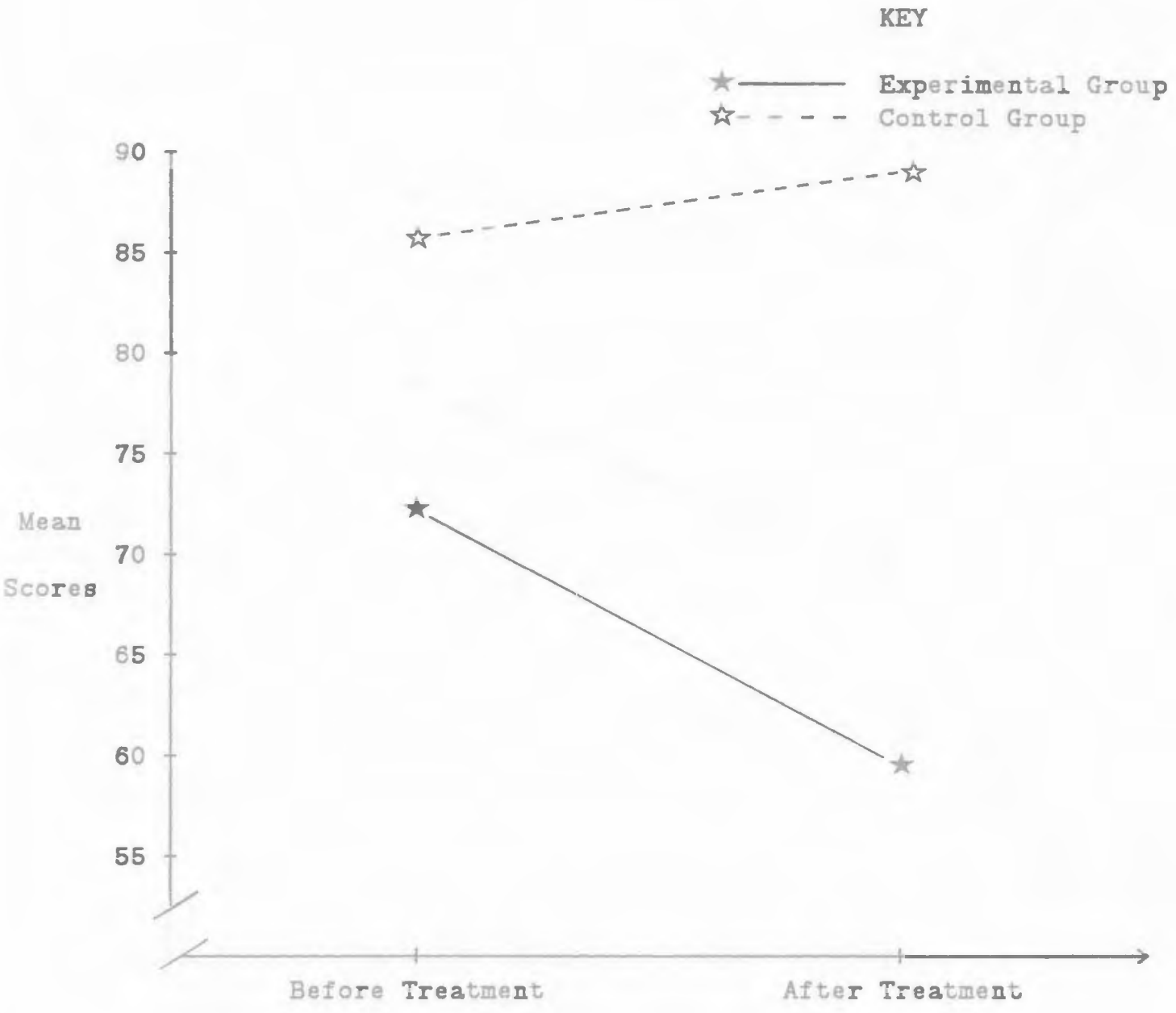

Figure 4: Mean symptom questionnaire (total) scores, of experimental and control groups, before and at the end of treatment.

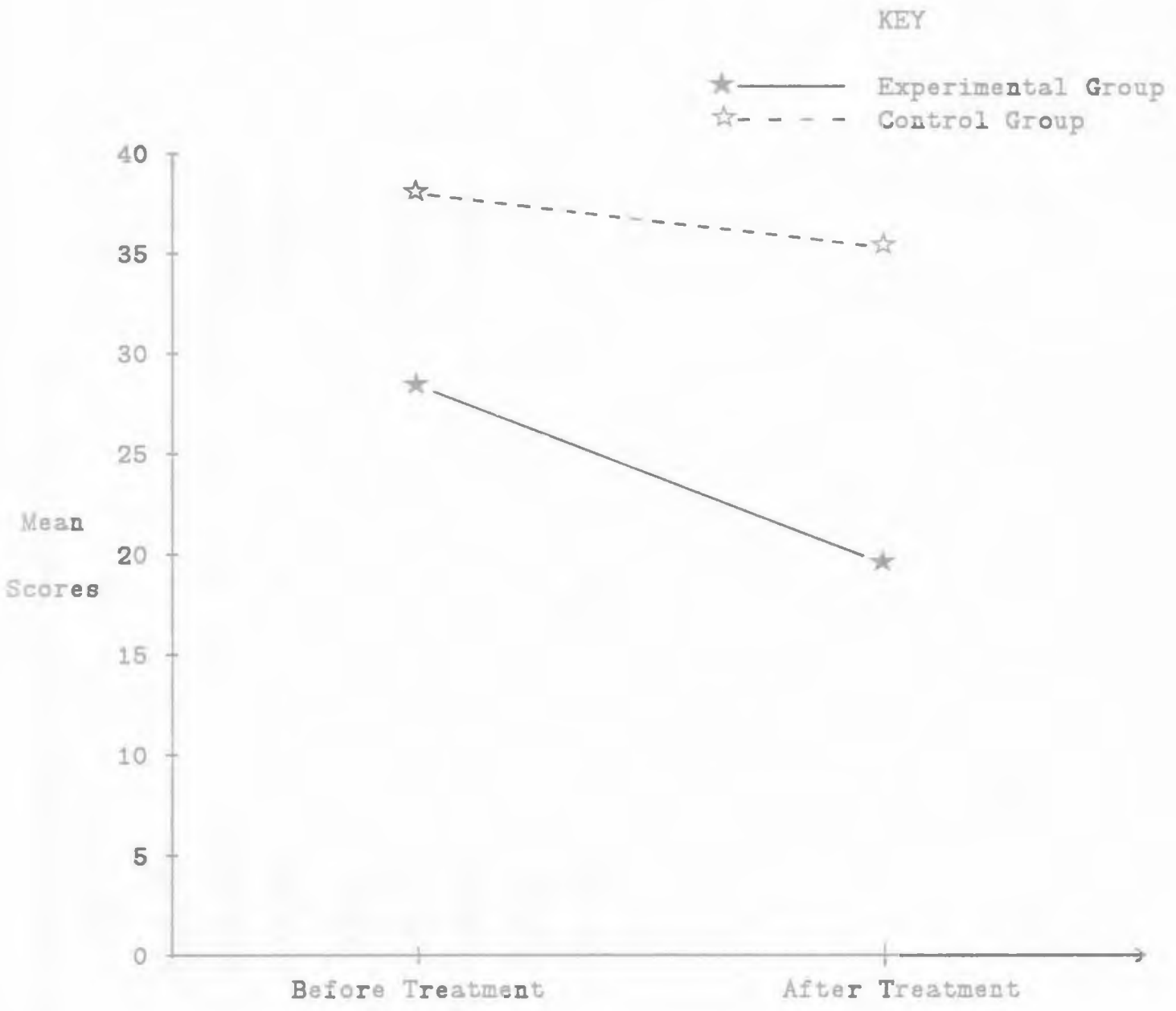

Figure 5: Mean symptom questionnaire (cognitive) scores, of experimental and control groups, before and at the end of treatment.

TABLE 10: ANOVA summary table for general anxiety (cognitive scores)

SOURCE	SS	df	MS	F
Between Subjects	8544.125			
Group	1080.0416	1	1080.0416	1.45
Subjects	7464.084	10	746.4084	
Within Subjects	677.5			
Time	234.375	1	234.375	5.89*
Group x Time	45.375	1	45.375	1.14
Time x Subjects	397.75	10	39.775	
Total	9221.625	23		

* $p < .05$

** $p < .01$

TABLE 11: ANOVA summary table for general anxiety (behavioural scores)

SOURCE	SS	df	MS	F
Between Subjects	5467.4584			
Group	22.041733	1	22.041733	0.04
Subjects	5445.4167	10	544.54167	
Within Subjects	312.5			
Time	40.0417	1	40.0417	2.44
Group x Time	108.375	1	108.375	6.61*
Time x Subjects	164.0833	10	16.40833	
Total	5779.9584	23		

* $p < .05$

** $p < .01$

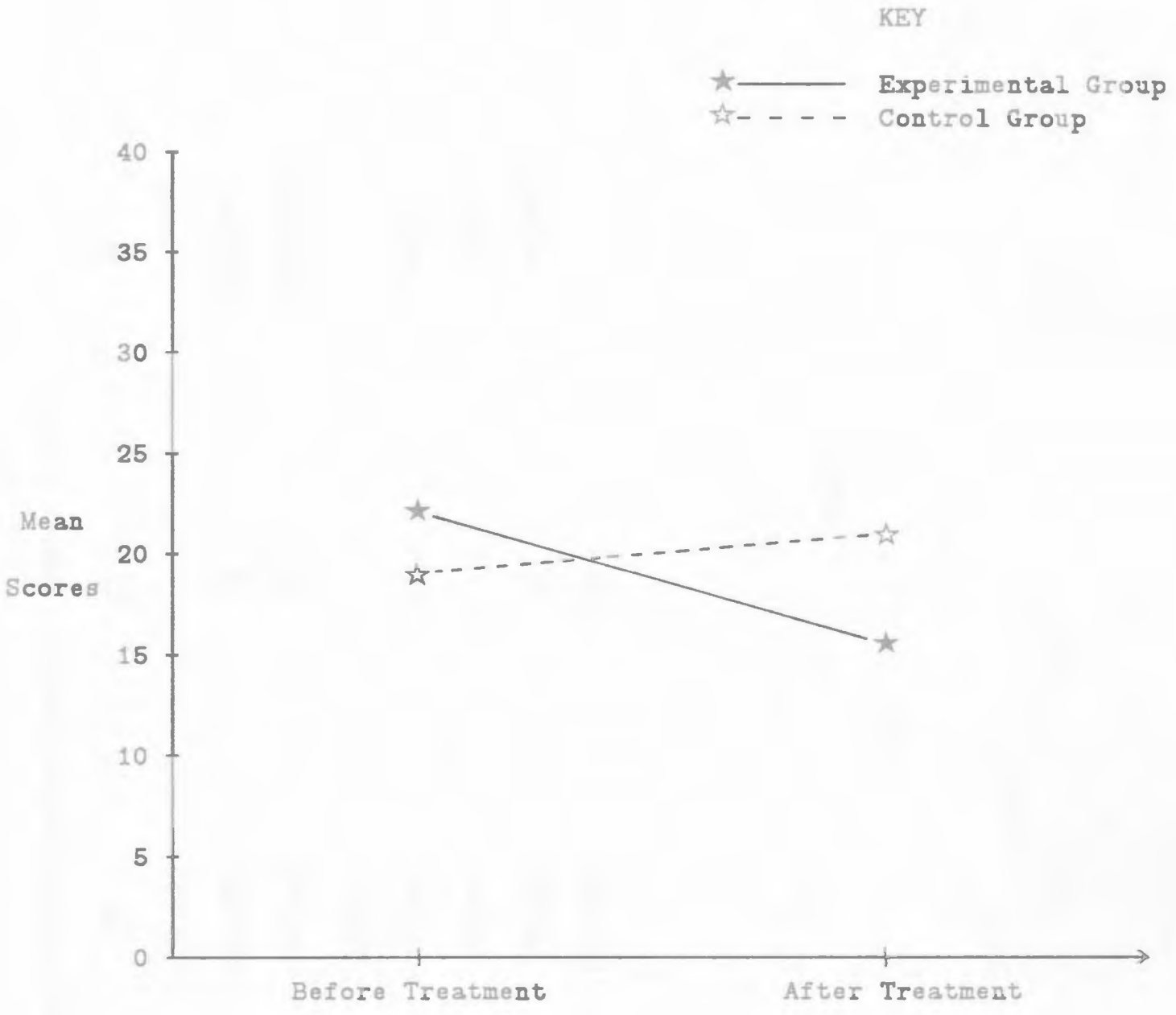

Figure 6: Mean symptom questionnaire (behavioural) scores, of experimental and control groups, before and at the end of treatment.

TABLE 12: ANOVA summary table for general anxiety (somatic scores)

SOURCE	SS	df	MS	F
Between Subjects	10167.459			
Group	222.042	1	222.042	0.22
Subjects	9945.417	10	994.5417	
Within Subjects	833.5			
Time	135.375	1	135.375	1.98
Group x Time	15.042	1	15.042	0.22
Time x Subjects	683.083	10	68.3083	
Total	11000.959	23		

* $p < .05$

** $p < .01$

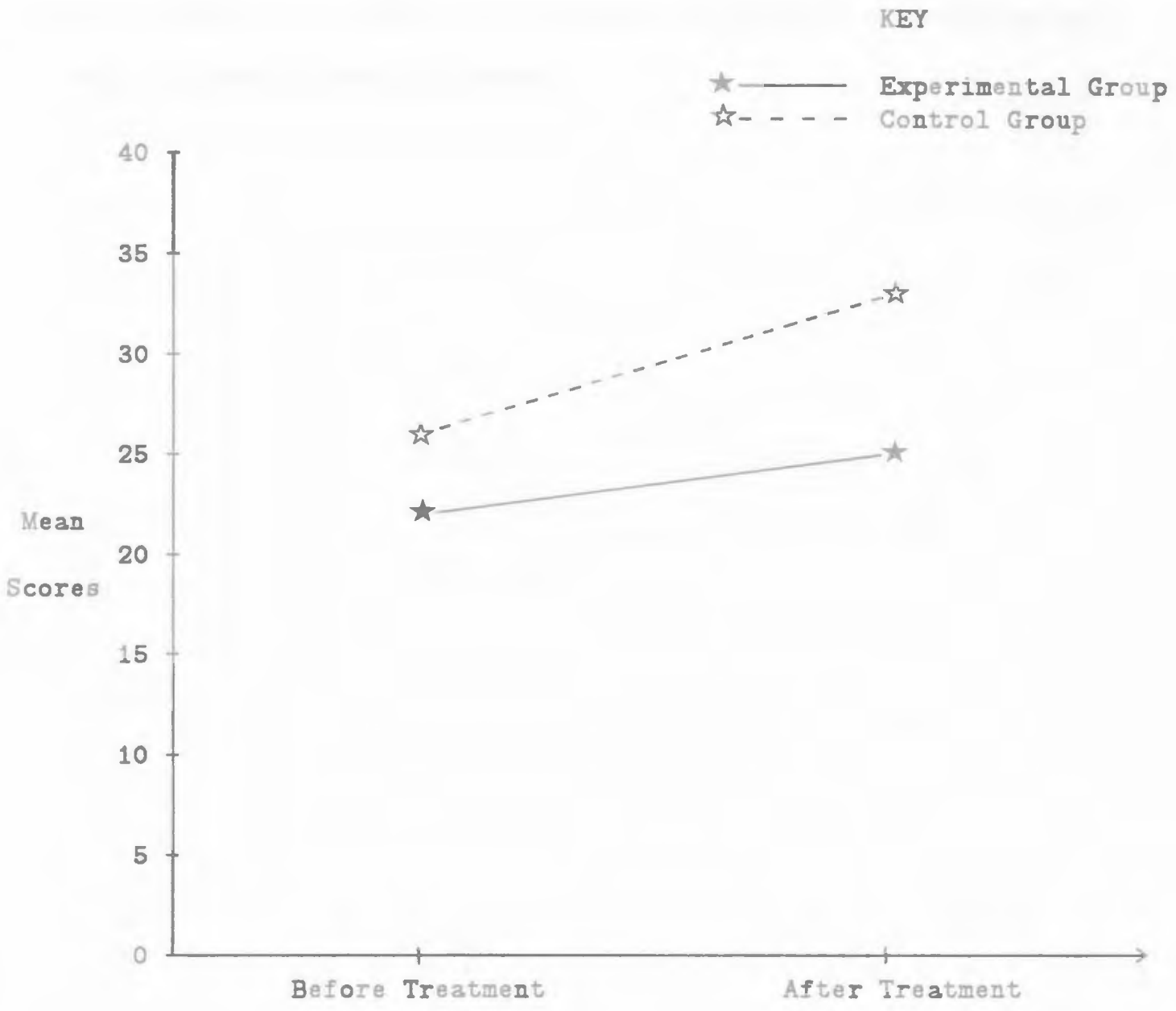

Figure 7: Mean symptom questionnaire (somatic) scores, of experimental and control groups, before and at the end of treatment.

Attending

Five individuals from the control group and six from the experimental group made a dental appointment by Session 3 of their respective treatment programmes (Fisher, $p = .50$, n.s.). All participants, from both treatment groups, succeeded in attending their appointment.

DISCUSSION AND CONCLUSIONS

Because most outcome measures failed to reach statistical significance, the main hypothesis of this study, regarding the superiority of a behavioural treatment programme directed at pain anticipation, was not adequately supported. Significant improvement, however, in both the experimental and control groups, was evident through significant decreases in pain anticipation, significant decreases in dental anxiety as demonstrated by score changes on the Corah DAS (Corah, 1969) and the attending of an initial dental appointment by all participants.

Past behavioural programmes (see Tables 1 and 2) have tended to deal with just one or two of the three modes of anxiety response. Most often, relaxation therapy was used to reduce somatic anxiety while various forms of exposure were directed at decreasing behavioural anxiety. Approaches to overcome the cognitive aspect of dental anxiety took the form of *general* coping strategies or distraction techniques, used to avert dental patients from the treatment experience. Although the use of a behavioural treatment programme addressing the behavioural, somatic and cognitive components of dental anxiety was clearly supported, the substitution of distraction and thought stopping with a more specific and direct cognitive component, which provided pain anticipation information, did not enhance treatment to the degree expected. Unfortunately, any expected enhancement by providing pain anticipation information may have been overshadowed by the power of the programmes' common components, namely, relaxation and exposure in imagination.

There seems to be a consensus between those involved in dental anxiety treatment and dentistry, in general, to reject the discussion of sensation or possible pain during dental treatment. This concern for avoiding the talk of pain anticipation appears unfounded since the present study found that dealing with pain directly did not heighten patients' fear; improvement shown by members of the experimental group was comparable to that of the control group. Previously discussed, and in line with the pain anticipation literature, were the findings of Lindsay et al. (1984), which showed that patients overestimated the intensity of sensations they were about to experience. Lindsay et al. (1984) also supported the need for a more open approach to treatment whereby sensation information would be provided to help patients control their negative anticipation regarding treatment. Wardle (1983) found that patients preferred information about sensations over perceived control or distraction. Patients who were provided with information about sensations during treatment reduced their anxiety and ratings of painfulness to negligible levels. The other two treatment conditions (perceived control and distraction) had no such impact. The provision of sensation information in dentistry has been viewed, therefore, as a viable approach with regards to the treatment of dentally anxious patients. This view of treatment is consistent with an approach that has worked effectively in medicine, as regards surgery and other procedures, for many years. When the possibility of pain and information about sensations are discussed openly, patients have rational expectations with which to deal with the situation more effectively. It is thought that a similar view regarding dental treatment would be comparable in effectiveness. The present study tested an experimental programme, directed

along this line, dealing realistically with painful sensations which were anticipated by dentally anxious individuals.

The significant interaction effect found on the Symptom Questionnaire-Behaviour scores showed that members of the experimental group became less likely to avoid anxiety producing situations while members of the control group increased their anxiety on this measure. Although all participants, in both groups, did keep their dental appointments, this change in attitude by the experimental group augurs better for future dental visits. One limiting factor regarding this issue is the short follow-up based on participants' first visit after programme completion. An extended follow-up of these clients would undoubtedly provide consolidating evidence with regards to future visits. Possibly, the experimental group came to understand the importance of approach behaviour by dealing with their pain anticipation directly. The control group, taught to avoid their feelings by distraction, may have not developed the same approach "philosophy." Again, a longer follow-up of this study would provide additional support with regards to this line of reasoning.

Both treatment programmes achieved their immediate aim in having clients attend a dental appointment. Because of the short follow-up, it is difficult to predict what factors will influence future dental visits. It is likely that the patients' experience during their initial visit, such as their reception and type or extent of dental treatment, will play an important role. Plans are made to continue following these clients for two years in able to monitor any differences which may arise as regards attending ability.

In conclusion, the demand set by the experimental programme of having

patients face pain by developing skills to cope with its anticipation did not enhance the effect of treatment but neither did it have a detrimental effect. The results suggest taking the cognitive component of dental anxiety into consideration when conducting future studies, as well as dismantling the experimental treatment programme to test the specific contribution of the pain anticipation reduction component.

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APPENDIX A

ADVERTISEMENT

AFRAID OF GOING TO THE DENTIST?

Does your fear stop you from visiting the dentist regularly? Do you feel uncomfortably anxious when you do go? If so,

a program directed at reducing DENTAL ANXIETY in ADULTS will be offered under the supervision of Members of the Clinical Faculty of MUN's Psychology Dept.

If interested call 737-4387 between 9-12 (Mon-Fri) for more information and to arrange an appointment.

APPENDIX B

INSTRUCTIONS: FOR EACH OF THE QUESTIONS BELOW PLEASE CHOOSE ONE STATEMENT WHICH IS MOST LIKE YOUR FEELING OR BEHAVIOUR. INDICATE YOUR CHOICE BY PLACING AN (X) IN THE SPACE PROVIDED.

1. If you had to go to the dentist tomorrow, how would you feel about it?

(a) I would look forward to it as a reasonable experience (...)
(b) I wouldn't care one way or the other (...)
(c) I would be a little uneasy about it (...)
(d) I would be afraid that it would be unpleasant and painful (...)
(e) I would be very frightened of what the dentist might do (...)

2. When you are waiting in the dentist's office for your turn in the chair, how do you feel?

(a) Relaxed (...)
(b) A little uneasy (...)
(c) Tense (...)
(d) Anxious (...)
(e) So anxious that I sometimes break out in a sweat or almost feel physically sick (...)

. When you are in the dentist's chair waiting while he gets his drill ready to begin working on your teeth, how do you feel?

(a) Relaxed (...)
(b) A little uneasy (...)
(c) Tense (...)
(d) Anxious (...)
(e) So anxious that I sometimes break out in a sweat or almost feel physically sick (...)

. You are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist is getting out the instruments which he will use to scrape your teeth around the gums, how do you feel?

(a) Relaxed (...)
(b) A little uneasy (...)
(c) Tense (...)
(d) Anxious (...)
(e) So anxious that I sometimes break out in a sweat or almost feel physically sick (...)

APPENDIX C

DISCAN: EXPECTATION OF PAIN

LEAD IN: Right now I expect that at my next dental appointment I will experience:

L4: Very Severe Pain

- fills my mind so I can't think about anything else
- excruciating, sharp pain
- makes me feel tense

L3: Severe Pain

- demands a great deal of my attention
- makes it hard to concentrate on anything else
- hurts quite a lot

L2: Moderate Pain

- focus my attention on it at times
- can concentrate on other things
- recognize pain as unpleasant but feel it's not that bothersome
- doesn't last that long

L1: Mild Pain

- aware of some pain
- not bothered much by it
- could easily focus my thoughts on other things
- doesn't last that long at all

APPENDIX D

DISCAN: EXPECTATION OF APPROACH

LEAD IN: Right now I expect that if I had a dental appointment tomorrow I would:

L4: not go

L3: probably not go

L2: probably go

L1: go

APPENDIX E

S Y M P T O M Q U E S T I O N N A I R E

NAME: _____

AGE: _____ SEX: M F DATE: _____

OCCUPATION: _____ MARITAL STATUS: S M D Sep W

EXAMPLE

Circle the number that indicates how you feel for each item. For example, if you feel happy often, but not all the time put:

I feel happy 0 1 2 3 4 5 6 7 8
Never Extremely Often

---

1. My throat gets dry.
0 1 2 3 4 5 6 7 8
Never Extremely Often

2. I have difficulty in swallowing.
0 1 2 3 4 5 6 7 8
Never Extremely Often

3. I try to avoid starting conversations.
0 1 2 3 4 5 6 7 8
Never Extremely Often

4. My heart pounds.
0 1 2 3 4 5 6 7 8
Never Extremely Often

5. I picture some future misfortune.
0 1 2 3 4 5 6 7 8
Never Extremely Often

6. I avoid talking to people in authority (my boss, policemen).
0 1 2 3 4 5 6 7 8
Never Extremely Often

7. My limbs tremble.
0 1 2 3 4 5 6 7 8
Never Extremely Often

8. I can't get some thought out of my mind.
0 1 2 3 4 5 6 7 8
Never Extremely Often

9. I avoid going into a room by myself where people are already gathered and talking.
0 1 2 3 4 5 6 7 8
Never Extremely Often

10. My stomach hurts.
0 1 2 3 4 5 6 7 8
Never Extremely Often

11. I dwell on mistakes that I made.
0 1 2 3 4 5 6 7 8
Never Extremely Often

12. I avoid new or unfamiliar situations.
0 1 2 3 4 5 6 7 8
Never Extremely Often

13. My neck feels tight.
0 1 2 3 4 5 6 7 8
Never Extremely Often

14. I feel dizzy.
0 1 2 3 4 5 6 7 8
Never Extremely Often

15. I think about possible misfortunes to my loved ones.
0 1 2 3 4 5 6 7 8
Never Extremely Often

16. I cannot concentrate at a task or job without irrelevant thoughts intruding.
0 1 2 3 4 5 6 7 8
Never Extremely Often

17. I pass by school friends, or people I know but have not seen for a long time, unless they speak to me first.
0 1 2 3 4 5 6 7 8
Never Extremely Often

18. I breathe rapidly.
0 1 2 3 4 5 6 7 8
Never Extremely Often

19. I keep busy to avoid uncomfortable thoughts.
0 1 2 3 4 5 6 7 8
Never Extremely Often

20. I can't catch my breath.
0 1 2 3 4 5 6 7 8
Never Extremely Often

21. I can't get some pictures or images out of my mind.
0 1 2 3 4 5 6 7 8
Never Extremely Often

22. I try to avoid social gatherings.
0 1 2 3 4 5 6 7 8
Never Extremely Often

23. My arms or legs feel stiff.
0 1 2 3 4 5 6 7 8
Never Extremely Often

24. I imagine myself appearing foolish with a person whose opinion of me is important.
0 1 2 3 4 5 6 7 8
Never Extremely Often

25. I find myself staying home rather than involving myself in activities outside.
0 1 2 3 4 5 6 7 8
Never Extremely Often

26. I prefer to avoid making specific plans for self-improvement.
0 1 2 3 4 5 6 7 8
Never Extremely Often

27. I am concerned that others might not think well of me.
0 1 2 3 4 5 6 7 8
Never Extremely Often

28. I try to avoid challenging jobs.
0 1 2 3 4 5 6 7 8
Never Extremely Often

29. My muscles twitch or jump.
0 1 2 3 4 5 6 7 8
Never Extremely Often

30. I experience a tingling sensation somewhere in my body.
0 1 2 3 4 5 6 7 8
Never Extremely Often

31. My arms or legs feel weak.
0 1 2 3 4 5 6 7 8
Never Extremely Often

32. I have to be careful to not let my real feelings show.
0 1 2 3 4 5 6 7 8
Never Extremely Often

33. I experience muscular aches and pains.
0 1 2 3 4 5 6 7 8
Never Extremely Often

34. I feel numbness in my face, limbs, or tongue.
0 1 2 3 4 5 6 7 8
Never Extremely Often

35. I experience chest pains.
0 1 2 3 4 5 6 7 8
Never Extremely Often

36. I have an uneasy feelings.
0 1 2 3 4 5 6 7 8
Never Extremely Often

APPENDIX F

MEMORIAL UNIVERSITY OF NEWFOUNDLAND
St. John's, Newfoundland, Canada A1B 3X9

Department of Psychology

Telex: 016-4101
Tel.: (709) 737-8496

This is to certify that _____ attended
Name

a dental appointment at the _____
Name of Dental Clinic

on _____ at _____.
Date Time

_____
Signature of Dentist

APPENDIX G

AGENDA 1: TREATMENT PROGRAMME 1 (EXPERIMENTAL GROUP)

SESSION 1:

- Introductions
- Programme Introduction
- Three Channels of Anxiety Response
- Introduction of Relaxation Training with Pain Anticipation Verbal Set
- Examples (of how to contract various muscles)
- Relaxation Training
- Discussion/Comments/Problems
- Discuss Appointment Making
- Homework Assignment (practice relaxation-see handout)
- Discan Administration

SESSION 2:

- Review Homework
- Discussion (of any problems that arose)
- Test Relaxation Training

- Discussion
- Pain Anticipation Information Presentation
- Introduction of Exposure in Imagination with Pain Anticipation Verbal Set
- Exposure in Imagination (preparing to make dental appointment): consists of 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation
- Discussion
- Exposure in Imagination (scene as above): 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation
- Discussion
- Homework Assignment: includes (a) practice relaxation, (b) practice exposure in imagination (using pain anticipation knowledge) of preparing to make dental appointment and, (c) make actual dental appointment
- Discan Administration

SESSION 3:

- Review Homework
- Reiterate use of Relaxation and Pain Anticipation Information

- Exposure in Imagination of Corah Scene 1: 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation
- Discussion
- Exposure in Imagination of Corah Scene 1: 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation
- Discussion/Comments/Problems
- Exposure in Imagination of Corah Scene 2: 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation
- Discussion
- Homework Assignment: includes (a) making of dental appointment if not already completed, (b) practice of relaxation and, (c) exposure in imagination of Corah Scenes 1 and 2 using pain anticipation knowledge
- Discan Administration

SESSION 4:

- Review Homework/ Discuss Problems
- Exposure in Imagination of Corah Scene 3: 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation

- Discussion
- Exposure in Imagination of Corah Scene 3: 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation
- Discussion
- Exposure in Imagination of Corah Scene 4: 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation
- Discussion
- Discuss Feelings re. attending Dental Appointment
- Homework Assignment: includes (a) relaxation and, (b) exposure in imagination of Corah Scenes 3 and 4 using pain anticipation knowledge
- Distribute Envelopes
- Administration of -- Discans
  -- Corah DAS
  -- Symptom Questionnaire

AGENDA 2: TREATMENT PROGRAMME 2 (CONTROL GROUP)

SESSION 1:

- Introductions
- Programme Introduction
- Three Channels of Anxiety Response
- Introduction of Relaxation Training with Antagonistic Verbal Set
- Examples (of how to contract various muscles)
- Relaxation Training
- Discussion/Comments/Problems
- Homework Assignment (practice relaxation-see handout)
- Discan Administration

SESSION 2:

- Review Homework
- Discussion (of any problems that arose)
- Test Relaxation Training
- Discussion
- Distraction Presentation

- Introduction of Exposure in Imagination with Distraction Verbal Set
- Exposure in Imagination (preparing to make a dental appointment): consists of 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation
- Discussion
- Exposure in Imagination (scene as above): 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation
- Discussion
- Homework Assignment: includes (a) practice relaxation, (b) practice exposure in imagination (using distraction skills) of preparing to make dental appointment and, (c) make actual dental appointment
- Discan Administration

SESSION 3:

- Review Homework
- Reiterate use of Relaxation and Distraction
- Exposure in Imagination of Corah Scene 1: 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation
- Discussion

- Exposure in Imagination of Corah Scene 1: 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation
- Discussion/ Comments/ Problems
- Exposure in Imagination of Corah Scene 2: 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation
- Discussion
- Homework Assignment: includes (a) making of dental appointment if not already completed, (b) practice of relaxation and, (c) exposure in imagination of Corah Scenes 1 and 2 using distraction skills
- Discan Administration

SESSION 4:

- Review Homework/ Discuss Problems
- Exposure in Imagination of Corah Scene 3: 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation
- Discussion
- Exposure in Imagination of Corah Scene 3: 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation,

2 minutes exposure, 2 minutes relaxation

- Discussion
- Exposure in Imagination of Corah Scene 4: 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation, 2 minutes exposure, 2 minutes relaxation
- Discussion
- Discuss Feelings re. attending Dental Appointment
- Homework Assignment: includes (a) relaxation and, (b) exposure in imagination of Corah Scenes 3 and 4 using distraction skills
- Distribute Envelopes
- Administration of -- Discans
  -- Corah DAS
  -- Symptom Questionnaire

APPENDIX H

RELAXATION TRAINING

Relaxation is like every other skill, the more you practice, the better you'll become. Therefore, it is important to practice the exercises twice a day, for 15-20 minutes each time. Practice sessions consist of tensing each muscle group, noting where it is tense, relaxing it gradually, and concentrating on the difference in these feelings. Do the exercises in a quiet place in a comfortable chair, on the floor with a pillow, or while in bed. Try to do them when there is no time pressure, like after work, before dinner, or before bedtime. Try to avoid any interruptions, like telephone calls or visitors.

1. Clenching fist of dominant hand.
2. Clenching fist of non-dominant hand.
3. Bending wrist of one or both arms.
4. Clenching biceps (one at a time or together).
5. Shrugging shoulders (one at a time or together).
6. Wrinkling forehead.
7. Closing eyes tightly.
8. Pressing tongue or clenching jaws.
9. Pressing lips together.
10. Pressing head back (on chair or pillow).
11. Pushing chin into chest.
12. Arching back.
13. Inhaling and holding chest muscles.
14. Tightening stomach muscles.
15. Contracting buttocks.
16. Stretching legs.
17. Pointing toes toward head.

Relaxation can be practiced while walking by scanning your body and relaxing all the parts except those necessary for walking. You can also do the breathing exercises at the same time.

You can also practice various parts separately throughout the day, especially those areas that are giving you trouble (for example, tightening and relaxing your legs while watching t.v.) You can practice before any event that you anticipate will be anxiety-provoking, practice during that event, and after an event that has made you anxious by taking a deep breath, exhaling, and relaxing all the muscles in your body. If you are very anxious, using this procedure will not completely eliminate anxiety, but keep doing it, and the anxiety can be reduced to a tolerable level.

APPENDIX I

EXPOSURE IN IMAGINATION

Scene 1: Making an Appointment

I want you to imagine that you are about to phone to make a dental appointment. (Try to make it as real as you can.) You walk towards the phone, realizing you must look up the dentist's number in the telephone directory. You do that and then pick up the phone. (Try to make it as vivid as possible.) You dial the number. You hear the rings go through as you wait for someone to answer. A secretary answers by giving the name of the dental clinic. You say who you are and that you would like to make an appointment. (Try to make it as real as possible.) She looks in the appointment book and you discuss a suitable time. She repeats the day and the time so you can write it down. You thank her and hang up the receiver.

APPENDIX J

RAW DATA: CORAH DENTAL ANXIETY SCALE

		CORAH DENTAL ANXIETY SCALE SCORE		
	Subjects	Pretreatment	Posttreatment 1	Posttreatment 2
EXPERIMENTAL GROUP	1	18	15	12
	2	18	7	5
	3	17	8	6
	4	13	11	13
	5	20	15	9
	6	18	7	7
CONTROL GROUP	1	18	11	10
	2	18	12	9
	3	16	10	12
	4	18	11	9
	5	16	10	9
	6	18	14	16

RAW DATA: EXPECTATION OF PAIN DISCAN

DISCAN SCORE: EXPECTATION OF PAIN

		Pretreatment	During Treatment			Posttreatment
	Subjects		Session 1	Session 2	Session 3	Session 4
EXPERIMENTAL GROUP	1	4	5	5	5	3
	2	12	13	6	2	1
	3	14	13	13	4	1
	4	1	3	1	1	1
	5	11	13	6	4	4
	6	6	11	4	5	3
CONTROL GROUP	1	12	13	5	4	4
	2	12	11	8	4	4
	3	1	1	3	1	1
	4	13	10	5	1	1
	5	11	10	9	4	7
	6	11	9	3	–	3

RAW DATA: EXPECTATION OF APPROACH DISCAN

DISCAN SCORE: EXPECTATION OF APPROACH

		Pretreatment	During Treatment			Posttreatment
	Subjects		Session 1	Session 2	Session 3	Session 4
EXPERIMENTAL GROUP	1	1	5	1	1	1
	2	14	3	10	1	1
	3	4	5	5	1	1
	4	5	1	1	1	1
	5	7	8	7	7	4
	6	1	1	1	1	1
CONTROL GROUP	1	5	1	1	1	1
	2	4	11	9	6	4
	3	14	6	6	5	1
	4	1	5	7	5	5
	5	1	1	1	1	1
	6	1	1	1	-	1

RAW DATA: LEHRER AND WOOLFOLK SYMPTOM QUESTIONNAIRE

LEHRER AND WOOLFOLK SYMPTOM QUESTIONNAIRE SCORES

		Total		Cognitive		Behavioural		Somatic	
	Subjects	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
EXPERIMENTAL GROUP	1	48	39	16	15	12	10	20	14
	2	37	17	15	4	5	0	17	13
	3	57	42	23	7	25	12	9	23
	4	57	53	21	13	25	22	11	18
	5	214	192	80	63	61	44	73	85
	6	22	16	14	13	4	3	4	0
CONTROL GROUP	1	135	108	56	46	24	19	55	43
	2	92	97	50	38	24	31	18	28
	3	33	18	17	8	4	1	12	9
	4	76	80	37	29	24	26	15	25
	5	128	140	45	48	38	43	45	49
	6	48	96	28	43	4	8	16	45