THE EFFECT OF RELAXATION AND PREPARATORY INFORMATION ON POSTOPERATIVE PAIN IN SENSITIZERS AND AVOIDERS

by

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Dissertation submitted to the Graduate Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of
DOCTOR OF PHILOSOPHY
in
Psychology

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July, 1981

Blacksburg, Virginia

Acknowledgements

I would like to extend special thanks to the surgeons, nurses, and staff of Lewis-Gale Hospital for their invaluable assistance in the organization of this study. I would also like to extend sincere appreciation to the members of the advisory committee, George Clum, Chairperson, Jerry Kehoe, John Bernardin, William Herbert, and Richard Eisler for their valuable suggestions during the preparation of this manuscript. Special thanks are also extended to Lee Fredericksen for serving as a member of the examining committee in Dr. Eisler's absence.

The assistance of , , and in data collection is also gratefully acknowledged. Special thanks are also extended to and for their perseverence and skill in rating the audio-tapes.

Most sincere appreciation is extended to my colleagues at the University Counseling Services for their support throughout this past year.

Finally, heartfelt thanks to , , and for their continual love and support.

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Introduction

Pain - Definition and Measurement Issues

Pain is a complex phenomenon. It is generally agreed that it cannot be defined simply as a sensation that varies only along an intensity dimension. Pain is a label, a category, signifying a multitude of different, unique experiences. Melzack (1973) asserts that pain varies along both sensory-discriminative and motivational-affective dimensions. The magnitude or intensity along these dimensions, moreover, is influenced by cognitive activities, such as evaluation of the seriousness of the injury. If injury or any other aversive stimulus fails to evoke an aversive reaction, the experience cannot be labelled as pain. Conversely, anxiety or anguish without somatic aspects is not pain. Pain must be defined in terms of its sensory, motivational, and central control determinants. According to Melzack and Casey (1968), pain is a function of the interaction of all three of these determinants, and cannot be ascribed to any one of them.

Pain, then, is not produced simply by a stimulus sufficiently aversive to activate the pain receptor and send a message on its way to the sensory cortex, a process that might be termed the sensory component of pain. The modification which the sensory message undergoes, from affective and cognitive components, constitutes the pain experience. Beecher's (1956) classic studies have demonstrated this lack of proportionality between the stimulus and the subjective experience of pain. Beecher found that soldiers wounded in battle often denied pain and asked for analgesics in only one out of four cases.

In comparison, in civilian life, with a similar surgical wound made under anesthesia, over 75% of the patients requested pain medications. Beecher explained the difference as due to the anxiety-reducing nature of the war wound (as a ticket to safety) as compared to the anxiety-invoking nature of civilian surgery (and its implications for serious illness). Beecher (1962) also notes that emotion, suggestion, hypnosis and placebo therapy have been shown to block pain. This block is related, presumably, to the affective, cognitive components of pain; one would not expect, for example, that a placebo could affect the pain-producing mechanism or the sensory component in any way. Pain has also been shown to be related to numerous other variables, such as cultural background, past experience, personality variables, attention, arousal level, and contingencies of reinforcement (Sternbach, 1975; Frederickson et al., 1978).

Accepting, then, the complexity and the subjective nature of the pain experience, it is not surprising to find that the measurement of pain is a difficult undertaking. Sensory psychologists and physiologists have attempted to circumvent these problems by viewing pain simply as a type of sensation (Weisenberg, 1977). Laboratory methods for arousing pain have been compared and the specific nervous pathways discussed. Still no single pain theory is adequate to account for the wide range of pain phenomena. The psychological mechanisms of pain experience cannot be understood without reference to psychological components. Liebeskind and Paul (1977) suggest that the dichotomous terms we use to specify the origin of pain ("physiological" vs. "psychological", "organic" vs. "functional") be rejected. They contend that the use

of such terms promotes an artificial division of pain patients into those who have "real" pain and those who imagine it. They conclude that pain patients with a strong affective component deserve as much attention in treatment as those who minimize their experience, although perhaps for treatment of a different type.

Thus, it is necessary to consider the multidimensional nature of pain when selecting measurement devices. Several authors (Frederickson et al., 1978; Liebeskind & Paul, 1977) have suggested that multiple measures of pain be used, so that the various components of pain can be examined empirically, without an inappropriate emphasis on any one aspect, such as verbal report. Numerous approaches to pain measurement have appeared in the literature on both experimentally-induced and clinical pain. Generally, methods of measuring pain have fallen into three broad categories: cognitive, behavioral, and physiological. Cognitive or self-report measures have covered a broad spectrum of forms, from simple point scaling to use of a comprehensive list of descriptors. Melzack (1975), for instance, developed the McGill Pain Questionnaire in which subjects are asked to select from a list of descriptor words which describe sensory, affective, and cognitive components of pain. The visual analogue scales have also widely been used. This may consist of a straight line, with fixed ends representing extremes of the sensation measured. Sternbach (1974), for example, asks the patient to rate his pain on a scale of 0 to 100, in which 0 is no pain at all and 100 is pain so severe that the patient would commit suicide if he had to endure it for a few minutes. Johnson (1973)

attempts to separate pain into sensation and distress components. She asks subjects to rate their pain sensation on a scale from 1-100 and their level of distress (due to the pain) on a Likert scale from "slightly distressing" to "just bearable."

Two techniques have attempted to distinguish the sensory component from the motivational component of pain (Weisenberg, 1977). These techniques involve the experimental induction of pain in a laboratory setting. In the magnitude estimation procedure, as developed by Tursky (1974, 1976, 1977), a standard electrical stimulus is presented and given a rating of 10. Other presentations of shocks above and below the standard are rated by the subject, who provides a numerical estimate in comparison with the standard. To assess the reactive-motivational components of pain, Tursky asks subjects to indicate four levels of intensity as the shock intensity is raised: (a) sensation threshold; (b) discomfort; (c) pain; and (d) tolerance. The second approach of this type is signal detection or sensory decision theory, which again, attempts to distinguish the sensory component of pain (d') from the nonsensory, motivational-attitudinal (L_x, or the willingness to report experienced pain) component. However, the analysis developed to sort signal from noise requires many more stimuli than does the magnitude estimation procedure. Also, signal detection is mainly useful in the laboratory, where the stimulus can be clearly defined (Weisenberg, 1977). Clark (1974) has hypothesized that pain thresholds raised by placebos, redirection of attention, and hypnosis, represent a response bias based on a reluctance to report pain (L_x), rather than a change in the sensory perception of the pain stimulus (d') (Weisenberg,

1977). The complex methodology required in this technique, however, has caused some to question the applicability of findings to clinical pain settings (Rollman, 1977). Sternbach (1975) also reports that most experimental laboratory research in pain has little applicability to the clinical situation. Sternbach (1975) cites three reasons for his conclusion: (1) Beecher's (1959) findings that the affect elicited in the clinical patient is rarely comparable to the state of the experimental subject; (2) experimental studies usually involve pain of short duration, as compared to long-lasting clinical pain; and (3) data published on pain thresholds, pain stimuli, etc., has contributed little to the understanding and treatment of clinical pain.

In the methods described above and numerous other methods of pain measurement not included here, the reliance is placed heavily on verbal reports. Other researchers have attempted to look at pain behaviors, mainly with chronic pain patients. Fordyce et al. (1973) note that in order to describe pain, it is necessary to conceive of it as a set of responses, that is, the person must engage in some behavior identified by observers as indicative of pain. They conclude that the identification and measurement of pain is based on something the patient says or does and that information from a patient about the nature and severity of his pain is subject to marked influence by factors which are independent of underlying pathology. Fordyce et al. (1973) propose, then, only to measure pain behaviors, not pain. They took measures of such behaviors as taking medication, moaning, gasping, or walking in a guarded manner. They found these behaviors responded to reinforcement

contingency programs designed to reduce their frequency in chronic pain patients.

Physiological measures have also been used to measure pain. This is a promising area of methodology, but little used to this point. Part of the difficulty is a function of the questionable validity of such techniques for measuring pain and conflicting evidence as to which physiological measure is best suited to pain measurement. Hilgard (1969) reported that blood pressure is associated with pain reports, when using cold-pressor pain induction. Sternbach and Tursky (1965) used electrodermal and heart rate measures. Tursky (1977) has reported that an orderly relationship can be found between shock intensity and measurements of skin potential from nonpalmar areas (the inner edge of the forearm, the vertical surface of the forearm, across the lower abdomen). A haphazard relationship was obtained when using palmar placements.

However, as Weisenberg (1977) points out, it is difficult to separate physiological pain responses from other activating responses. Also, many standard indicators, such as electrodermal responses, may be too sensitive - producing maximum reactions at low stimulus intensity and unable to discriminate at high levels. Also, there is conflicting evidence as to the validity of these measures. Davidson and Neufield (1974) found that frontalis muscle tension and respiration rate could be used to discriminate the pain group from subjects undergoing other types of stressors. Skin conductance and heart rate did not discriminate subjects who were in pain. They failed to find a significant increase in

heart rate for the pain group. Furthermore, Turk, Meichenbaum, and Berman (1979), in a comprehensive review of the literature on biofeedback regulation of pain, conclude that

> The relationship between the experience of pain and the various physiological responses that biofeedback techniques are designed to control has not been established. Without the determination of some relationship between a physiological response and the experience of pain, the rationale for selecting a physiological function for voluntary control remains unclear.

It appears that further investigation is necessary to discover a set of reliable, discriminating physiological indicators for pain.

In view of the complexity of pain perception and the problem of choosing one appropriate pain measure, it is also apparent that further efforts need to be made to develop reliable, discriminating verbal and behavioral measures, to the extent that that is feasible. Until then, it is best to reiterate the need to use many types of measures to avoid method bias, whenever possible, and to allow for comparisons between different measures.

Correlates of Pain Experience

In this section, factors that have been demonstrated to influence the experience of pain will be reviewed, in greater detail. Sternbach (1975) notes that these factors can be categorized as social, psychological, and physical. Discussion will be confined to those studies which discuss emotional and cognitive aspects, and cultural and experiential factors that correlate with pain experience, in individuals who have some physical injury. It is beyond the scope of this review to examine psychogenic pain.

Anxiety

One of the most important correlates, and most frequently mentioned, is anxiety, primarily situational or state anxiety. This factor has been examined in clinical and experimental studies. Beecher (1956) reported that the difference between the soldier's response to injury and that of civilians in surgery was a function of the difference in anxiety levels. Drew, Moriarty, and Shapiro (1968) found that analgesic usage was much higher among patients undergoing photocoagulation for retinal repair than in patients undergoing major abdominal surgery. The difference being that, even though photocoagulation is known to be relatively painless, it is associated with high levels of anxiety. Other studies of surgery patients (Janis, 1958; Martinez-Urrutia, 1975; Scott, Clum & Peoples, 1981) have shown a significant linear relationship between the magnitude of reported pain and the level of reported anxiety. Spear (1967) also reported, in a study with psychiatric patients, that pain as a symptom appeared with the highest incidence in patients with anxiety states. Pain was associated with a history of surgical operations, other somatic symptoms, and overt anxiety. Sternbach (1968) concludes, in a review of the literature, that the greater the anxiety, the greater will be the reaction to painful stimulation.

Weisenberg (1977) notes, however, that anxiety is an ambiguous concept and its relation to pain perception and reaction must still be clarified. For instance, Leventhal (1970) and Lazarus (1968) have proposed a parallel response model, in which emotions, such as anxiety and fear, are considered responses which are a function of the individual's

appraisal of the situation. These emotional responses can be independent of instrumental responses to reduce danger or threat (i.e., ambulation after surgery, complaints of pain, requesting medicine). That is, all possible combinations of emotional reactions and instrumental behaviors are possible. Achieving reduction in anxiety or fear need not insure the threat is gone and reducing the threat need not reduce the emotional response (Johnson, Leventhal, & Dabbs, 1971). Johnson, Leventhal, and Dabbs (1971) reported that instrumental responses to surgery were a function of internality-externality, rather than emotionality. A similar framework may also explain the low to moderate relationship found between anxiety and pain measures in clinical settings (Martinez-Urrutia, 1975; Scott, Clum, & Peoples, 1981).

Personality Traits and Cognitive Styles

Earlier studies primarily refer to personality traits which relate to pain response. Two characteristics frequently studied were extraversion and neuroticism, using the Eysenck Personality Inventory. Several experimental pain studies found that persons high on extraversion (outgoing, impulsive, easygoing, many social contacts) tolerated pain better (Haslam, 1967; Lynn & Eysenck, 1961; Petrie, 1967). Bond, Glynn, and Thomas (1976) reported that there was a significantly greater level of pain in subjects who were extroverted and showed a tendency to be anxious, despite equal pain medication, in a study of men undergoing disc surgery. Jacox (1977) reports, however, that there is equivocal evidence for the relations of extraversion to pain, since several studies (Davidson & McDougall, 1969; Leon, 1974; Schalling & Levander, 1964) report no relationship between extraversion and pain.

Neuroticism, defined as emotional lability, overresponsiveness, and using neurotic defenses under stress, has also been related to pain (Jacox, 1977). This dimension is also closely related to anxiety. Bond (1971) reported that in women with advanced cancer of the cervix, neuroticism was significantly related to level of pain reports. Parbrook, Dalrymple, and Steele (1973) found there was a significant correlation between higher neuroticism scores, higher pain scores, and more injections of narcotics in male patients undergoing elective peptic ulcer surgery. As with anxiety, the relationship between neuroticism and pain is not clear, but generally increased neuroticism seems to be related to increased pain (Jacox, 1977). Other personality traits have also been related to pain, such as proneness to depression, hysterical traits, hypochondriacal traits, and obsessional traits (Bond, 1978; Wise, Hall, & Wong, 1978).

Individuals have also been divided into categories reflecting their characteristic style of reacting to stimulation and/or stressful events. A widely used dimension in pain and stress research is repression-sensitization. The Repression-Sensitization Scale (Byrne, 1961) was developed to distinguish individuals who respond to aversive stimuli with blocking and denial (repressors), from those who exaggerate it and cope with stress by trying to deal with it directly (sensitizers). Sensitizers are generally described as handling stress by being vigilant, overtly anxious, and alert to threatening cues. They actively seek information about a stressor as a means of preparing to experience it. Repressors, however, are described as reporting low anxiety, and deal

with stress by denying its potential threat or refusing to think about it. Several studies (Davison, 1963; Hane, 1966; Merbaum & Kazoaka, 1967; Scarpetti, 1973; Cohen, 1975) have found, however, that even though repressors express little anxiety or concern, they generally show greater physiological responsiveness (Wagstaff, 1977; Shipley, Butt, Horwitz, & Farbry, 1978).

Several experimental and clinical studies have attempted to differentiate between repressor and sensitizer responses to pain and stress. Petrie (1967) argued that pain tolerance was part of a more general perceptual trait, involving augmenting or reducing sensory inputs. Petrie, who classified augmenters and reducers on the basis of a kinesthetic size-approximation task, found reducers to have a higher pain tolerance. Her results have since been questioned by Elton, Vagg, and Stanley (1978) who were unable to replicate her findings.

More recent studies of repression-sensitization, using various paper-and-pencil measures have consistently reported differential responses. Davidson and Bobey (1970), in an experimental analogue study, found that avoiders (repressors) showed a significantly higher pain tolerance than copers (sensitizers) in the first half of the study, but showed a significant decrease in tolerance with repeated administration of the painful stimulation. Copers did not show any significant effects of repeated exposure to painful stimulation. Weinstein, Averill, Opton, and Lazarus (1968), using the MMPI R-S scale, compared physiological (skin conductance and heart rate) responses and self-report measures of psychological distress for male subjects viewing the Lazarus

and Opton (1966) stress-induction film on crude genital operations. As predicted, repressors showed relatively greater physiological arousal than self-report reactions and sensitizers reported more stress, with relatively lower physiological reaction.

Weinberger, Schwartz, and Davidson (1979) distinguished between repressors (on the Byrne R-S scale) and truly low-anxious subjects. They noted that low-anxious subjects report low trait anxiety and low defensiveness and repressors report low anxiety but high defensiveness. Monitoring three physiological responses (GSR, heart rate, forehead muscle tension) during a phrase association task, and taking measures of reaction time, content avoidance, and verbal interference, they found all measures indicated repressors to be experiencing more stress than low-anxious subjects.

Rofe and Lewin (1979) also report that repressors (Byrne R-S scale) were rated as better adjusted and more likely to be chosen as a friend than sensitizers. Subjects were high school students and adjustment scores were based on peer ratings and teacher evaluations. Early and Kleinknecht (1978) investigated the relationship between R-S (Byrne scale) and palmar sweating in a paradigm designed to simulate dental threat. Subjects were sixty female undergraduates, exposed to simulated dental drill sounds (threat stimulus) or the sounds of a windup toy (control). Sensitizers were more physiologically aroused than repressors during presentation of drill sounds. Sensitizers also reported more fear of dentistry than repressors. The authors interpreted these results as substantiation of Mischel's (1976) description of the R-S dimension as

representing differences in learned patterns of attending to or avoiding potentially threatening stimuli. Such selective attention could be expected to affect physiological responsiveness in this way.

Gayton, Bassett, Tavormina, and Ozmon (1978) examined the relationship between R-S (Byrne scale) and seeking health care. Ninety male inmates of prison were divided into three equal groups - repressors, intermediates, and sensitizers. The number of sick call visits was tabulated from the prison records for a one-year period and the medical officer's assessment of inmate's need for treatment was also noted. They found that sensitizers sought medical attention significantly more frequently than repressors. Sensitizers and repressors did not differ in terms of unjustified visits. The authors noted that their findings indicate that, 1) sensitizers may get ill more often than repressors, and/or 2) repressors may ignore physical problems and avoid health care, even when they are actually sick.

Some researchers have examined the differential responses of repressors and sensitizers to treatment strategies for pain and stress reduction. Beers and Karoly (1979) induced pain by using the cold-pressor method and measured tolerance, threshold, and overall discomfort in subjects who had been instructed in one of four cognitive strategies, 1) counting backwards, 2) imagining a pleasant, warm scene, 3) imagining a pleasant, but cold-related scene, and 4) making positive self-statements and minimizing the unpleasant aspects of the cold-pressor pain. Treatments did not affect discomfort ratings, but imaginal strategies increased pain tolerance and raised threshold.

Subjects coping style, as measured by the Epstein and Fenz (1967) R-S scale was not related to any of the dependent measures.

Shipley, Butt, Horwitz, and Farbry (1978) examined the relationship between anxiety during a stressful endoscopic exam and amount of stimulus pre-exposure. Patients were also divided into repressors and sensitizers, using the Epstein and Fenz (1967) modification of the R-S scale. Subjects were 60 patients, 50 males and 10 females, with no prior experience with endoscopy. Anxiety was measured by physiological (heart rate, respiration rate, and skin conductance) means, behavioral ratings by the nurse and physician involved, and self-report (Spielberger State-trait Anxiety Inventory, Post-Endoscopy Interview Schedule). Subjects viewed a video-tape of the endoscopy procedure either zero, one, or three times. On most measures of distress, as number of exposures increased, distress decreased. This was interpreted as a result of habituation of anxiety. The authors also found differential heart rate changes for sensitizers and repressors. There was a monotonic decrease in heart rate as a function of number of exposures for sensitizers. Repressors, however, produced an inverted-U-shaped relationship. One viewing produced the highest heart rate. The authors noted that one exposure may have disrupted respressive defenses and fear was extinguished only by three exposures.

In a follow-up study, Shipley, Butt, and Horwitz (1979) used the same paradigm with 36 patients who had undergone endoscopy at least once before. In this instance, tape viewing resulted in decreased anxiety in sensitizers and had no effect or increased anxiety in

repressors. Without separating the sample into repressors and sensitizers, the tape viewing had no effect. The authors concluded that sensitizers should be prepared extensively and that repressors may respond best when left alone.

In a study with surgery patients, Andrew (1970) divided patients into three groups: sensitizers, repressors, and nonspecific-defenders (those who use both sensitizing and repressing strategies). She provided half of the subjects in each group with information explaining the origins of hernias, the dangers of delay of surgery, the surgery process, preparatory procedures, and possible consequences. The other half of the group did not receive this information. Results revealed that nonspecific-defenders who were provided with the information showed the fastest recovery. Repressors who were instructed required more pain and sleeping medications after surgery than repressors who were not instructed. Sensitizers were not affected by the information. Andrew notes that sensitizers may have failed to improve because they had already "rehearsed" the information considerably, so that the short information tape did not provide sufficient additional preparation to effect any change. Andrew also suggests that repressors may have experienced anxiety arousal as a result of the tape, but may not have had enough time to work through from the initial arousal of anxiety phase to the expected decrease in anxiety phase, before the time of surgery. This is based on the notion that preparatory information allows an individual to prepare himself for a stressful experience, which as Butt et al. (1979) report, may not hold true for repressors.

DeLong (1970), in a follow-up of the Andrew (1970) study, looked at the effect of type of information as a function of coping style. Twenty-four hours before surgery, specific and detailed information was given to one group of patients, and general information about the hospital and operative procedures was given to another group of patients. The nonspecific-defenders showed the fastest recovery from surgery. Sensitizers who were given the specific information showed a good recovery, and those given general information showed a poorer recovery. Repressors had the slowest recovery. DeLong interprets these results as indicating that repressors block the information and thus fail to adequately prepare themselves for the upcoming stress. The data also suggest, however, that repressors do not respond favorably to preparation and that their own coping style may work better for them.

Cohen and Lazarus (1973) also examined the relationships between coping style and recovery from surgery. They also examined, however, the adequacy of instruments for measuring coping, suggesting that a process measure, specific to the situation, is preferable to dispositional measures. They rated 61 surgical patients on an interview measure of coping, developed for the surgery situation. Subjects also completed the dispositional measures (Goldstein Sentence-Completion Test [1959]; Epstein & Fenz [1967] modified version) of repression-sensitization. Cohen and Lazarus (1973) found a low, but significant correlation between the process and dispositional measures of coping. Patients were divided into repressors (avoiders), sensitizers (vigilant), and a middle group, which emphasized neither style, on the basis of the process

measure. Sensitizers generally showed a slower recovery, based on days in the hospital, minor complications, and negative psychological reactions. Repressors recovered best, although not significantly better than the middle group. The authors suggest that the sensitizer's information-gathering may have contributed to their more complicated recovery. Also, "working through the threat," as suggested by Janis (1959), does not appear to be necessary for repressors. However, Cohen and Lazarus (1973) note that repressor's characteristic denial may only be beneficial in situations when the outcome is expected to be positive.

Sociocultural, Experiential, and Sex Differences

Appraisal of the social appropriateness of pain expression is another important correlate. Zborowski (1952) observed that a patient's ethnic and cultural background greatly influenced, and to a large degree, directed the nature of his/her response to a painful or stressful situation. He reported that "old Americans" have a stoical attitude towards pain and pain expression. They tend to withdraw when the pain is intense and cry out or moan only when they are alone. Jews and Italians, however, tend to complain openly and excessively and seek support and sympathy. Chapman and Jones (1944) found that southern Negroes had a lower pain threshold and less tolerance than whites. Woodrow et al. (1972) also found that whites had the highest average pain tolerance, blacks the next highest, and Orientals the lowest. However, other studies (Mersky & Spear, 1974; Winsberg & Greenlick, 1967) have found no differences between whites and blacks.

Although there is some conflicting evidence with respect to sex differences, Jacox (1977) notes, in a review of the literature, that there does not appear to be any difference between men and women with respect to pain threshold, but pain is tolerated better by men than women. This conclusion was also reached in a study designed to compare tolerance and sensitivity to pain (Notermans & Tophoff, 1975). Woodrow et al. (1972), using pain induced by pressure to the Achilles tendon, found that men tolerated more pain than women.

In addition, pain expression has been shown to be related to factors such as lower or laboring social class, low ordinal position in the family, larger family size, a history of more previous pain experiences and having relatives with such experiences, and relatively poor marital and sexual adjustments (Mersky & Spear, 1967; Mersky, 1968).

Age has also been often cited as a factor that is related to pain. Jacox (1977) reports that pain studies are inconclusive with respect to the effect of age, although more studies indicate that pain threshold increases with age. Studies on pain tolerance or pain expression are conflicting and there appears to be no clearcut relationship between age and level of pain.

Intervention Techniques

Suggestion, Hypnosis, and Relaxation

A number of techniques have proven to be effective in reducing pain. Suggestion and placebo, for instance, are known to relieve pain. The effect of the expectancy that the analgesic effect will occur has been well documented throughout the literature. Beecher (1959) has reported

that about 35% of patients, in a study that included over a thousand patients, experienced marked relief from pathological pain. Lasagna et al. (1954) gave 293 post-operative patients alternate injections of normal saline and a narcotic analgesic. All patients had undergone major surgery and all doses were given within 30 hours of the operation. Of 493 doses of saline, 43.2% resulted in pain relief. Shapiro (1971), in a review of characteristics of placebo responders, reported that suggestibility appears to increase with stress. Anxiety was a frequently reported characteristic of placebo responders. It also appeared important that the therapist express interest in the patient and the treatment.

Hypnosis has also been found, in numerous studies to relieve pain. Hypnosis has been shown to be effective in relieving chronic intractable pain (Lea, Ware, & Monroe, 1960; Cheek, 1966; & August, 1963). Hilgard (1967, 1969, 1971) also demonstrated that subjects, who were very susceptible to hypnotic suggestion, could block ischemic pain for 18 to 45 minutes and increase their pain tolerance, when pain was induced by the cold pressor method. He noted, however, that it was necessary to suggest analgesia. Hypnosis alone did not reduce discomfort. Barber (1978) has also used hypnosis for relief of pain in cancer patients, as well as to promote life-enhancing attitudes in them. Wakeman and Kaplan (1978) conducted two studies with burn patients. A variety of hypnotic techniques were used, with both therapist and self-hypnosis. Suggestions were made for analgesia, anesthesia, and dissociation and reduction of fear and anxiety. In both studies hypnosis patients used significantly lower amounts of pain medication.

Hilgard (1973) contends that hypnosis works because it produces a different state of consciousness, in which the pain stimulus is blocked from awareness. Barber (1964) proposes that hypnotized patients are role-playing and responding as a person who is not perceiving pain. Crasilneck and Hall (1975) note, however, that psychological explanations are not sufficient, since individuals who enter deep trance experience significant physiological changes as well. They suggest that hypnosis may trigger some yet unidentified physical mechanism that interferes with the perception of pain. Nevertheless, as Weisenberg (1977) points out, both placebo medications and hypnosis appear to be most effective when anxiety is present, and both appear to involve suggestion, expectation of successful outcome, and anxiety relief.

Relaxation techniques, of many types, have also been used to alleviate pain, in both experimental and clinical studies. Wolpe (1958, 1969) has proposed that relaxation inhibits or reduces anxiety. Behavior therapists, such as Wolpe (1958), have long advocated the use of progressive relaxation to inhibit the stress response, for use within the framework of systematic desensitization. Relaxation training has also frequently been used in treatment of stress-related health disorders, such as hypertension (Benson, Shapiro, Tursky, & Schwartz, 1971; Schwartz & Shapiro, 1973; Russ, 1974) and tension headache (Epstein, Webster, & Abel, 1976; Benson, Klemchuk, & Graham, 1974).

In studies with experimentally-induced pain, training in relaxation techniques has been effective. Bobey and Davidson (1970) induced pain by radiant-heat and pressure algometer stimulation. Relaxation training

(based on Wolpe's desensitization techniques) was compared with an increased anxiety condition, cognitive rehearsal of the upcoming stimulation, and a control condition. Results showed that subjects who were trained in relaxation produced the highest pain tolerance scores, which were significantly different from the control group. McAmmond, Davidson, and Kovitz (1971) also found that relaxation was most effective in reducing stress reactions to pressure-algometer stimulation, when compared to a hypnosis or control group. This difference was only obtained, however, for those subjects who were highly anxious (as measured by GSR) to begin with. Klepac (1975) has used relaxation instructions to increase pain tolerance to electrical shocks. This was part of a treatment regimen to reduce dental phobia. The subjects included in the treatment to increase pain tolerance had attributed their avoidance of dental care to "pain." After increasing the pain tolerance of these patients through the relaxation procedure, they successfully completed the desensitization to dentists.

In clinical settings, Gessel and Alderman (1971) examined the usefulness of relaxation training for reducing pain in patients with myofascial pain dysfunction syndrome. Relaxation training was effective, except for those patients who were depressed at the beginning of the training. Wilson (1977) compared the effectiveness of training in systematic muscle relaxation with preparatory instructions about sensations and procedures to be expected during hospitalization. Patients were gall bladder or hysterectomy patients. Both treatments significantly reduced patient's length of stay in the hospital. However,

only relaxation training reduced pain, as measured by reported pain distress and the number of days injections for pain were required. Aiken and Henricks (1971) also trained patients about to undergo open heart surgery in progressive muscle relaxation. Those who trained in relaxation experienced a reduced degree of hypothermia, required less time on cardio-pulmonary bypass, and received less anesthesia and fewer total units of blood, than controls.

It appears that relaxation can be an effective procedure for increasing pain tolerance. However, the conditions under which it should optimally affect pain must still be clarified. This might be accomplished more easily if we understood how anxiety affects pain (Weisenberg, 1977).

There are other techniques that have been developed to induce relaxation, other than the systematic muscle relaxation (Wolpe & Lazarus, 1966) or the breathing-focus technique used by Benson (1975) with hypertensives. Biofeedback procedures, for instance, have been quite helpful in reducing pain associated with chronic muscle tension. Budzynski, Stoyva, and Mullaney (1973) used EMG feedback in treating tension headache. Subjects in training groups maintained decreased headache frequency at 18 month follow-up. Alpha feedback was used by Gannon and Sternbach (1971) to treat a case of migraine headache. The patient was able to prevent pain prior to the beginning of the headache, but could not change the pain after the headache began. Temperature biofeedback has also been used extensively for the treatment of migraine headache (Sargent, Green, & Walters, 1972; Mitch, McGrady, & Iannone, 1976).

Melzack and Perry (1975) treated patients suffering chronic pain of pathological origin with alpha-feedback training methods in association with prior hypnotic training. The combined procedures produced a substantial decrease in pain in 58% of the patients during the training sessions. Patients who received the alpha training alone, however, reported no decreases in pain even though they showed increases in alpha output. Patients who received hypnotic training alone also produced increased alpha during the training sessions and showed substantial (though not significant) decreases in pain. The results demonstrate that chronic pain can be reduced in a significant number of patients by means of a combination of alpha-feedback training, hypnotic training, and placebo effects. However, Melzack and Perry concluded that the contribution of the alpha training procedure to pain relief is not due to increased EEG alpha as such but, rather, to the distraction of attention, suggestion, relaxation, and sense of control over pain which are an integral part of the procedure.

Turk, Meichenbaum, and Berman (1979), in a recent review of the biofeedback literature conclude, however, that the efficacy of biofeedback has not been demonstrated. They conclude that cheaper, more readily accessible techniques, such as relaxation and coping skills interventions are as effective or more effective than biofeedback training in many cases. They also suggest that research be focused to examine what combination of cognitive, behavioral, and biofeedback techniques works best with what types of patients, with what kinds of problems, under what conditions.

Cognitive Strategies and Preparatory Information

Numerous cognitive strategies had been examined, including instruction, attention redirection or distraction, reinterpretation of the painful stimulation, and cognitive imagery. The effectiveness of these strategies has been examined in experimental studies and with clinical pain patients. Holmes and Houston (1974) compared the effect of situation redefinition and affect isolation on subject's tolerance of painful shocks. In the redefinition condition subjects were told to think of the shocks as interesting new physiological sensations. In the isolation condition, subjects were told to relax and maintain an unemotional and detached attitude toward the shocks. Threat condition subjects were told that the shocks would be painful, but not harmful. Results indicated that subjects using redefinition and isolation experienced less stress than threat condition subjects, as measured by GSR and heart rate and self-report.

As previously cited, Beers and Karoly (1979) found that imaginal strategies (imagining a pleasant, but cold-related scene or imagining a pleasant, warm scene) increased pain tolerance and raised threshold, when using the cold-pressor method for pain induction. They concluded that strategies that involve relevant, realistic transformations of the situation are best suited to reduce pain.

Horan and Dellinger (1974) found emotive imagery, having the subject imagine pleasant scenes or feelings, to be most effective in increasing pain tolerance when compared with distraction or control conditions for cold-pressor stimulation. In a later study, Horan, Layng, and Pursell

(1976) examined the effects of "in vivo" emotive imagery on dental discomfort. Discomfort was measured by heart rate and self-report. Twenty-seven female subjects undergoing tooth prophylaxis were trained in one of two strategies: 1) relaxation imagery, imagining relaxing scenes, walking through a lush meadow, swimming in a clear blue lake; 2) neutral imagery, viewing 2-digit numerals. Controls received no strategies. The treatments did not have any effect on heart rate. However, the relaxation imagery produced significantly reduced discomfort ratings, as compared with the other two conditions.

Chaves and Barber (1974) compared cognitive strategies of imagining pleasant events or imagining the finger to be insensitive, with an expectation condition (told to expect a reduction in pain), with a control condition. Pain was induced by pressure stimulation to the finger. Ratings of the average amount of pain felt were reduced most for the cognitive strategies. The expectation condition also resulted in a reduction, but smaller than that found in the cognitive strategies.

Spanos, Horton, and Chaves (1975) assigned subjects to one of two treatment conditions or a control group. Treatments consisted of asking the subject to imagine a situation inconsistent with pain (relevant strategy) or to imagine a situation unrelated to pain (irrelevant strategy). Subjects were divided, on the basis of pretests, into those with high and low pain thresholds. There was no difference in pain thresholds for subjects with low pretest thresholds. For subjects with high pretest pain thresholds, however, the relevant strategy was most effective, and the irrelevant strategy was more effective than no

strategy. Subjects who reported great involvement in their imaginings showed greatest increases in pain threshold.

Worthington and Shumate (1981) examined the effect of components of a stress inoculation training package on subjects' tolerance for cold-pressor pain (immersion of their non-dominant hand in ice water). Subjects were 96 undergraduate women. Subjects in the experimental conditions were asked to create pleasant imagery for themselves, conceptualize the pain as a multi-stage process and reinforce themselves for coping with each stage, or to generate a list of coping statements to use during immersion. Controls completed a demographic questionnaire. Results indicated that use of imagery and the use of conceptualization of pain as a multi-stage process were both effective in significantly reducing self-reported pain and increasing tolerance. However, conceptualization added no additional benefit if added to imagery. Use of self-generated statements did not affect pain control. Worthington and Shumate (1981) conclude that pleasant imagery may be the effective component of stress inoculation.

Hackett and Horan (1980) also tested the effectiveness of components of coping-skills training for reducing cold-pressor pain. Subjects, female undergraduates, were trained in either relaxation techniques, emphasizing slow, deep breathing, distraction and imagery, such as attention to environmental cues, or generating calming images, or the use of self-instruction. Self-instruction consisted of active coping, based on Meichenbaum's (1977) formula, by preparation for the stressor, handling the stressor, dealing with feelings, and self-reinforcement.

Hackett and Horan (1980) reported that relaxation increased pain tolerance, distraction and imagery increased pain threshold, and self-instruction was ineffective on all measures. When subjects were trained in two or more strategies, results indicated that distraction and imagery when added to relaxation training enhanced pain control, but self-instruction produced no additional effect.

Cognitive strategies have also been used for control of clinical pain and stress. Holroyd and Andrasik (1978) compared self-control strategies using groups of chronic tension headache patients. Treatments included two self-control groups, in which patients were taught to recognize maladaptive cognitions that were related to headache onset. Subjects were then trained to interrupt the sequence of cognitions, that led to upset and headache, by using incompatible cognitive strategies (such as reappraisal, redirection of attention, and fantasy). One control group received the cognitive strategies alone and the second control group was also trained in relaxation techniques. A third group participated in a headache discussion, in which they talked about symptoms and were encouraged to examine thoughts and feelings that seemed to accompany their headaches. Controls recorded their headaches. Results showed that members of both self-control groups and the headache discussion group experienced significant reductions in headaches, which were maintained at 6-week follow-up. Holroyd and Andrasik (1978) concluded that cognitive self-control strategies are an effective treatment for tension headache even when administered in a group. However, they noted that the effectiveness of these strategies

did not appear to be related to the presentation of control techniques since members of the headache discussion group attained significant reduction of symptomatology by developing their own strategies.

Kendall et al. (1979) also examined the relative effectiveness of cognitive strategies developed by the patient and patient education. Subjects were male veterans scheduled for cardiac catheterization. In the cognitive intervention, subjects were taught to identify anxiety-producing cues and to use their own cognitive coping skills to relax and reduce the stress. Subjects were extensively trained, using modeling and rehearsal. Subjects in the patient education group received instruction on the anatomy of the heart and the catheterization procedure was explained in great detail. Both intervention groups were rated by medical staff as more adjusted during the procedure. Subjects in the interventions recalled significantly less state anxiety, during catheterization, than controls. The cognitive intervention produced the lowest post-procedure levels of anxiety and the highest adjustment ratings. Kendall et al. (1979) concluded that patients respond best when encouraged to use their own strategies, which is preferable to presenting a prescribed coping method, which could conflict with the subject's own method and interfere with adjustment.

The final type of intervention strategy examined in the literature, with respect to pain control and stress reduction, is preparatory information. This is a broad category and many types of instruction have been used. A number of clinical studies have examined the effectiveness of pre-procedure preparation. Some studies, using surgery patients, have

used multiple-component patient instruction. One of the earliest studies of this type was done by Egbert et al. (1964). The study included 97 abdominal surgery patients who were assigned to the instruction group or to a control group. Patients in the instruction group were informed of the nature, location, intensity , and duration of the pain they would experience after surgery. Patients were also told that pain is normal after abdominal operations and were instructed in methods to reduce pain, such as relaxing the muscles, controlled breathing, and careful movement. These instructions were presented by the anesthesiologist. Controls received routine hospital care. Results indicated that patients in the instruction group received one-half the number of analgesics when compared to controls, and were released an average of 2.7 days earlier. Patients in the treatment group were also rated, by independent observers, as more comfortable and in better physical and emotional condition than controls.

Wolfer and Visintainer (1975) assigned 80 children and their parents to a preparation condition or to a routine hospital care control. The children were between the ages of 3 and 14 and were scheduled for minor surgery, such as tonsillectomy. In the preparation condition children received information about procedures and sensations they would experience and support from a nurse, at several critical points during their hospital stay. The mother was also included in these procedures and the nurse attempted to clarify their feelings and thoughts and to provide support and information on how best to care for the child. Presentation of information to the child was tailored to his age and level of cognitive

development. Control subjects received routine hospital care and contact with medical staff. Prepared children were rated as less upset, more cooperative, and less resistent to induction. Their pulse rate was also less elevated, than that of controls, during painful procedures and post-hospital adjustment was reported as better. Parents in the prepared group also reported less anxiety and were more satisfied with the hospital care.

Lindeman (1972) compared the efficacy of a preoperative teaching package, presented individually and in a group. She did not compare this method of intervention to a control group, but only wanted to determine if the preoperative teaching was equally effective, regardless of method of presentation. Subjects were 351 patients admitted for major surgery. Patients in both groups were instructed in diaphragmatic breathing, coughing, and bed exercise. Group teaching was found to be as effective as individual teaching, in terms of postoperative ventilatory function, length of hospitalization, and postoperative analgesics received.

Other studies utilizing preoperative preparation have examined the efficacy of particular components of interventions, and have also employed more adequate control groups, to control for the effects of attention. Melamed and Seigel (1975) assigned sixty children, between the ages of 4 and 12, scheduled for elective surgery, to one of two conditions. Children in the treatment condition viewed a film describing the experiences of a 7-year-old white male undergoing a hernia operation. The film showed various events most children encounter, from admission to

discharge, including such procedures as blood tests, separation from parents, and interacting with medical staff. Children in the control group viewed a film, of nearly equal length and equal interest-value, but unrelated to the hospital situation. Subjects were treated as equally as possible in terms of care and attention from medical staff. Results indicated that the experimental film group experience significantly less anxiety, as measured by self-report, behavioral observation, and the Palmar Sweat Index, the night before surgery. Parents also reported significantly more behavior problems in control group children after discharge. On 4-week follow-up, control group children were also found to be significantly more anxious, on all measures.

Langer, Janis, and Wolfer (1975) assigned 60 adult surgical patients to one of four conditions, coping device only, preparatory information, a combination of coping and information training, or a control group, equated for amount of attention from the researchers. Subjects in the coping device group were taught it is possible to control reactions to stressful situations and encouraged to redefine the situation in terms of its positive aspects-improvement in health, extra care and attention, weight loss (if needed), a chance to relax. In the preparatory information group, subjects were informed of procedures to be performed prior to surgery and probable pains and discomforts, such as gas pains and incisional pain, that they would experience during recovery. Subjects in the combination group, received both types of training, somewhat condensed, to equate time spent with the researcher, with that of the other groups. Results indicated that patients in the coping device

only group received significantly fewer pain relievers and sedatives than controls and were rated as less anxious preoperatively by nursing staff. There was a similar trend for length of stay in the hospital, but not significant. Langer et al. (1975) found that preparatory information alone increased anxiety preoperatively and had no effect on the postoperative measures. The combination group was rated as less anxious and received less postoperative medication, but did not do as well as the coping device only group. Physiological measures of stress (blood pressure and heart rate) did not correlate with each other or with the other measures.

Langer et al. (1975) concluded that the coping device, which was assumed to reduce stress by reappraisal, selective attention, and a heightened perception of control, was superior to preparatory information, which was found to have a negative effect initially and no effect postoperatively. They suggested that patients may have responded to the information by focusing on the pain and discomforts.

The results of the Langer et al. (1975) are indicative of a broader controversy in the literature with respect to the effects of preparatory information. The rationale for providing information, according to Janis (1958), was to allow the individual to attain a moderate level of anticipatory fear. This anticipation would result in cognitive rehearsal of the impending stress and prevent the emotional trauma that could result from a discrepancy between expectations and actual experience. Averill (1974), however, in a review of literature on stress and pain reduction, concludes that the relation between information and alleviation

of distress is a complex one. He reported that in order for information to be beneficial, the specific situation or the individual's cognitive style must allow for a positive appraisal of the impending harm.

There is evidence in the experimental pain literature and in studies of surgery patients, and other medical patients, to demonstrate both the positive and the negative effects of preparatory information. For instance, Kanfer and Goldfoot (1966) demonstrated that the presentation of a negative set, prior to a measure of pain tolerance, using the cold-pressor test, significantly increased discomfort ratings and reduced pain tolerance. The negative set condition consisted of specific information about the expected intensity, location and nature (i.e., cramping) of the pain.

Blitz and Dinnerstein (1968) showed the pain threshold to electric shock was affected by asking subjects to be sure that their judgments were "clearly painful and not just strong discomfort." Instructions also elevated tolerance and the drug request point, or the point at which subjects would have taken analgesics if they had been made available to them. Blitz and Dinnerstein (1971) have interpreted the relationship between instructional sets and pain threshold as a function of attention, rather than simply a result of the relabelling of sensations. They tested three groups with cold-pressor stimulation. One group was asked to focus on the cold, forgetting about the pain; the second group was asked to think of the cold as pleasant, and the third group was a control. Both experimental groups showed increases in pain threshold.

Bobey and Davidson (1970), compared the effect of relaxation training and information, detailed descriptions of the procedures of the

session involving the two pain stimulators, on pain induced by radiant heat and pressure algometer. Results indicated that the relaxation technique was more effective overall and the information only increased pain tolerance when pain was induced by heat and the experimenter was male.

Craig, Best and Best (1978) compared two instructional sets with respect to tolerance for increasing levels of painful shocks. In the first condition, subjects were asked to monitor their level of discomfort, and the second group was asked to describe the sensory quality of the experience and its physical intensity. Subjects in the first group demonstrated significantly greater pain tolerance than the second group. The authors concluded that attention to personal discomfort may permit a more realistic appraisal of the experience and enhance the perception of control. Restricting attention to sensations may have left subjects unprepared for the severity of shocks at higher levels.

Staub and Kellett (1972) presented subjects with two types of information about a series of painful shocks they were to receive. The first type of information consisted of a description of the type of apparatus that would administer the shocks and the manner of the transfer of electricity, emphasizing the safety features. Subjects who were in the sensation information group received a page of descriptions of commonly reported sensations arising from exposure to electrical stimulation. Subjects who received both kinds of information endured more intensive shocks than subjects in the two single-information groups or the control group. Staub and Kellett concluded that both types of information are important if it is to increase pain tolerance.

Johnson (1973), using a modified submaximum effort tourniquet technique to produce ischemic pain, administered two types of information to manipulate expectations. One group was given a description of the sensations to be expected from ischemic pain and the other received a control message which described the procedure used to produce the ischemic pain. Subjects were also asked to rate the intensity of the pain and the degree of distress they experienced during the painful stimulus. The subjects that received the descriptions of sensations reported less distress than those who only got the description of the procedure. The sensation group was also found to have more accurate expectations of what the pain would be like. The different information, however, did not affect stress experienced before the pain was administered, the reported intensity of the pain that subjects experienced, nor their reported feelings of fear. Johnson concluded that the congruity between expectations and experienced sensations is very important in alleviating the distress component of pain.

Leventhal et al. (1979), in three experiments, using the cold-pressor method of pain induction, examined the process of utilizing information about sensations. In the first experiment, subjects were provided with either information on the sensory properties of the noxious stimulus or information about emotional reactions to the ice water. Subjects in both information conditions and the control (no information) were also divided into two groups, those who received information about the painfulness, or magnitude, of the stimulus, and those who did not. Results indicated that subjects who received sensory information reported

less distress, associated with the pain, than those with arousal information or controls. If the pain magnitude information was added, however, this effect disappeared. Leventhal et al. (1979) concluded that the magnitude information (warnings about the painfulness of the ice water) appeared to have caused subjects to process the stimulus as a threat. They note that this is consistent with Epstein's (1973) findings that magnitude information amplifies the reaction to a threatening stimulus, even if the magnitude information is accurate.

In the second experiment Leventhal et al. (1979) instructed subjects to either attend to sensations in their hand in the ice water or to attend to sensations in their hand and body. Subjects in the hand only condition, reported less distress than subjects attending the hand and body or controls. The authors concluded that limiting attention to the site of the stressor promotes a process of habituation to the distressing components of the stimulus. In the third experiment, subjects were instructed to either, 1) attend to hand sensations throughout, 2) attend to hand sensations initially, then view slides for the purpose of distraction (attention-distraction), or 3) view the slides first, then attend to the hand sensations for the last half of the immersion (distraction-attention). A fourth group viewed the slides for the entire immersion time. Results revealed that subjects in the attention-distraction group reported low levels of distress equal to those of subjects who attended to hand sensations for the entire immersion. The distraction throughout and distraction-attention groups reported no distress reduction. Leventhal et al. (1979) concluded that monitoring

during the onset of sensations promotes habituation. Obtaining information about sensory qualities of the stimulus, through instruction or monitoring them, reduces the degree to which new sensory input can evoke distress reactions (habituation). However, if the subject is threatened and interprets the sensations as warnings of further harm, focusing on sensations may increase distress.

A number of studies have examined the efficacy of information-giving in clinical settings. In a study of patients undergoing gastrointestinal endoscopic examinations, Johnson and Leventhal (1974) found that the combination of description of sensations and recommendations of coping behaviors reduced emotional reaction, as measured by heart rate, and reduction in gagging. Johnson and Rice (1974) later demonstrated, with experimentally-induced ischemic pain, that a partial list of sensations was as effective as a complete description of sensations in reducing the distress component of pain.

Auerbach and Kendall (1978) presented dental surgery patients with either general or specific information prior to surgery. The specific information consisted of a description of some of the factors that necessitate tooth removal, specific procedures to be used, and instructions that would normally just be given postoperatively. General information included a description of the dental clinic and the surgeon's equipment. Female patients responded to the specific information with increased anxiety and were rated by the surgeon as showing poorer adjustment to the procedures than males. Auerbach and Kendall (1978) also noted that the male subjects may have been less inclined to admit to upset since this is not consistent with traditional male roles.

Auerbach et al. (1976) also examined the effects of two types of preparatory information on dental surgery patient's state anxiety and adjustment to surgery. In this study, however, subjects were also categorized according to their level of dental anxiety and their locus of control orientation (internal-external). The types of information were the same as those presented in Auerbach and Kendall (1978). Results indicated that internals who received specific information were rated as better adjusted during surgery than internals given general information. Externals, however, responded best to the general information. The authors concluded that these findings support the need for tailoring treatment approaches to individual patients' needs. Internals, for instance, could benefit from specific information and externals from general information.

Siegel and Peterson (1980) also worked with dental patients. Subjects, however, were pre-school aged children. Children were assigned to coping skills, a sensory information, or a control condition, equated for amount of contact with the researcher. In the coping skills condition children were instructed in techniques of general body relaxation and the use of pleasant imagery. In the sensory information condition, the experimenter described procedures and typical sensations, sights, and sounds children would encounter during treatment. Control subjects were read a chapter from a children's book. Measures of anxiety, discomfort, and physiological arousal were taken throughout the session with the dentist. Results revealed that the children in the coping skills and the sensory information groups were less disruptive, experienced less anxiety and discomfort, and had a lower heart rate than

controls. Seigel and Peterson (1980) concluded that it is possible to tailor stress reduction techniques for even young children. They also report, however, that it was not possible to determine the active component of the treatments in this study.

As cited under the review of psychological correlates, Shipley, Butt, and Horwitz (1979) examined the effect of viewing a videotape of an endoscopy procedure, zero, one, or three times, prior to undergoing the procedure. This type of preparation reduced anxiety and distress in sensitizers, but had no effect or increased anxiety in repressors. Shipley et al. (1979) concluded that prior knowledge is not always helpful and suggest that treatments should be tailored to the patient's needs in a particular situation.

In studies of surgery patients, Andrew (1970) examined the effect of preparatory instruction on sensitizers, avoiders (repressors), and a middle group. Information (explaining the origins of hernias, dangers of delay, the procedures involved, and possible consequences) had no effect on sensitizers, increased pain and sleeping medications in avoiders, and reduced length of hospital stay for the middle group. Sime (1976) studied the relationship between preoperative fear, style of coping, and amount of preoperative information, and recovery. Female abdominal surgery patients were rated on coping, assessment of tendencies for information-seeking, level of fear, and the amount of information the patient had obtained concerning their problems, the procedures, and probable postoperative course. Results indicated that patients with higher levels of preoperative fear received more analgesics

and sedatives and reported more negative affect postoperatively. There was also an interaction between amount of information and level of fear. Patients who were highly fearful preoperatively but had obtained considerable information about their hospitalization, received fewer analgesics and sedatives and were in the hospital fewer days than patients who were highly fearful and had obtained little information. However, there was no difference in postoperative negative affect between the high fear, high information group and the high fear, low information group. Sime (1976) concluded that the data were consistent with the parallel response model proposed by Leventhal (1970) - that is, emotions and adaptive behavioral responses can vary independently. Postoperative emotional state appeared to be independent of medication usage. Sime also suggested that, despite no change in postoperative affect, high fear-high information patients may have been able to participate in their care in order to reduce medication received and length of stay.

Johnson and her colleagues (Johnson, Rice, Fuller, & Endress, 1978; Johnson, Fuller, Endress, & Rice, 1978) have conducted two studies with surgical patients to examine the efficacy of providing preoperative information. In the first study, Johnson, Rice, Fuller, and Endress (1978) assigned 81 cholecystectomy (gall bladder removal) patients to a coping strategy group, one of three information groups (either description of sensations, description of the course of events and procedures, or no information) and a preoperative fear level (high or low). The coping strategy consisted of instruction in how to deep breathe, cough, and move after surgery. Patients were also instructed in leg exercises.

Johnson et al. (1978), as in Johnson's earlier studies (Johnson, 1973), measured pain by asking subjects to rate the sensory component and the distress components. Number of analgesics received was also tabulated. Results indicated that patients who received specific sensory information were released sooner from the hospital. There was no effect for sensory information on any pain indices. Patients who received the coping instructions received fewer doses of analgesics than those who did receive instruction. Also, patients who were high in preoperative fear reported higher intensity pain sensations after surgery than patients low in preoperative fear. Instruction, sensory information, and description of events all reduced negative mood postoperatively for patients reporting relatively high fear before surgery.

In the second study, Johnson, Fuller, Endress, and Rice (1978) combined sensory information, general information, and instructions in the preoperative preparation session. Results in this study, with instruction, in the cholecystectomy patients only, also showed that sensory information and instructions reduced the length of postoperative hospitalizations, as compared to controls. Johnson et al. (1978) also found that the cholecystectomy patients who received sensory information a second time, on the first postoperative day, received fewer analgesics than those who did not have the second exposure. There were no other effects for pain measures.

Finally, Wilson (1977) combined the specific sensory information and information about procedures, used by Johnson (1975), and compared the effect of that information separately, and in combination with relaxation training. Subjects were cholecystectomy and abdominal hysterectomy

patients. Wilson (1977) also tested patients on a multi-component, dispositional measure of defensive style. Results indicated that relaxation training, when analyzed in a factorial design with fear control as a blocking variable, was associated with reduced reports of pain distress (as defined by Johnson [1973] who asked patients to rate pain sensation and pain distress separately), but did not affect report of pain sensations. The only effect on pain medication was that patients trained in relaxation switched more quickly to oral analgesics than those not trained in relaxation. Information had no effect on any of the pain measures. Patients in all the treatment groups, however, had a significantly shorter hospital stay than controls. Wilson (1977) concluded that relaxation training appears to benefit patients with inadequacies in fear control (based on a measure of the extent to which the patient reported he could control symptoms of fear in other situations).

Conclusions, Rationale, and Hypotheses

It is apparent from the literature that a number of techniques have been proven effective, either in an experimental paradigm or in a medical setting, for reducing pain and distress. However, it is virtually impossible to select one technique that is effective overall. Effectiveness appears to vary with the type of pain, such as clinical vs. experimentally induced (Sternbach, 1968), the emotional state of the subject (Wolpe, 1968; Gessel & Alderman, 1971), and coping style (DeLong, 1970; Andrew, 1970; Shipley, Butt, & Horwitz, 1979). A number of researchers (Auerbach & Killmann, 1977; Shipley, Butt, & Horwitz, 1979; Weisenberg, 1977) have suggested that the development of optimum

strategies of intervention to reduce perceived pain, as well as emotional reactions to stress, would involve tailoring those strategies to the needs of specific individuals. The task would be to examine intervention strategies to determine their true efficacy and limitations. To do this, it appears necessary to consider the situation, the emotional state of the individual, and the coping mechanisms used by subjects.

The purpose of the present study was to examine the effect of a relaxation strategy and specific sensory information, separately and in combination, on levels of postoperative pain. An important question that was addressed was whether these two types of treatments would be differentially effective for individuals with different types of coping style (i.e., sensitizers vs. avoiders, with respect to the stress of surgery). This was especially relevant to the question of the utility of preparatory information for reducing pain in a clinical setting. Moreover, these variables had not been examined previously in combination, with respect to sensitizers and avoiders, to determine if they have an additive effect.

Given the data that has been presented to this point on pain in surgery and the function of coping style, the following hypotheses were suggested for the relationship between proposed treatments and coping:

1. Sensitizers, defined as those scoring in the upper half on the coping scale, would do better in conditions where relaxation was provided, than sensitizer controls. This was hypothesized since the sensitizer was expected to have sought out information about surgery before coming to the hospital and in interactions with his doctor. These individuals exhibit fairly high anxiety and a strategy aimed at anxiety, such as relaxation, was expected to benefit them most.

2. Avoiders, defined as those scoring in the lower half on the coping scale, would do better in the relaxation plus information group than avoiders in any other group. This was hypothesized since avoiders have been shown in previous studies to respond to information alone with increased indices of distress, such as anxiety and pain. Thus, they do not seek information on their own and respond poorly to stressful situations as a result of being unprepared. They report low anxiety prior to surgery, however. Thus, it was expected that in a situation in which they are presented with information, and their anxiety is aroused, that the relaxation strategy would work best. This was expected since relaxation strategies have been shown to work best when the patient is anxious.

3. Patients, in general, would do better when trained in relaxation than those given information alone.

4. Patients who received preparatory information would do better than controls. This had not been demonstrated in previous clinical settings, with respect to pain, but was expected in this study since patients were provided with several exposures to the information, both pre and postoperatively, and this was expected to constitute the level of reassurance necessary, in this setting, to produce an effect.

Method

Subjects

The subject population consisted of surgical patients admitted to Lewis-Gale Hospital in Salem, Virginia, from July, 1979 to March, 1981. Of the 64 total patients, 41 were cholecystectomy patients, 19 abdominal hysterectomy, and four vaginal hysterectomy. Nine of the cholecystectomy patients were male. Four of the women were black and one was Indian. Ages ranged from 19 to 70 with a mean age of 43. None of the patients had a medical history of organic brain damage, mental retardation, and/or other significant psychological disturbances. Patients were referred in the order that they were scheduled for surgery and were approached if they were physically well enough to complete the measures.

Of the 72 patients who initially agreed to participate, eight did not complete the study. Two were excluded since their surgery was cancelled. Two patients were unable to understand the measures, one was rescheduled for another type of surgery, and another had requested an electrical stimulator for pain relief. Two patients did not wish to continue with the study: one because her surgeon requested that his patients no longer be included in the study, and the other because of significant psychological distress unrelated to our procedures.

Measures

The McGill Pain Questionnaire (MPQ). The MPQ consists of 20 subscales divided into three major classes of word descriptors, the sensory, affective, and evaluative scales. There are also four subscales of

miscellaneous descriptors that have been useful in describing pain, but could not be categorized under any of the other three scales. The ten subscales of the sensory scale describe pain in terms of temporal, spatial pressure, thermal, dullness, and tenderness qualities. The five affective subscales include tension, autonomic arousal, fear, punishment, and miscellaneous descriptors. The descriptors in the evaluative scale are designed to rate the overall intensity of the total pain experience. A score was also obtained by summing the scores for all four scales (PRI). Patients were also asked to rate their pain on a five-point scale from "mild" to "excruciating" (PPI), according to the amount of pain that they were feeling at the time of the testing and to rate the worst and least pain they have experienced postoperatively (Melzack, 1975).

Melzack (1975) reports a high degree of agreement on the intensity relationships among pain descriptors by subjects who have different cultural, socio-economic, and educational backgrounds. In a study of 297 patients, suffering from several kinds of pain, Melzack (1975) was able to detect differences among different methods of pain relief and obtained information about the relative effects of a given manipulation on the sensory, affective, and evaluative dimensions of pain.

STATE-TRAIT Anxiety Inventory (STAI). The STAI is comprised of two self-report scales to measure state anxiety and trait anxiety. Only the state anxiety scale was used in this study. This scale consists of 20 statements designed to provide an index of the patient's feelings at the time of testing. The patient was asked to apply the statements to

himself/herself and to rate how well they described his/her feelings on a 4-point scale from "not at all" to "very much so" (Spielberger, Gorsuch, & Lushene, 1970).

Coping Process Measure. Cohen and Lazarus (1973) developed a structured interview to assess a patient's coping style, specific to the surgery situation. Each patient was asked about his/her emotional state, the amount of information he/she has about the upcoming surgery, what other information he/she may want to know, etc. (see Appendix B). Each interview was audio-taped and later rated by two independent raters. Raters were advanced clinical psychology graduate students. Ratings were based on specific criteria provided by Cohen and Lazarus (1973). Avoidance and sensitization were treated as a dimension, on a scale from 1 to 10, with higher ratings (8-10) representing a sensitizing process, low ratings (1-3) reflecting an avoidant strategy, and a middle range (4-7), for patients who reflect both strategies, but do not emphasize either. The correlation between the two sets of independent ratings was +.817, for this study.

Analgesics administered. The number of analgesics received during the postoperative course was tabulated from the medical records, after each patient was discharged. Two methods of tabulating these medications were used. First, the number of narcotic analgesics (i.e., morphine, demerol, dilaudid), combination narcotic analgesics (i.e., tylenol #3, percodan, percocet) and nonnarcotic analgesics (i.e., tylenol, aspirin) was counted. This count represented the number of times a particular type of medication was administered, regardless of dosage. Second, a

potency measure was tabulated for each patient. This represents the equivalent dosages of narcotic analgesics received, based on morphine sulphate as the comparison measure. The potency measure was based on equivalent dosage data presented by Gebhart (1977) and as cited in the Physician's Desk Reference (1980). (See Appendix A for equivalency scale.) Dosage equivalance was based on the total amount of narcotic analgesic received, intramuscularly and orally, in pure or combination form (i.e., tylenol #3 contains 60 mg. of codeine which is approximately equivalent to 10 mg. of morphine).

Procedures and Treatments

Patients scheduled for cholecystectomy or abdominal hysterectomy were contacted on the afternoon prior to surgery, between 3:00 p.m. and 6:00 p.m., and asked to participate in the study. All contact with patients was made by one of four students, two advanced clinical psychology graduate students or two trained undergraduate assistants. All examiners wore long, white hospital coats. After signing a consent form, which briefly explained the purpose of the study (see Appendix B), the examiner answered questions concerning the form, the experimenters involved, or the use of the data, without discussing hypotheses or types of treatments. Each patient in a treatment group was told that he/she would be given information that would help him/her cope more effectively with the distress and discomfort associated with surgery. Patients in the control group were told that the purpose of the study was to gather information about how different people respond to surgery. At that time, each patient answered the coping process interview questions

and their responses were audiotaped. Patients were told that their responses were taped in order to save time during the data-gathering process. Next the STAI state anxiety form and the McGill Pain Questionnaire were administered.

At this point in the pre-operative session, patients were presented with the materials and/or information corresponding to the group to which they were assigned. Patients were assigned to groups in a random fashion, in sequential order (R, I, RI, C). There was a minor divergence from this ordering in the later stages of data collection in order to equalize age and type of surgery across treatment groups. This random assignment to groups resulted in an approximately equal number of each coping style, based on a median split into two groups (1-5 and 6-8), in each of eight cells. There were nine subjects in the relaxation treatment sensitizers (6-10) group, and seven subjects in the relaxation treatment avoiders (1-5) group.

Relaxation Training (R). Each patient in this group was read a narrative explaining the relationship between tension and discomfort. The relaxation strategy was described as an effective technique for reducing tension and discomfort. The examiner then read the relaxation instructions to each patient, as the patient practiced the strategy for 10 minutes. The strategy was that developed by Benson (1975), which instructs the patient to focus on his breathing to achieve a deep level of relaxation (see Appendix B). Each patient was then instructed to practice the strategy at least three times per day or whenever they were feeling tense or in discomfort. Each patient was given a typed copy of the rationale and instructions to refer to as often as needed.

During the postoperative sessions, the examiner discussed the patient's response to surgery, asked them how many times they had practiced the relaxation strategy, and encouraged patients to practice it as often as possible.

Information (I). Each patient in this group was read a narrative describing in detail the procedures they would have to undergo prior to surgery, the location, quality, and type of discomfort usually experienced by patients undergoing cholecystectomy or hysterectomy, and the sensations associated with medications typically administered. Patients were told that the experiences described are typical and that they should not be surprised when they experienced similar discomforts. The narrative was based on that used by Johnson, Rice, Fuller, and Endress (1978), with minor adjustments for different procedures used in the hospital in this study (see Appendix B). Four of the hysterectomy patients were scheduled for possible vaginal hysterectomy. Two of these patients received information. These patients were read the same narrative, but told that in the event they did have the vaginal procedure, they would not have incisional pain, but rather some mild to moderate cramping postoperatively.

In the postoperative sessions, the examiner discussed the patient's response to surgery, inquired if there were any surprises with respect to their experiences, and reread the portion of the information narrative describing the postoperative sensations and procedures.

Relaxation-training and information (RI). Patients in this group received the relaxation training and information described for the

relaxation and information groups above. In the postoperative sessions, the examiner discussed the patient's response to surgery, asked if there were any surprises, and how many times the patient had practiced the relaxation strategy. The examiner reread the information on postoperative procedures and sensations and encouraged the patient to practice the relaxation strategy as often as possible.

Control (C). Patients in this group completed the interview, state anxiety scale, and pain measures. The examiner talked with the patient briefly about his/her feelings about surgery, how he/she liked the hospital, etc., without offering any information or suggestions related to the surgery. In the postoperative sessions, the examiner inquired about the patient's response to surgery, feelings about the hospital, how many visitors they had had, and when they expected to go home.

Patients in all groups were revisited on the second (counting the day after surgery as the first postoperative day) and fourth postoperative days and completed the pain measures and the state anxiety measure. Patients also received the treatments described above, corresponding to the group to which they had been assigned, after completing the self-report measures on pain and anxiety. After each patient was discharged, his/her medical records were examined and the number and type of analgesics administered during the postoperative period, from the day of surgery until discharge, was tabulated.

Results

Since there were multiple measures of pain response utilized in this study, correlations among these measures were examined for both pre- and postoperative sessions. The remainder of the data analysis consists of analysis of covariance, first in a 2 x 4 factorial, and then a 3 x 4 factorial design, with type of surgery, sex, age, and race as covariates. The variables were chosen as covariates since they have been demonstrated to be related to levels of pain and anxiety in previous research. In the 2 x 4 design, coping style ratings were divided into two levels, based on a median split, with subjects rated as six or above assigned to level one (sensitizers) and those rated as five or below assigned to level two (avoiders). This split into two levels for coping style, resulted in an essentially equal sample size for each cell, with nine subjects in level one of the relaxation group and seven subjects in level two. Since eight of the patients were released early, prior to the collection of the post-operative day four data, the analyses for Day Four were based on unequal cell frequencies, as shown in Table 1.

Insert Table 1 about here

For the 3 x 4 factorial coping style ratings were divided into three levels, with subjects rated as seven or above assigned to level one (sensitizers), those rated as four, five, or six assigned to level two (non-specific) and subjects rated as three or below assigned to level three (avoiders). This division is approximately equal to that suggested

Table 1

Cell Sizes on Postoperative Day 4 for Two Levels of Coping Style

	Treatment			
	Relaxation	Information	Relaxation plus Information	Control
Sensitizers	7	8	7	8
Avoiders	7	7	6	6

by Cohen and Lazarus (1973), when they developed the coping process measure. This division was adjusted slightly for this study since there were no subjects who rated as a nine or ten on the coping measure. Assignment of subjects to three levels of coping style resulted in unequal cell frequencies, as designed in Table 2.

Insert Table 2 about here

Since the use of the 3 x 4 design and the missing data for Day 4 dependent measures resulted in unequal cell frequencies, a computer procedure was chosen that is appropriate for analysis of unbalanced data. This is the general linear models procedure of the SAS computer package (Goodnight, 1979, pp. 237-263). This procedure produces a Type IV Sum of Squares for the analysis of covariance, owing to adding the variable of interest (i.e., coping style or coping style x treatment interactions), last in the model. This analysis is presented as the most appropriate form of estimable function for unbalanced data.

To examine the source of interaction effects, planned comparisons between levels of coping style and treatment were accomplished by two methods. First, for the 2 x 4 factorial design, where cell sizes were essentially equal, comparisons were calculated using adjusted cell means, and a cell size of eight. For comparisons involving variables collected on Day 4, the harmonic mean cell size (Keppel, 1973, pp. 346-350) of seven, was used in the calculation of F values for each comparison. For the 3 x 4 design, where cell sizes were radically different (see Table 2), comparisons were coded, using effect coding, with 1 and -1 assigned to the means to be compared, and 0 assigned to all other cells.

Table 2

Cell Sizes on Postoperative Day 2

for Three Levels of Style

	Treatment			
	Relaxation	Information	Relaxation plus Information	Control
Sensitizers	4	2	6	5
Non-Specific	7	9	7	8
Avoiders	5	5	3	3

These coded vectors were entered in GLM analyses of covariance, in place of the effect of interest. The Type IV SS and corresponding F value was taken as the test of each comparison. This constituted a more conservative test of the comparisons than tests used in the 2 x 4 analyses.

Relationships Among Measures of Pain and Anxiety

Relationships among measures of pain and anxiety were examined for each period of data collection. Table 3 presents the correlations among state anxiety and the four subscales of the PRI, PRI Total and Present Pain Intensity of the McGill Pain Questionnaire, for the preoperative session. It should be noted, however, that 48 of the 64 patients in the study, reported that they were experiencing no pain on the preoperative day. Table 4 presents the correlations between the measures of pain and anxiety for the second postoperative day, and Table 5 presents the correlations for the fourth postoperative day. Tables 4 and 5 also include the medication measures of pain behavior for comparison with the self-report measures of pain. The medication values were tabulated for

Insert Table 3 about here

the entire postoperative period, however, and were subject to differential treatment effects. In order to examine the relationship between medication measures and self-report measures, without confounding treatment effects, Table 6 presents the correlations between all measures for the control group. Although this is based on a reduced sample size (n = 16), these values are not confounded by treatment effects.

Insert Tables 4, 5, and 6 about here

Table 3

Correlations Among Self-Report Measures of Pain and Anxiety on the Preoperative Day (n = 64)

	Sensory	Affective	Evaluative	Miscellaneous	Total PRI	PPI
State Anxiety	.27*	.19	.27*	.15	.27*	.28*
Sensory		.49**	.81***	.66***	.94***	.76***
Affective			.62***	.56***	.70***	.54***
Evaluative				.63***	.87***	.63***
Miscellaneous					.81***	.51***
PRI						.76***

*p < .05
**p < .01
***p < .001

Table 4

Correlations Among Self-Report Measures of Pain and Anxiety on Postoperative Day 2 and Medications Received Postoperatively (n = 64)

	Sensory	Affective	Evaluative	Miscellaneous	PRI	PPI	Narcotic Analgesics	Combination Medications	Non-Narcotic Analgesics	Potency
State Anxiety	.50***	.40***	.36**	.42***	.52***	.40***	.18	.40***	.08	.32**
Sensory		.69***	.67***	.61***	.94***	.67***	.35**	.18	.18	.31**
Affective			.50***	.51***	.81***	.68***	.27***	.14	.25*	.26*
Evaluative				.49***	.71***	.50***	.42***	.30**	.29*	.44***
Miscellaneous					.75***	.33**	.29*	.04	.29*	.19
PRI						.68***	.38**	.20	.27*	.33**
PPI							.19	.24*	.23	.26*
Narcotic								-.13	.16	.69***
Combination									-.08	.49***
Analgesics										.11

*p < .05
**p < .01
***p < .001

Table 5

Correlations Among Self-Report Measures of Pain and Anxiety on Postoperative Day 4 and Medications Received Postoperatively (n = 56)

	Sensory	Affective	Evaluative	Miscellaneous	PRI	PPI	Narcotic Analgesics	Combination Medications	Non-Narcotic Analgesics	Potency
State Anxiety	.25*	.41***	.23*	.35**	.34**	.44***	.17	.21	.09	.12
Sensory		.59***	.63***	.69***	.95***	.49***	.24	.33**	.20	.37**
Affective			.48***	.65***	.74***	.24*	.10	.01	.31**	.09
Evaluative				.46***	.69***	.46***	.24	.22	.21	.29*
Miscellaneous					.83***	.31**	.07	.22	.22	.12
PRI						.41***	.21	.29*	.25	.30*
PPI							.13	.50***	-.11	.30*
Narcotics								-.13	.16	.69***
Combinations									-.08	.49***
Analgesics										.11

*p < .05
**p < .01
***p < .001

Table 6

Correlations Between Self-Report Measures of Pain and Anxiety and Medications Received Postoperatively for Patients in the Control Group (n = 16)

	Narcotic Analgesics	Combination Medications	Total Medications	Equivalent Potency
Post-Operative Day 2				
State Anxiety	.46	.01	.36	.39
Sensory	.29	.10	.29	.42
Affective	.38	-.25	.13	.21
Evaluative	.54	.39	.67**	.67**
Miscellaneous	.20	-.22	.02	.21
PPI	.67**	.10	.58*	.55*
PRI	.36	.00	.27	.41
Post-Operative Day 4				
State Anxiety	.58*	-.39	.19	.02
Sensory	.67**	.31	.70**	.78**
Affective	.56*	-.27	.26	.23
Evaluative	.71**	.34	.74**	.68**
Miscellaneous	.34	-.08	.21	.34
PPI	.64**	.45	.77**	.67**
PRI	.66**	.17	.61*	.67**

*p < .05
**p < .01

Main Effects and Interactions for 2 x 4 Analyses of Covariance

As noted, the effect of style and treatments on postoperative pain and anxiety was first examined in 2 x 4 analyses of covariance, with two levels of coping style and four levels of treatment. Type of surgery, sex, age, and race were designated as covariates. Each of the self-report measures of pain and anxiety, first for the second postoperative day, and then for the fourth postoperative day, were the dependent measures. Number of narcotic analgesics, number of combination drugs, non-narcotic analgesics, the total number of medication dosages, and a potency measure, based on the tabulation of equivalent dosages of narcotic analgesics, were also treated as dependent measures of pain experienced. These medication measures were based on the subject's entire postoperative course, from day of surgery until discharge.

Dependent measures for postoperative Day 2. Table 7 provides a summary of the analysis of covariance and the results of planned comparisons between adjusted cell means. There was a significant interaction between style and treatment for state anxiety. Figure 1b presents in graphic form, the difference between sensitizers and avoiders, for each treatment, with respect to state anxiety. There is a significant difference between sensitizers and avoiders in the relaxation plus information (RI) treatment, with sensitizers being more anxious. Figure 1a presents

Insert Table 7 and Figures 1a and 1b about here

the differences between treatments for each of the two levels of style. There was a significant difference between sensitizers in the relaxation

Table 7

Summary of Analysis of Covariance for Post-Op Day 2 State Anxiety with Type of Surgery, Sex, Age, and Race as Covariates (n = 64)

Type IV					
Source of Variance	df	SS	MS	F	p<
Style	1	9.38	9.38	.10	NS
Treatment	3	107.73	35.91	.38	NS
Style x Treatment	3	1040.51	346.84	3.64	.05
Type	1	491.87	491.87	5.16	.05
Sex	1	367.52	367.52	3.85	.05
Age	1	547.89	547.89	5.74	.05
Race	1	276.78	276.78	2.90	.10
Error	52	4960.84	95.40		

*Planned Comparisons Between Adjusted Cell Means				
Style, Treatment	with	Style, Treatment	F	p<
1, R		2, R	3.21	.10
1, RI		2, RI	7.61	.01
1, R		1, RI	8,31	.01
1, I		1, RI	4.32	.05
1, RI		1, C	3.96	.10

*style 1 = sensitizers R = relaxation RI = R and I
style 2 = avoiders I = information C = control

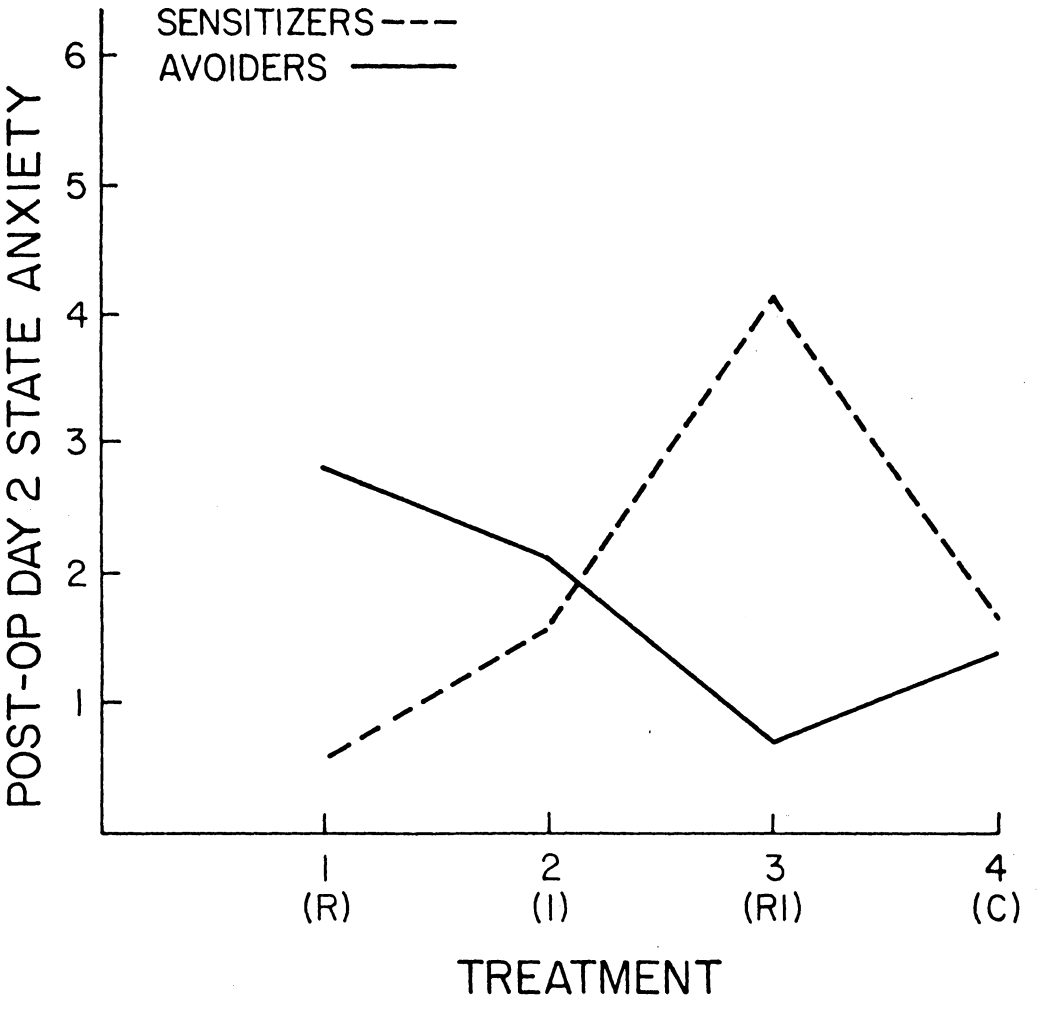

Figure 1a. Adjusted mean state anxiety on postoperative Day 2 for each coping style across treatment groups.

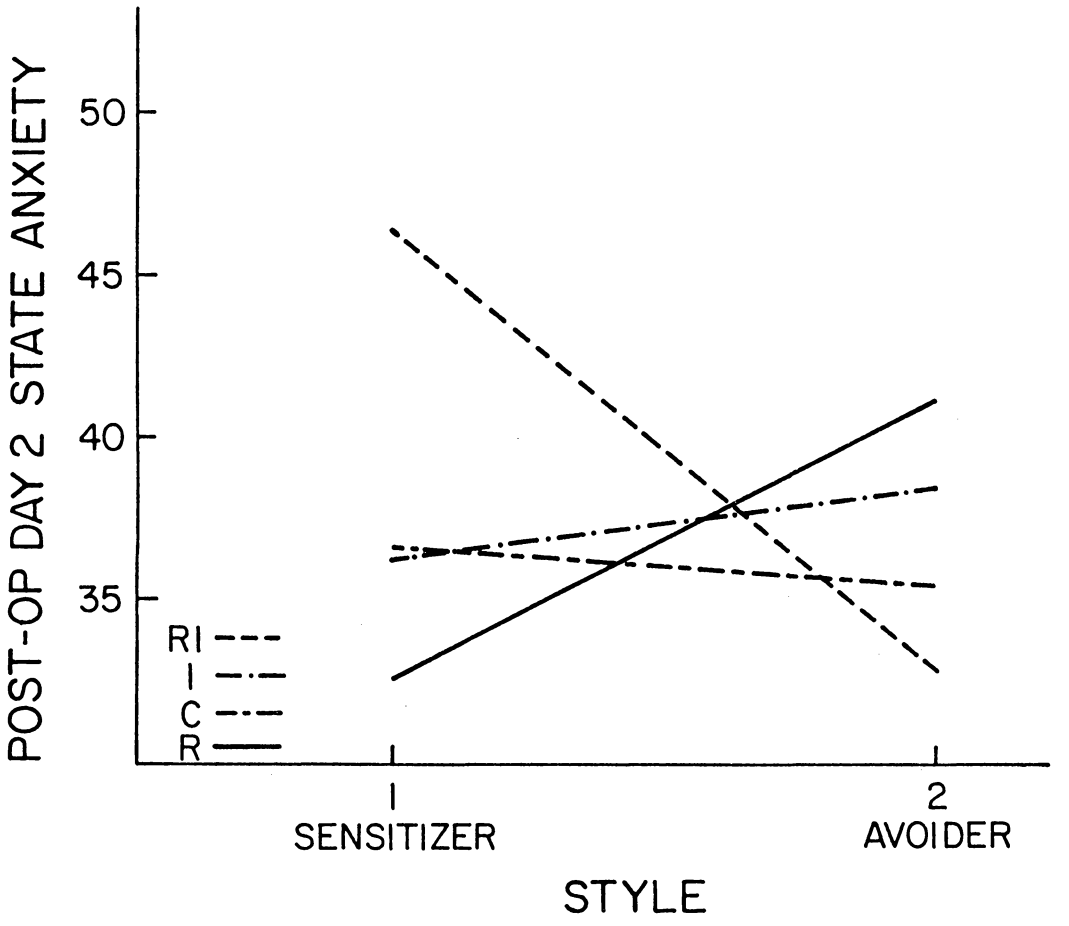

Figure 1b. Adjusted mean state anxiety on postoperative Day 2 for each treatment group across coping styles.

group and those in the relaxation plus information group, RI. Sensitizers in the RI group were more anxious. Sensitizers in the RI group were also significantly more anxious than sensitizers in the information group ($F = 4.32$, $p < .05$). There were no differences across treatments for avoiders, with respect to state anxiety.

Table 8 provides a summary of the analysis of covariance for the evaluative scale of the McGill Pain Questionnaire. There was a significant interaction between style and treatment ($F = 3.99$, $p < .01$). Figures 2a and 2b present the relationship between style and treatment in graphic form. As summarized in the results of the planned comparisons in Table 8, there was a significant difference between sensitizers and avoiders in the relaxation information and relaxation plus information groups. Sensitizers reported more pain in the I and RI groups and less pain than avoiders in the R group. Sensitizers in the relaxation group

Insert Table 8 and Figures 2a and 2b about here

reported significantly less pain than sensitizers in the information and relaxation plus information groups. Sensitizers in the R group reported less pain than controls, but this was not a significant difference. Avoiders reported less pain in the RI and I groups, but not significantly less than controls.

Table 9 is the summary of the analysis for the miscellaneous scale of the McGill Pain Questionnaire. The style x treatment interaction

Insert Table 9 about here

Table 8

Summary of Analysis of Covariance for Post-Op Day 2 Evaluative Scale with Type of Surgery, Sex, Age, and Race as Covariates (n = 64)

Type IV					
Source of Variance	df	SS	MS	F	p<
Style	1	2.32	2.32	1.02	NS
Treatment	3	4.13	1.38	.60	NS
Style* Treatment	3	27.36	9.12	3.99	.01
Type of Surgery	1	9.49	9.49	4.15	.05
Sex	1	.01	.01	.01	NS
Race	1	.03	.03	.02	NS
Age	1	1.35	1.35	.59	NS
Error	52	118.93	2.29		

*Planned Comparisons Between Adjusted Cell Means				
Style, Treatment	with	Style, Treatment	F	p<
1, R		2, R	4.42	.05
1, I		2, I	4.36	.05
1, RI		2, RI	4.81	.05
1, R		1, I	6.79	.05
1, R		1, RI	5.29	.05
1, R		1, C	3.28	.10
2, R		2, RI	3.98	.10
2, RI		2, C	3.62	.10

*style 1 = sensitizers
style 2 = avoiders

R = relaxation
I = information

RI = R and I
C = control

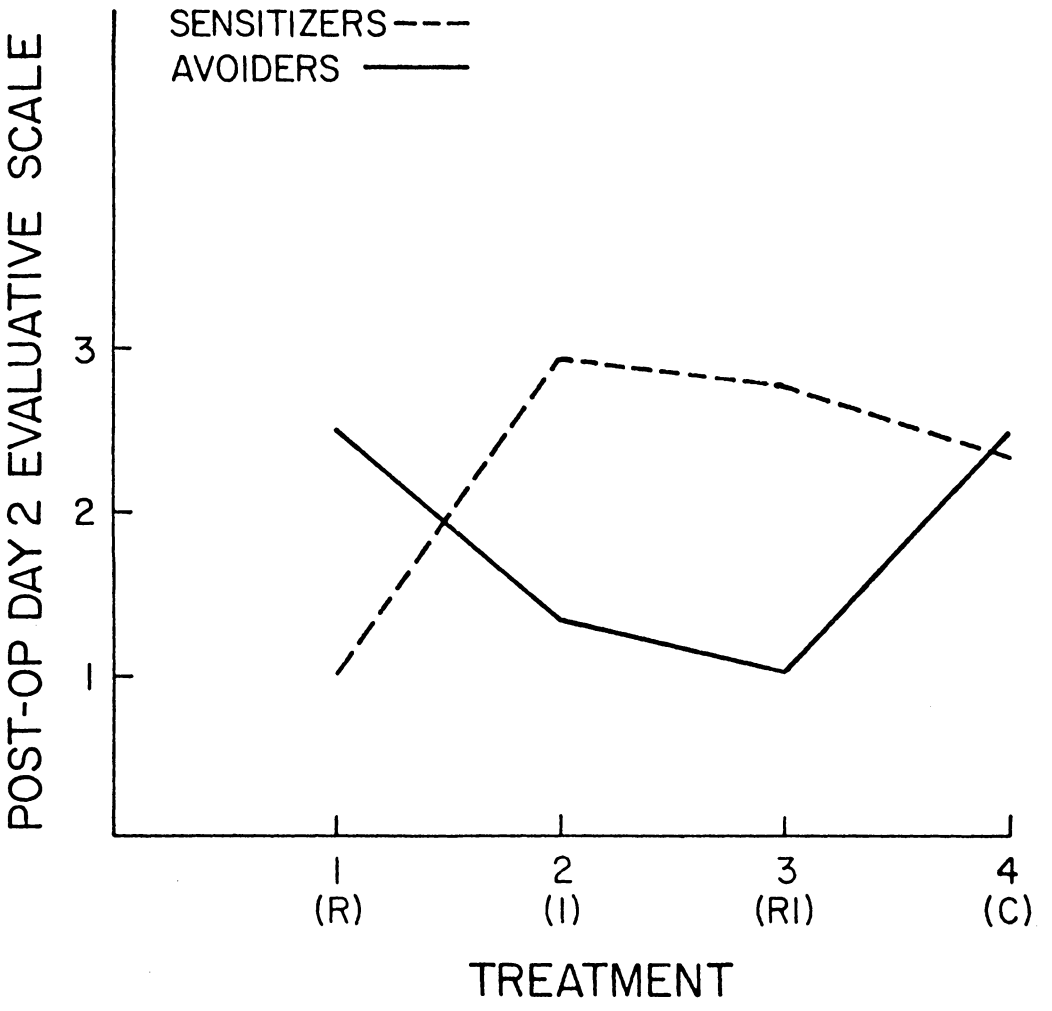

Figure 2a. Adjusted mean evaluative scale pain on postoperative Day 2 for each coping style across treatment groups.

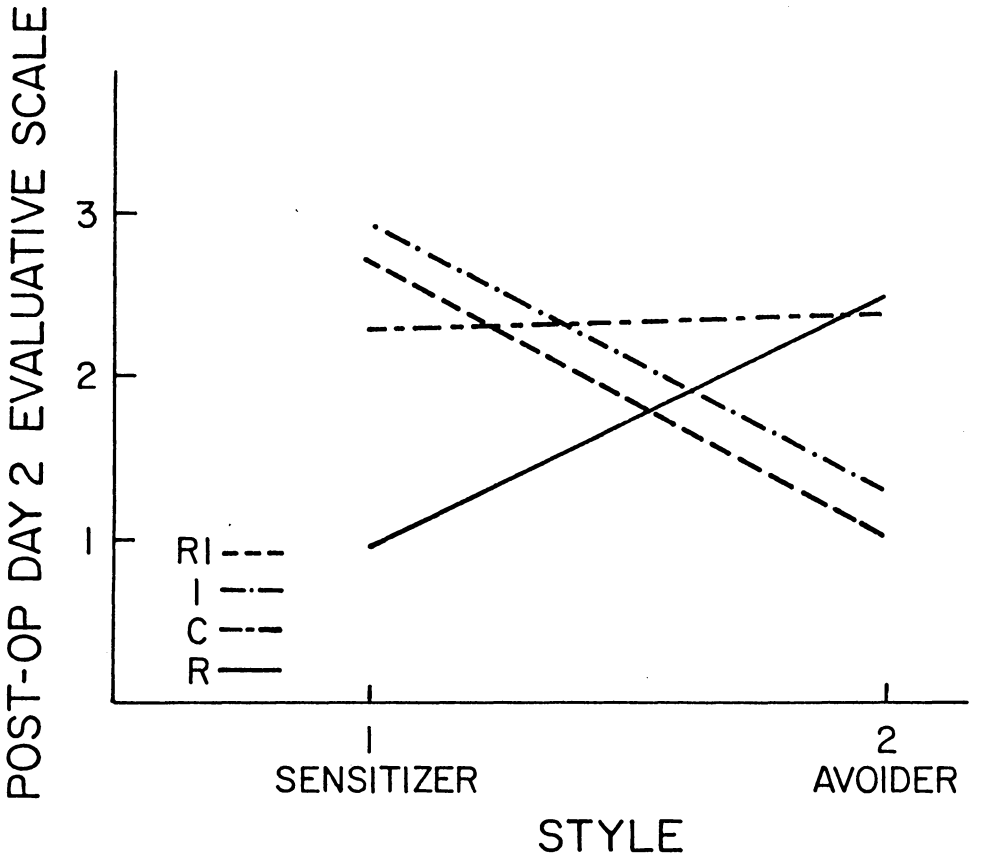

Figure 2b. Adjusted mean evaluative scale pain on postoperative Day 2 for each treatment group across coping styles.

Table 9

Summary of Analysis of Covariance for Post-Op Day 2 Miscellaneous Scale with Type of Surgery, Sex, Age, and Race as Covariates (n = 64)

		Type IV			
Source of Variance	df	SS	MS	F	p<
Style	1	5.27	5.27	.58	NS
Treatment	3	34.70	11.57	1.27	NS
Style* Treatment	3	67.55	22.52	2.48	.10
Type	1	74.88	74.88	8.25	.01
Sex	1	.30	.30	.03	NS
Race	1	66.34	66.34	7.31	.01
Age	1	29.38	29.38	3.24	.10
Error	52	471.84	9.07		

*Planned Comparisons Between Adjusted Cell Means

Style, Treatment	with	Style, Treatment	F	p<
1, I		2, I	6.99	.05
1, R		1, I	7.19	.01
1, I		1, RI	5.50	.05
1, I		1, C	7.34	.01

*style 1 = sensitizers R = relaxation RI = R and I
style 2 = avoiders I = information C = control

approaches significance ($p < .10$). Even though the interaction did not reach significance, the relationship between style and treatment was examined for this measure, since these comparisons were planned. Figures 3a and 3b reflect a significant difference between sensitizers

Insert Figures 3a and 3b about here

and avoiders in the information group, with sensitizers reporting more pain. Also, sensitizers in the information group reported significantly more pain than sensitizers in the other three groups. There were no differences across treatments for avoiders, with respect to the miscellaneous scale.

Finally, on the second postoperative day subjects were asked to rate the worst pain they had experienced postoperatively, on the 1-5 scale used for the PPI. This self-rating of worst pain experienced up to the second postoperative day was also affected by the interaction between style and treatment. Figures 4a and 4b present the relationship between adjusted cell means. As summarized in Table 10, sensitizers reported less pain than avoiders in the relaxation group. Sensitizers in the relaxation group reported less pain than sensitizers in all other groups, significantly less than the controls and those in the relaxation plus information group. There were no differences across treatments for avoiders, with respect to worst pain experienced.

Insert Figures 4a and 4b and Table 10 about here

There were no significant main effects or interactions for any of the other dependent measures collected on postoperative Day 2. However,

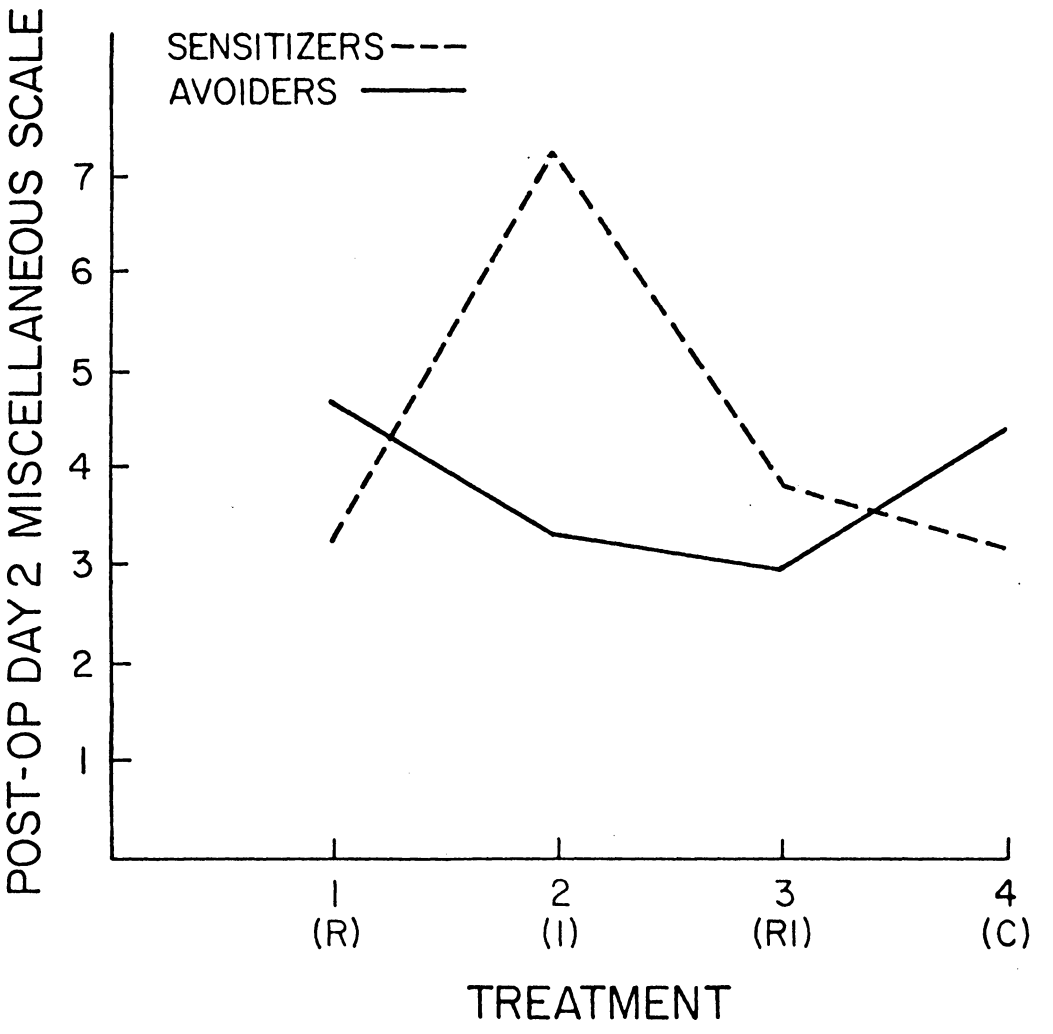

Figure 3a. Adjusted mean miscellaneous scale pain on postoperative Day 2 for each coping style across treatment groups.

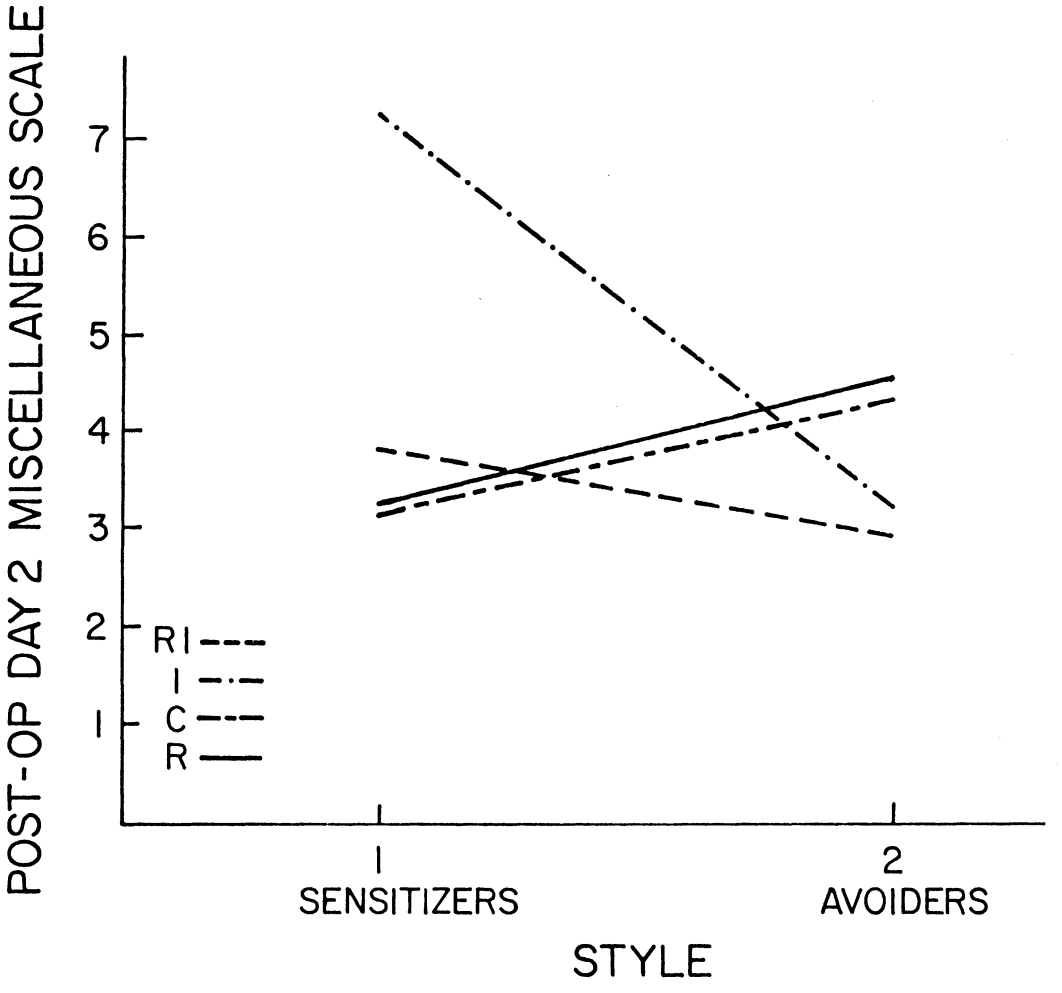

Figure 3b. Adjusted mean miscellaneous scale pain on postoperative Day 2 for each treatment group across coping style.

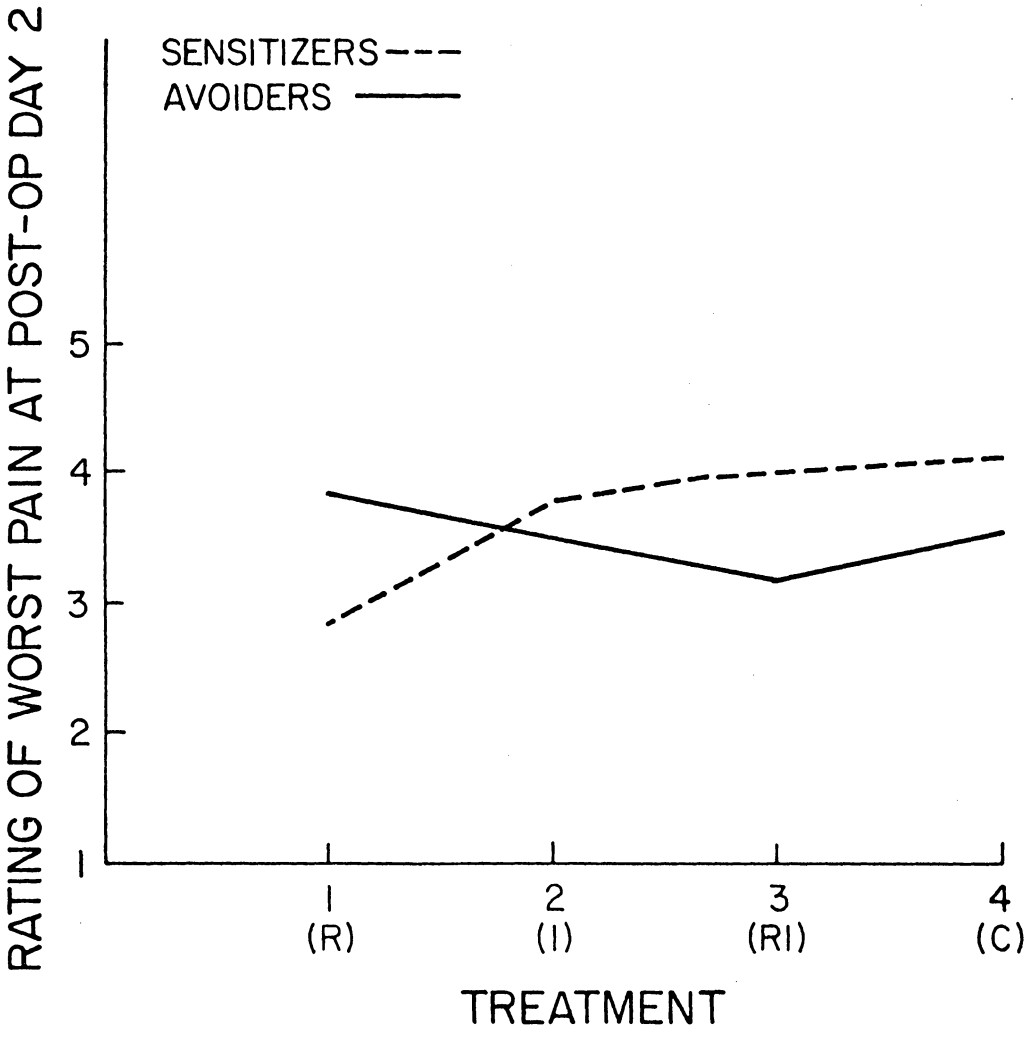

Figure 4a. Adjusted mean rating of worst pain experienced up to postoperative Day 2 for each coping style across treatment groups.

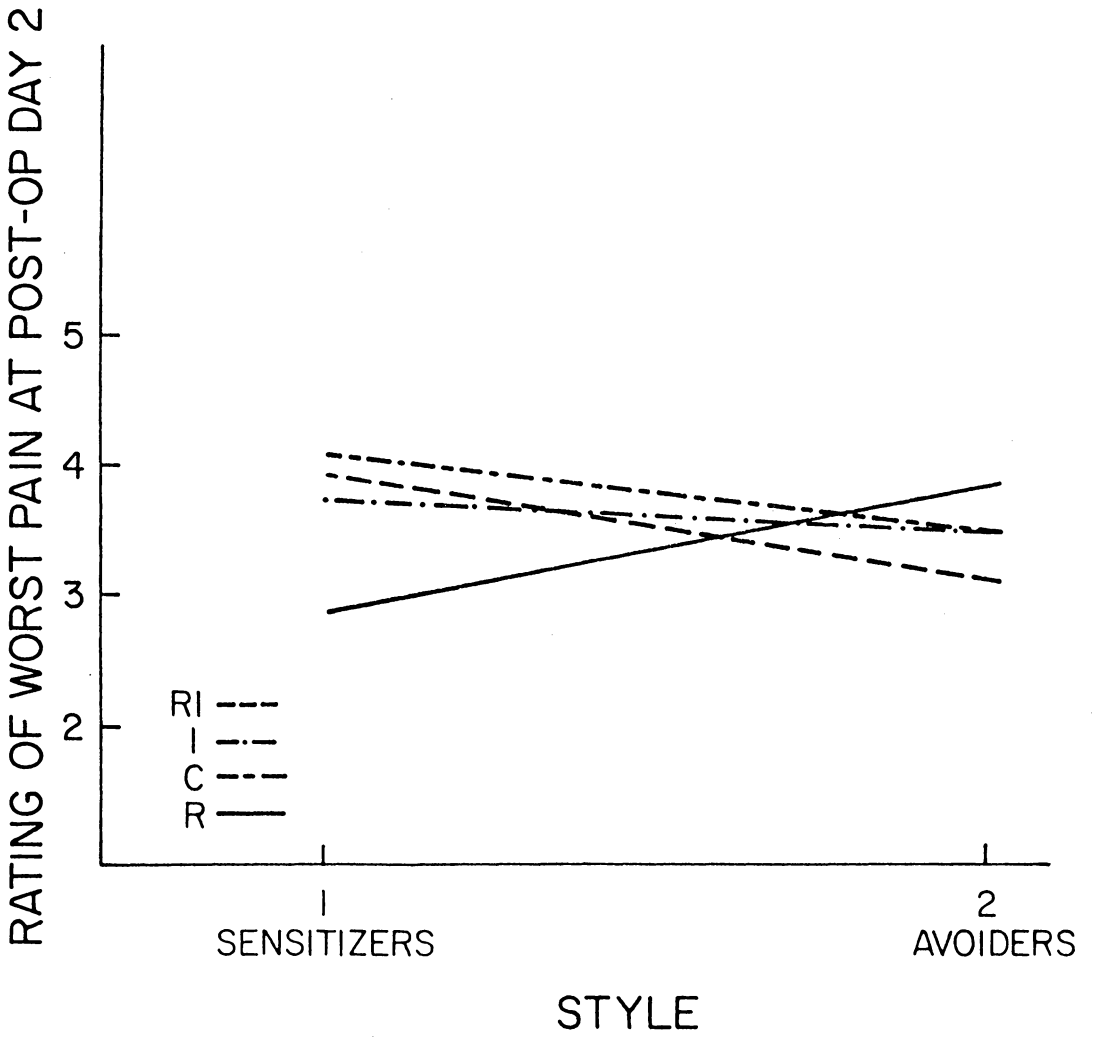

Figure 4b. Adjusted mean rating of worst pain experienced up to postoperative Day 2 for each treatment group across coping styles.

Table 10

Summary of Analysis of Covariance for MPQ Rating of Worst Pain up to Day 2 with Type of Surgery, Sex, Age, and Race as Covariates (n = 64)

		Type IV			
Source of Variance	df	SS	MS	F	p<
Style	1	.31	.31	.33	NS
Treatment	3	1.99	.66	.71	NS
Style* Treatment	3	7.46	2.49	2.66	.05
Type	1	4.78	4.78	5.12	.05
Sex	1	1.37	1.37	1.47	NS
Race	1	.25	.25	.28	NS
Age	1	14.27	14.27	15.29	.001
Error	52	48.52	.93		

*Planned Comparisons Between Adjusted Cell Means

Style, Treatment	with	Style, Treatment	F	p<
1, R		2, R	4.30	.05
1, R		1, C	6.94	.05
1, R		1, I	3.56	.10
1, R		1, RI	5.49	.05

*style 1 = sensitizers
style 2 = avoiders

R = relaxation
I = information

RI = R and I
C = control

since the comparisons between cell means were planned, it was possible to conduct these comparisons without an overall significant F (Keppel, 1973, pp. 89-94). These analyses revealed that sensitizers in the relaxation group reported significantly less pain on the PPI than sensitizers in the relaxation plus information group ($F = 4.14$, $p < .05$) or sensitizer controls ($F = 4.22$, $p < .05$). Also, avoiders in the relaxation plus information group reported significantly less pain, on the affective scale, than avoider controls ($F = 4.01$, $p < .05$).

Dependent Measures for Postoperative Day 4

There were no significant main effects or interactions for any of the measures of pain and anxiety for the fourth postoperative day. Table 11 presents a summary of significant planned comparisons between adjusted cell means for PPI and the affective and miscellaneous scales of the PRI. There were no significant comparisons for any of the other dependent measures collected on Day 4. Figures 5a and 5b present the relationship between treatment and style for PPI. Sensitizer controls reported significantly more pain than avoider controls. Avoiders in the information group were reporting significantly more pain than avoider controls on the fourth post-op day.

Insert Table 11 and Figures 5a and 5b about here

On the affective scale of the PRI, as shown in Figures 6a and 6b, sensitizers reported significantly less pain in the relaxation group

Insert Figures 6a and 6b about here

Table 11

Summary of Planned Comparisons Between

Adjusted Cell Means for Post-Op Day 4

Dependent Measures (n = 56)*

PPI:

Style, Treatment	with	Style, Treatment	F	p<
1, C		2, C	4.00	.05
2, R		2, C	3.35	.10
2, I		2, C	5.23	.05

Affective Scale:

Style, Treatment	with	Style, Treatment	F	p<
1, C		2, C	3.39	.10
1, R		1, RI	5.75	.05
1, I		1, RI	3.56	.10
2, I		2, C	5.29	.05
2, RI		2, C	3.04	.10

Miscellaneous Scale:

Style, Treatment	with	Style, Treatment	F	p<
1, RI		2, RI	2.94	.10
2, R		2, C	3.41	.10
2, I		2, C	5.74	.05
2, RI		2, C	4.49	.05

*style 1 = sensitizer
style 2 = avoider

R = relaxation
I = information

RI = R and I
C = control

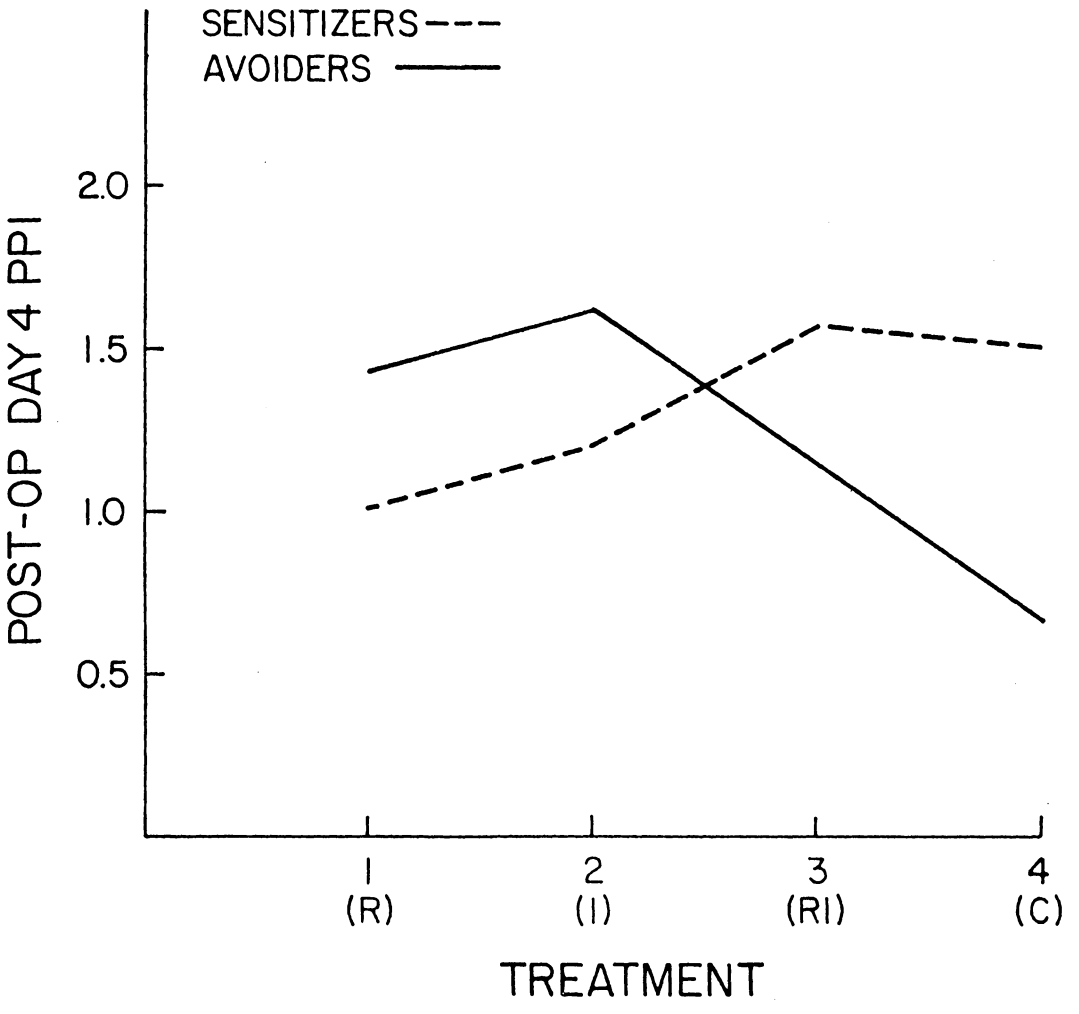

Figure 5a. Adjusted mean present pain intensity on postoperative Day 4 for each coping style across treatment groups.

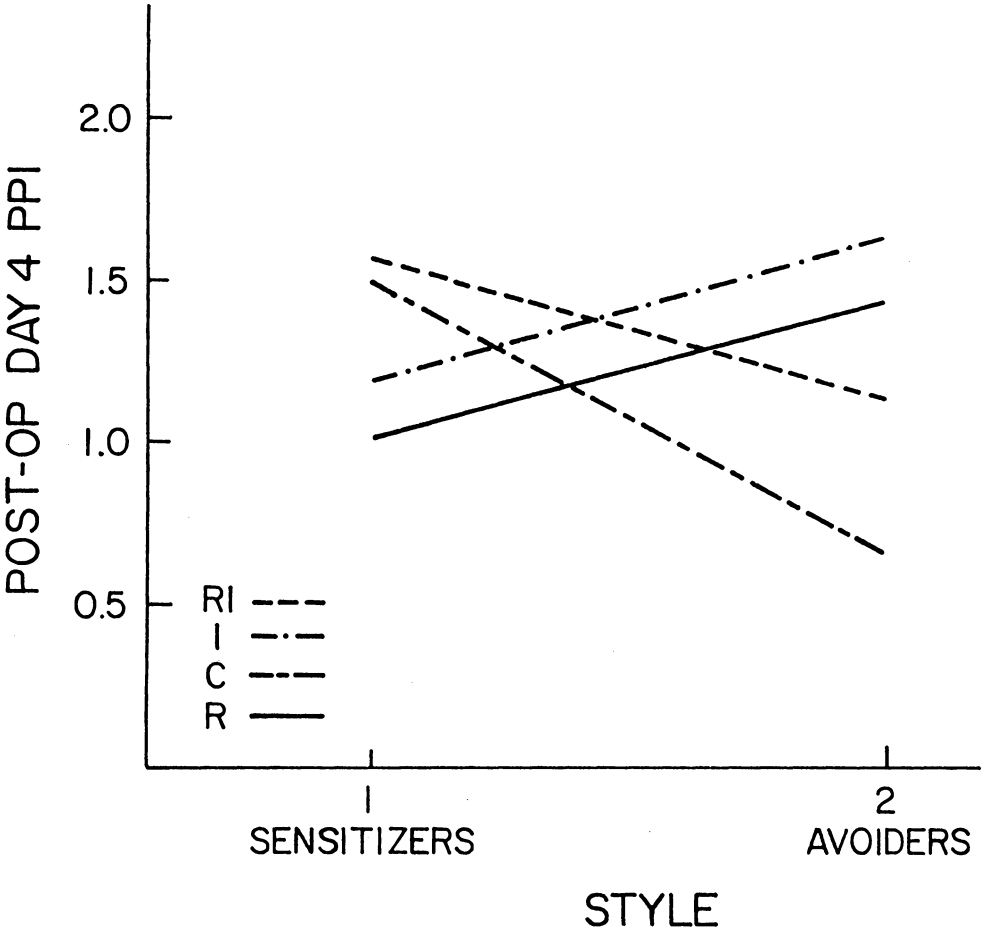

Figure 5b. Adjusted mean present pain intensity on postoperative Day 4 for each treatment group across coping styles.

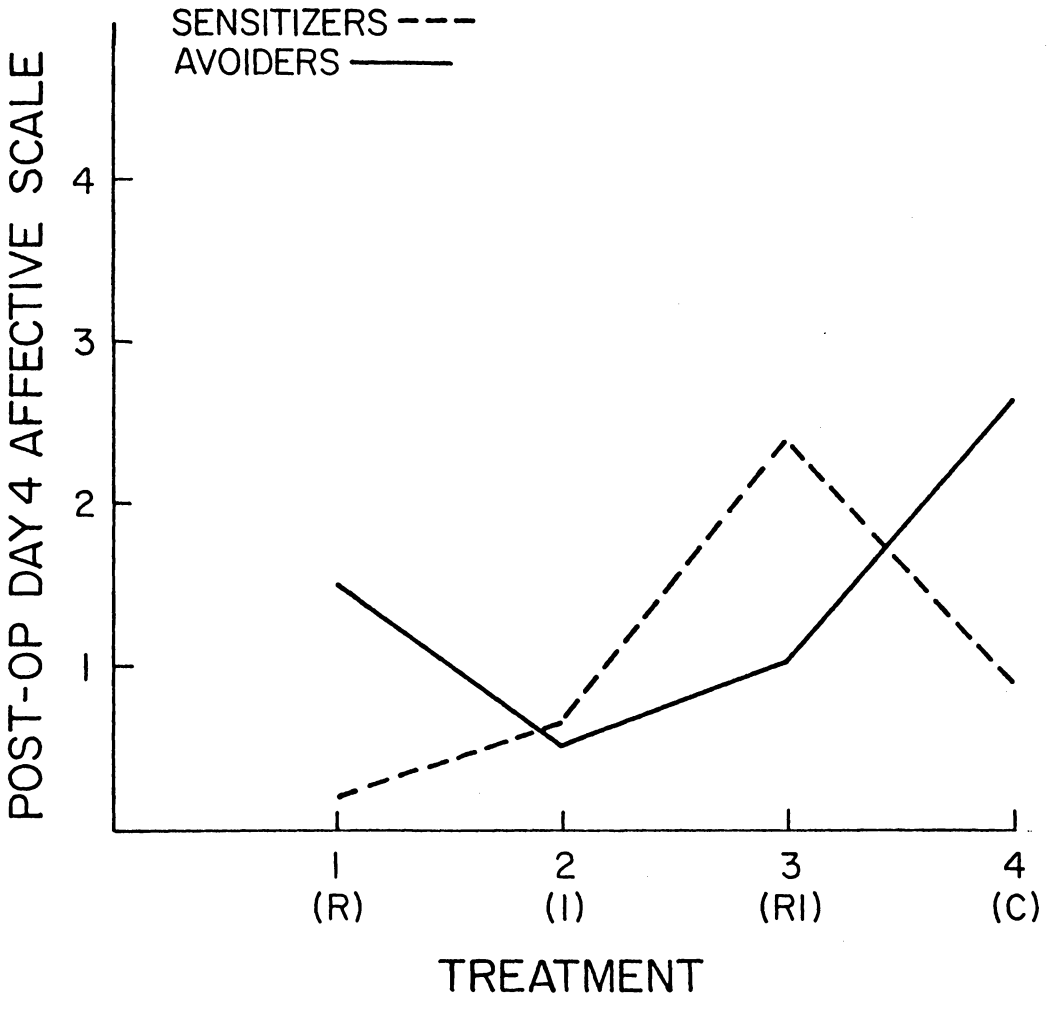

Figure 6a. Adjusted mean affective scale pain on postoperative Day 4 for each coping style across treatment groups.

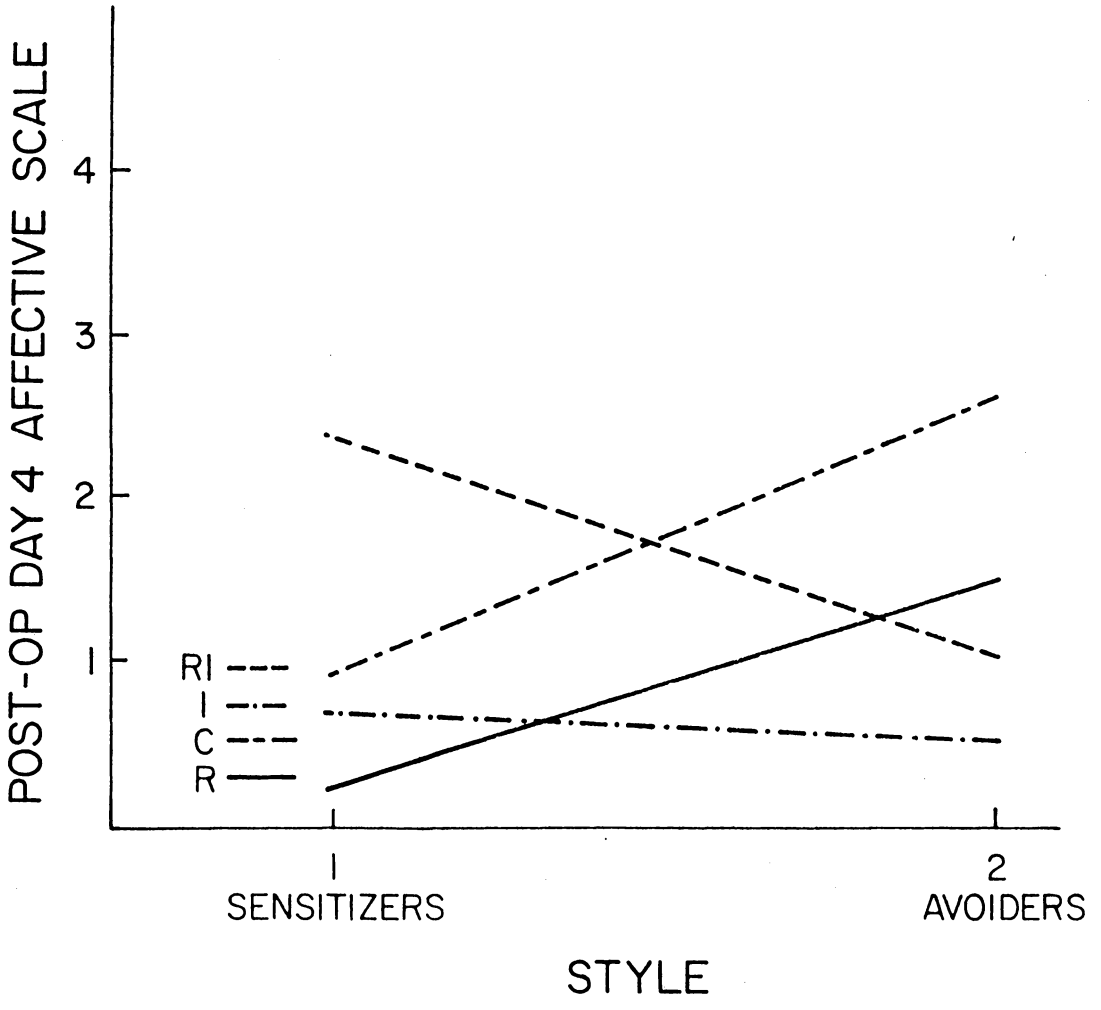

Figure 6b. Adjusted mean affective scale pain on postoperative Day 4 for each treatment group across coping styles.

than in the relaxation plus information group. Avoiders in the information group reported significantly less pain than avoider controls.

On the miscellaneous scale, as shown in Figures 7a and 7b, avoiders reported less pain in the information and relaxation plus information groups than avoider controls.

Insert Figures 7a and 7b about here

Medication Measures of Postoperative Pain

There were no significant main effects or interactions for any of the medication measures of pain, tabulated for the entire postoperative period. Table 12 presents a summary of significant planned comparisons between adjusted cell means for total combination drugs and total potency of narcotic analgesics received postoperatively. As shown in Figures 8a and 8b, avoiders in the relaxation plus information group and the control group requested significantly less combination medications than avoiders in the information group. Avoiders in the relaxation group also received significantly less combination medications than avoiders in the information group.

Insert Table 12 and Figures 8a and 8b about here

As shown in Figures 9a and 9b and summarized in Table 12, sensitizers in the relaxation group received significantly less narcotic analgesia than sensitizers in the information group ($F = 4.67$, $p < .05$).

Insert Figures 9a and 9b about here

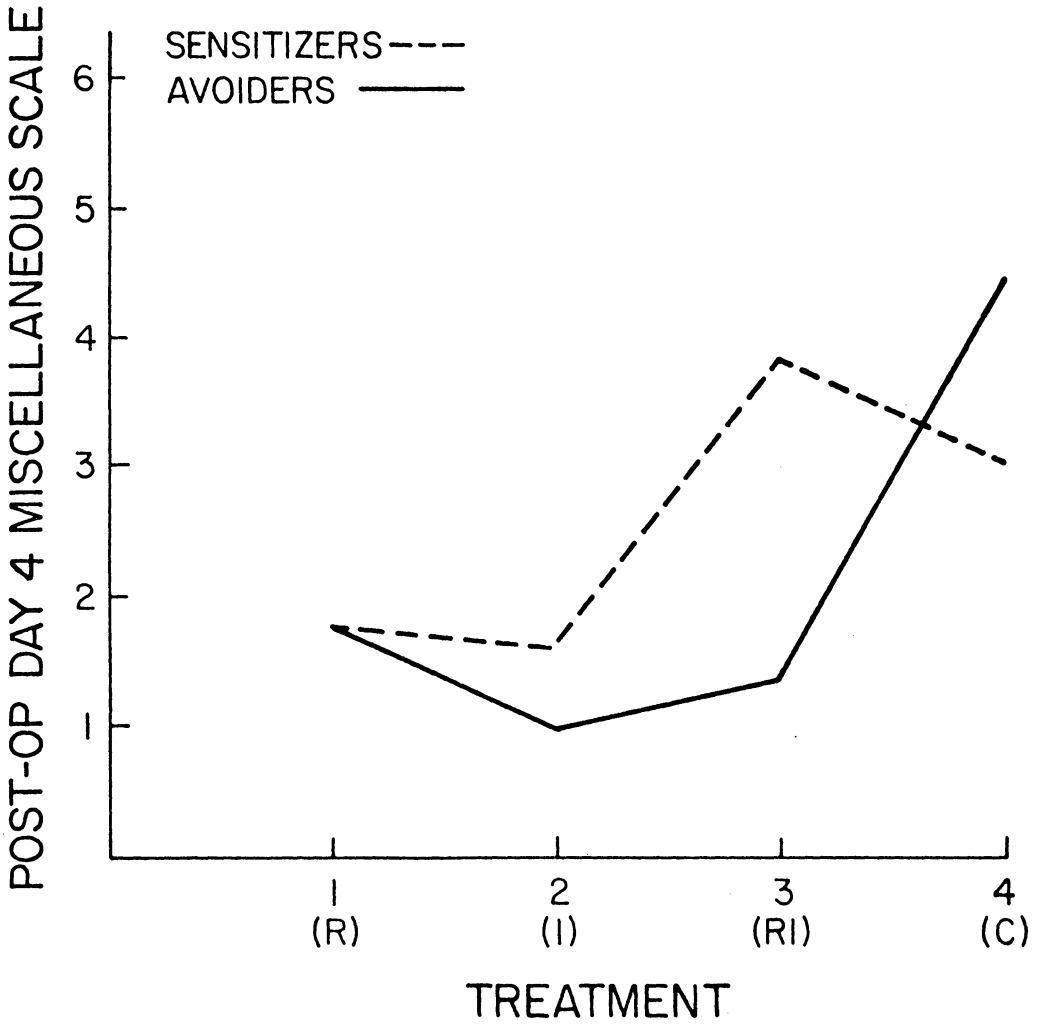

Figure 7a. Adjusted mean miscellaneous scale pain on post-operative Day 4 for each coping style across treatment groups.

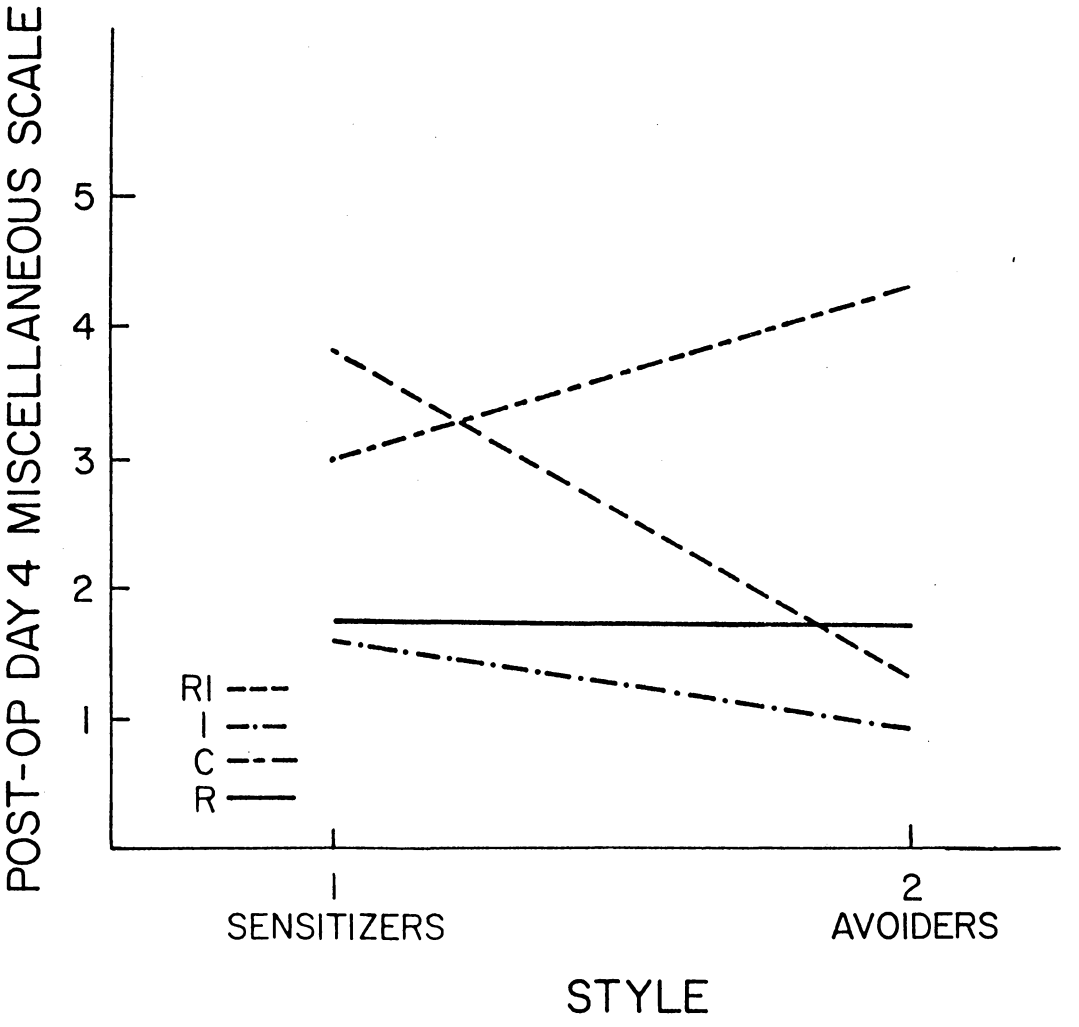

Figure 7b. Adjusted mean miscellaneous scale pain on post-operative Day 4 for each treatment group across coping styles.

Table 12

Summary of Planned Comparisons Between Adjusted Cell Means for Medication Measures of Postoperative Pain (n = 64)

*Total Combination Drugs:

Style, Treatment	with	Style, Treatment	F	p<
1, RI		2, RI	3.65	.10
2, R		2, I	9.25	.01
2, I		2, RI	4.48	.05
2, I		2, C	4.63	.05

*Total Potency of Narcotic Analgesics:

Style, Treatment	with	Style, Treatment	F	p<
1, R		1, I	4.67	.05
1, R		1, C	3.21	.10

*style 1 = sensitizers
style 2 = avoiders

R = relaxation
I = information

RI = R and I
C = control

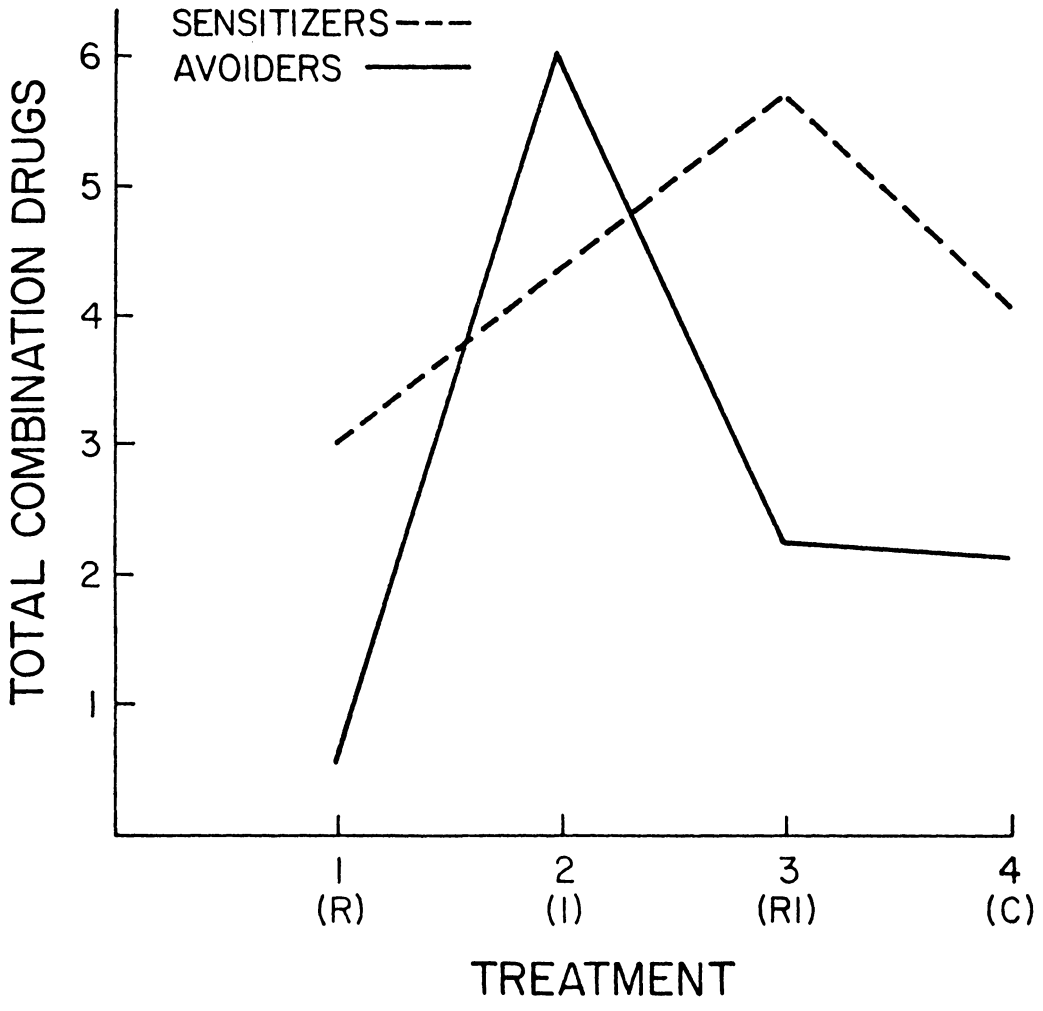

Figure 8a. Adjusted mean combination drugs received postoperatively for each coping style across treatment groups.

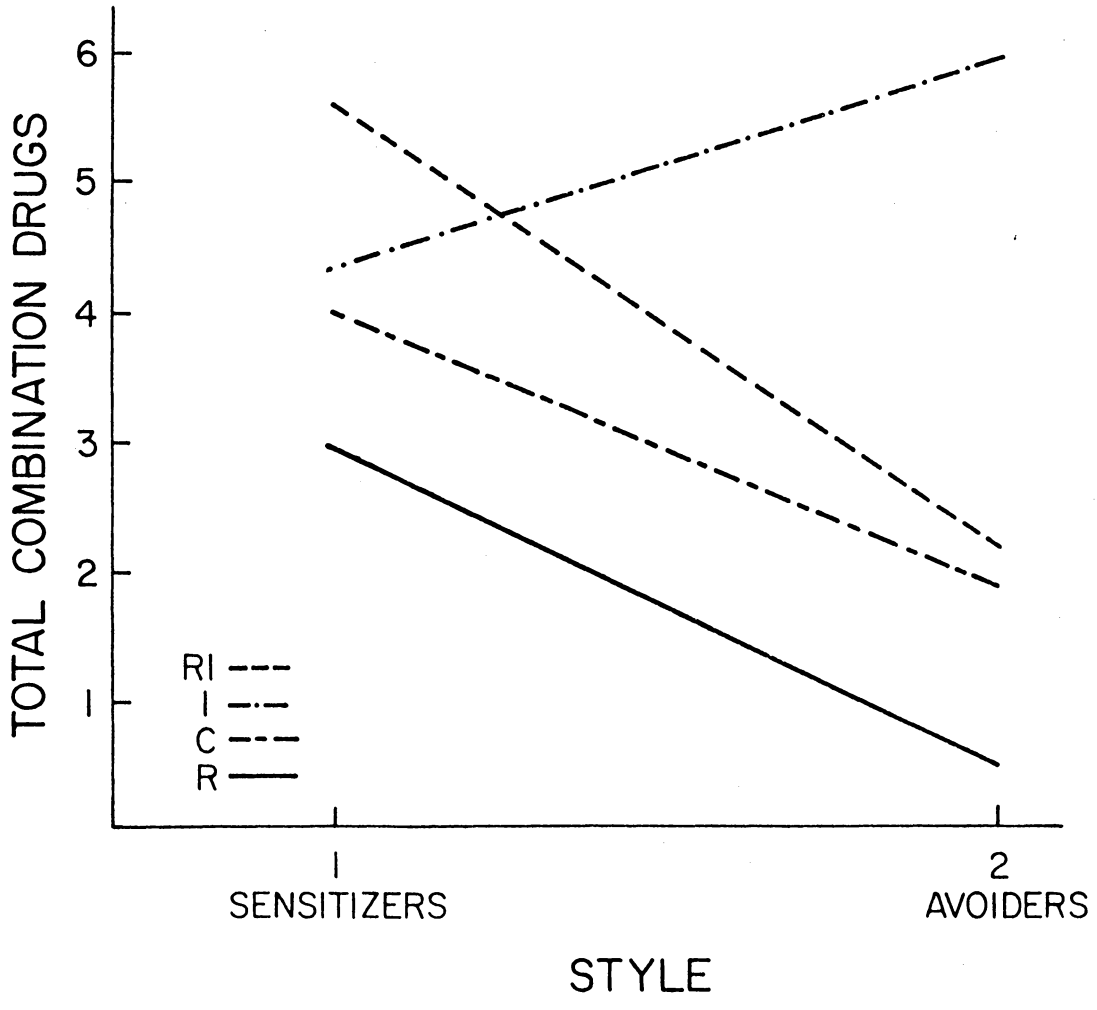

Figure 8b. Adjusted mean combination drugs received postoperatively for each treatment group across coping styles.

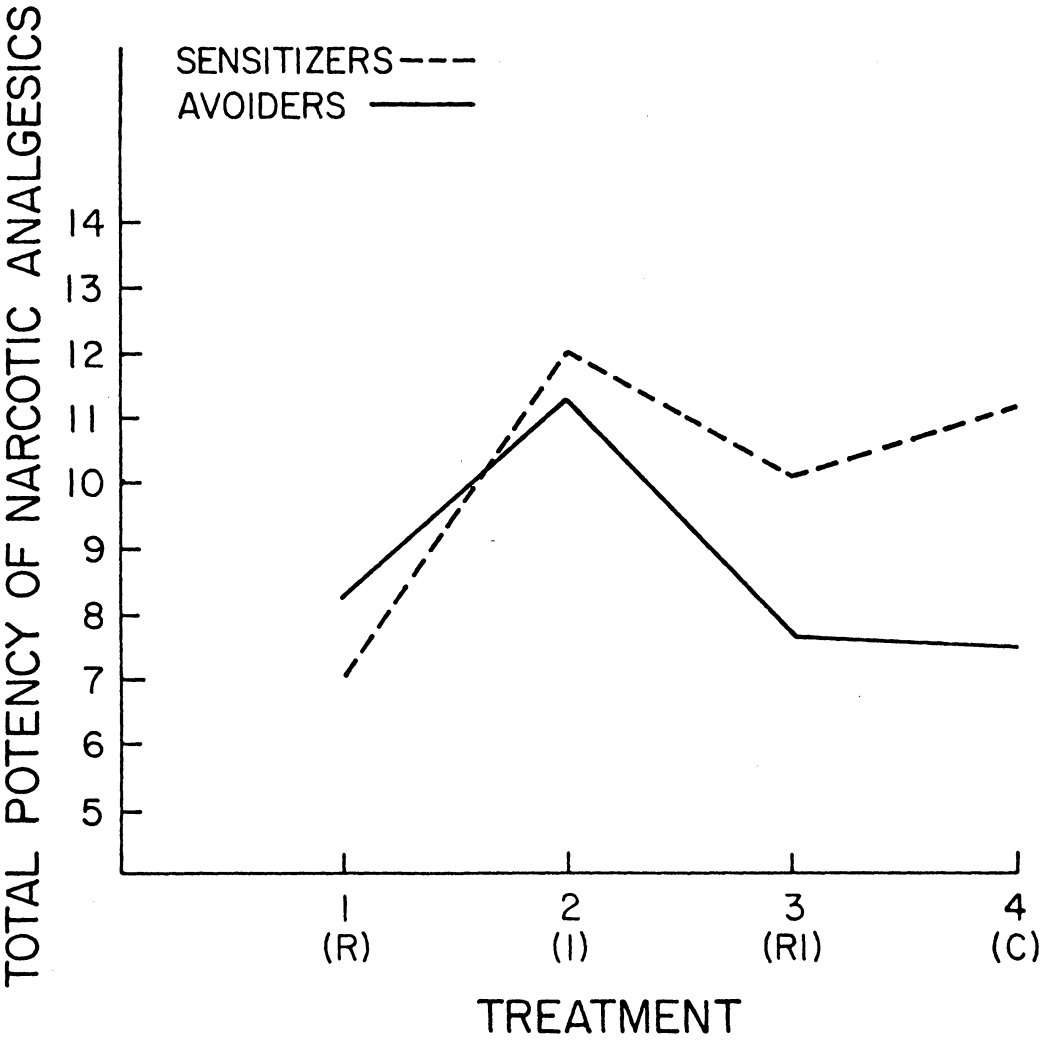

Figure 9a. Adjusted mean potency of narcotic analgesics received postoperatively for each coping style across treatment groups.

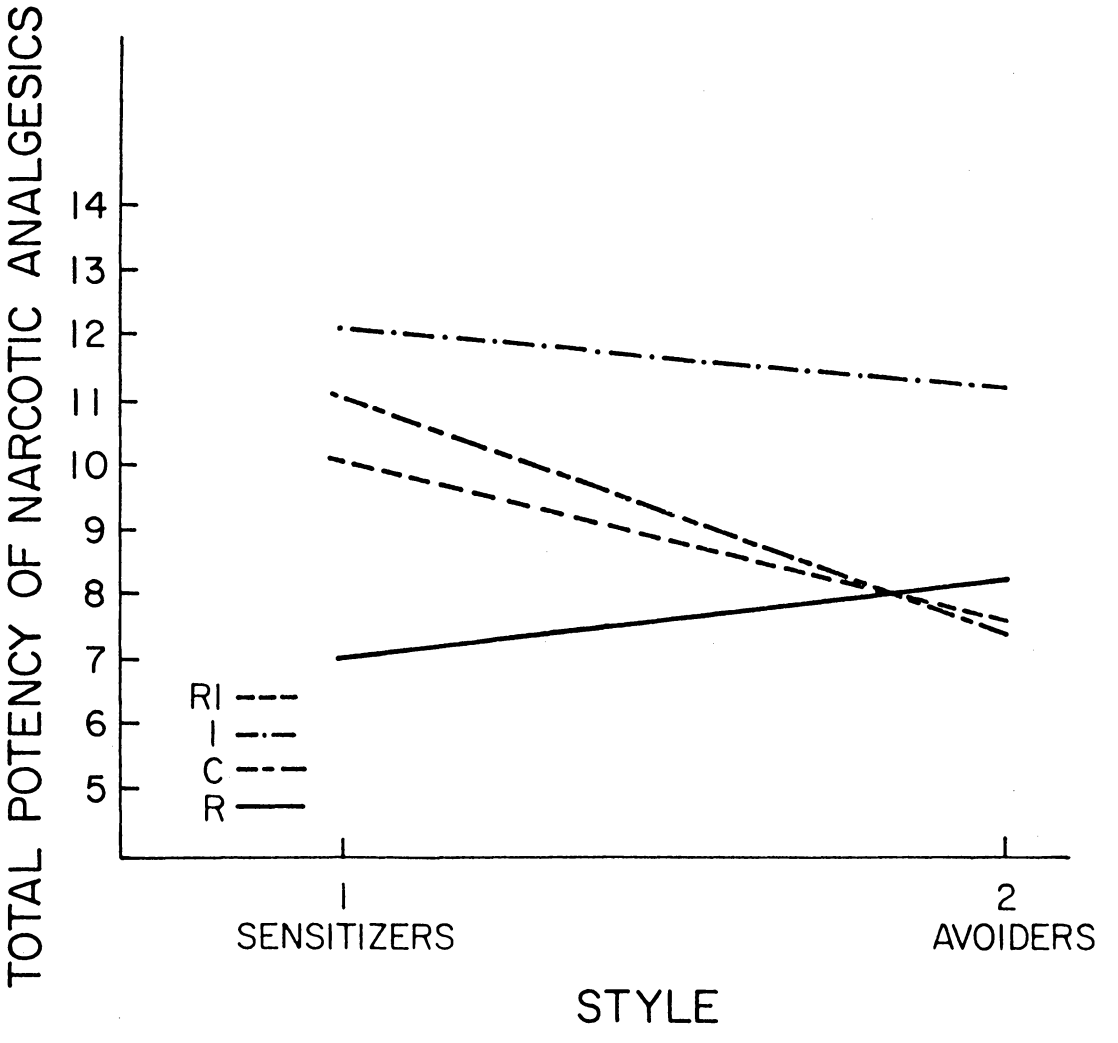

Figure 9b. Adjusted mean potency of narcotic analgesics received postoperatively for each treatment group across coping styles.

Main Effects and Interactions for 3 x 4 Analysis of Covariance

The relationship between coping style and treatment was also examined in a 3 x 4 analysis of covariance with type of surgery, sex, race, and age as covariates, and three levels of style. Subjects who were rated as a 7 or above were assigned to style level 1 (sensitizers), subjects rated as 4, 5, or 6 to style level 2 (non-specific group), and those rated as a 3 or below were assigned to style level 3 (avoiders). This resulted in quite unequal cell sample sizes (see Table 2).

The miscellaneous scale from the PRI for postoperative Day 2 was the only self-report measure of pain that was significant. As shown in Table 13 there was a significant effect for coping style ($F = 3.48$, $p < .06$). Planned comparisons between means using the coding method previously described were not significant. However, an examination of the means as presented in Table 13 and graphed in Figures 10a and 10b reveals that avoiders reported less pain than the other two groups. Also, subjects in the information group reported more pain than the other groups, which were essentially equal to each other.

Insert Table 13 and Figures 10a and 10b about here

There was also a significant treatment effect for the medication measure, total narcotic analgesics received postoperatively (see Table 14). Planned comparisons between treatment means and between individual cell means, by the coding method designated, were not significant. However, Figures 11a and 11b show the pattern of values by treatment and

Insert Table 14 and Figures 11a and 11b about here

Table 13

Summary of Analysis of Covariance for Post-Op Day 2 Miscellaneous Scale with Type of Surgery, Sex, Race, and Age as Covariates and Three Levels of Coping Style (n = 64)

Source of Variance	df	Type IV SS	MS	F	p<
Style	2	62.79	31.40	3.48	.05
Treatment	3	71.90	23.97	2.65	.10
Style* Treatment	6	66.45	11.08	1.23	NS
Type	1	74.36	74.36	8.23	.01
Sex	1	.31	.31	.03	NS
Race	1	24.46	24.46	2.71	NS
Age	1	15.64	15.64	1.73	NS
Error	48	433.44	9.03		

Style	N	Adjusted Mean	Unadjusted Mean
1	17	4.96	4.12
2	31	4.79	4.74
3	16	2.35	2.88

Treatment	N	Adjusted Mean	Unadjusted Mean
R	16	3.94	3.69
I	16	6.13	5.50
RI	16	3.07	3.88
C	16	3.00	3.38

*style 1 = sensitizers
style 2 = non-specific group
style 3 = avoiders

R = relaxation
I = information

RI = R and I
c = control

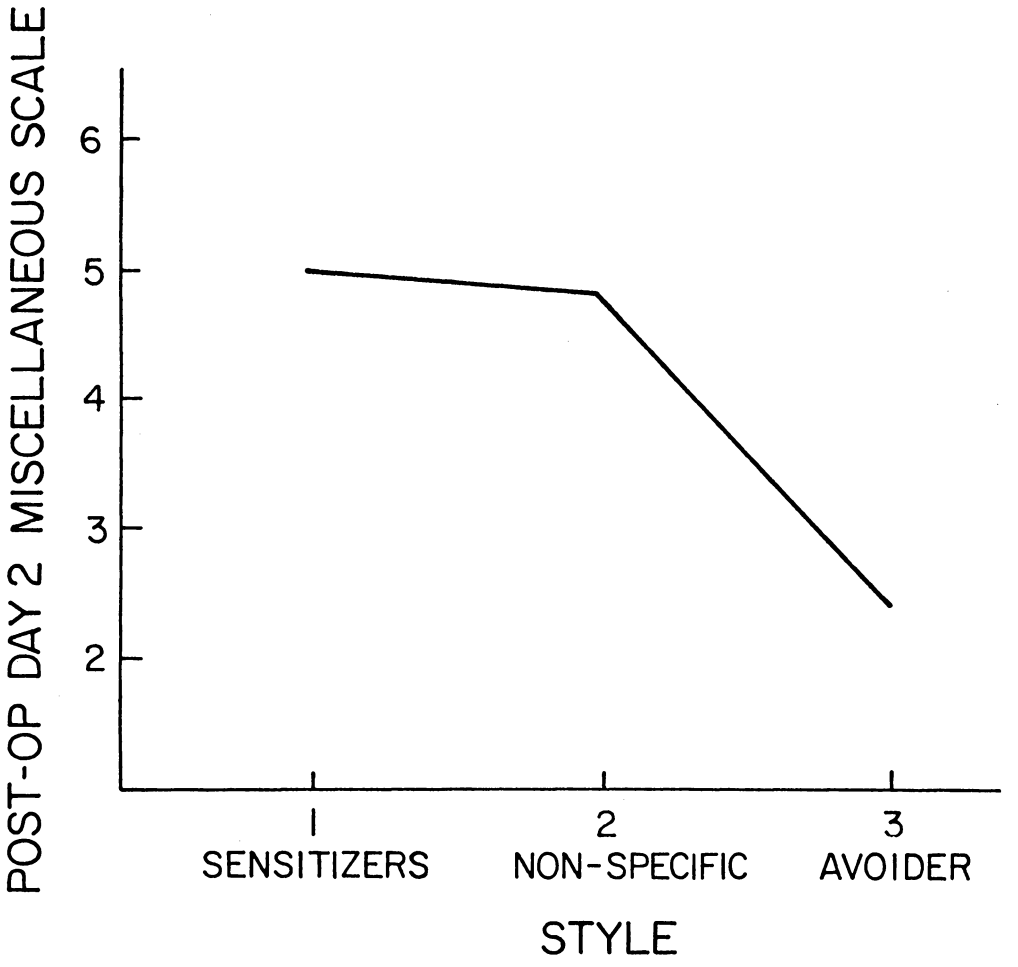

Figure 10a. Adjusted mean miscellaneous scale pain on postoperative Day 2 for three levels of coping style.

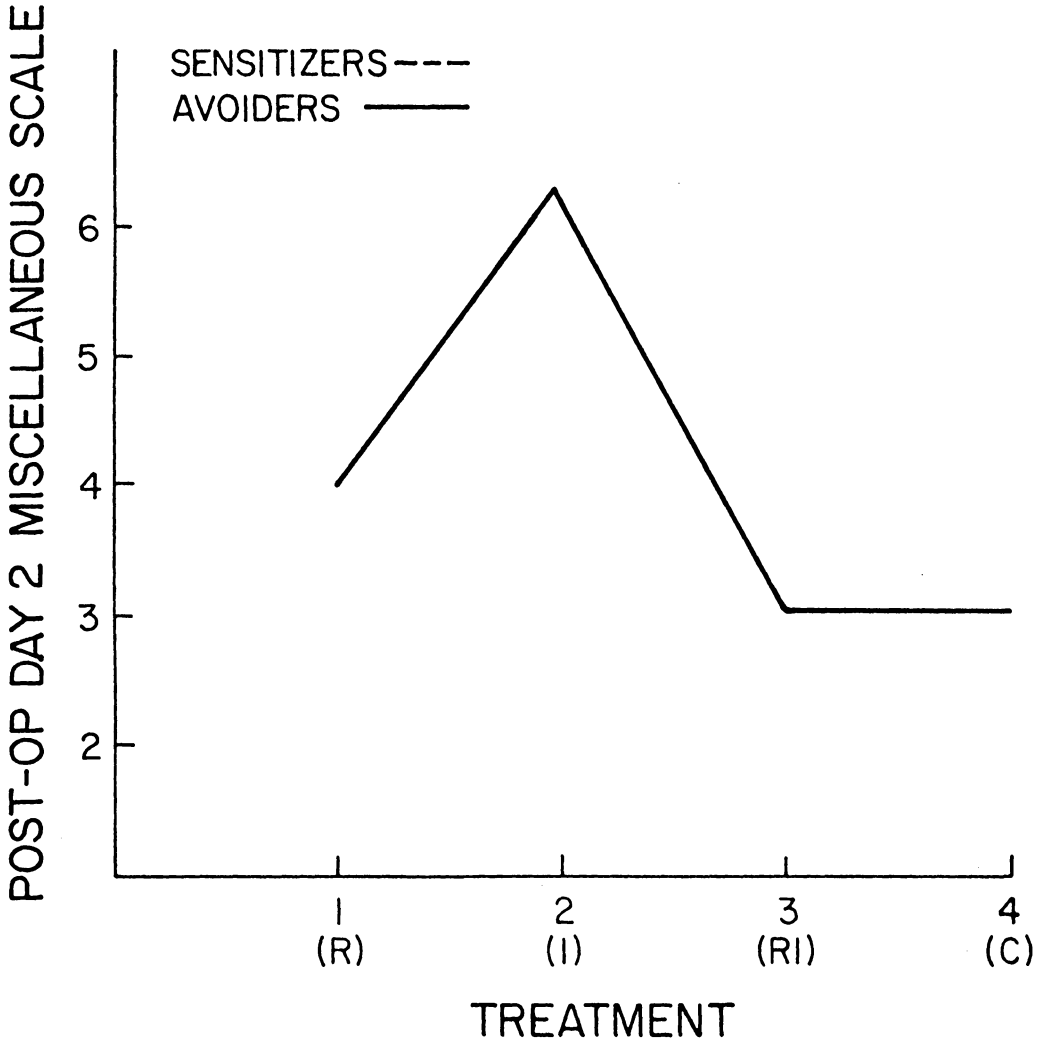

Figure 10b. Adjusted mean miscellaneous scale pain on post-operative Day 2 for each treatment group.

Table 14

Summary of Analysis of Covariance for Total Narcotic Analgesics with Type of Surgery, Sex, Race, and Age as Covariates and Three Levels of Style (n = 64)*

Source of Variance	df	Type IV SS	MS	F	p<
Style	2	115.77	57.89	2.59	.10
Treatment	3	206.15	68.72	3.07	.05
Style* Treatment	6	276.11	46.02	2.06	.10
Type	1	43.31	43.31	1.94	NS
Sex	1	26.75	26.75	1.20	NS
Race	1	.15	.15	.01	NS
Age	1	18.63	18.63	.83	NS
Error	48	1073.10	22.36		

Style	N	Adjusted Mean	Unadjusted Mean
1	17	11.37	9.94
2	31	8.25	7.87
3	16	7.83	9.19

Treatment	N	Adjusted Mean	Unadjusted Mean
R	16	9.18	9.25
I	16	12.57	9.88
RI	16	7.08	7.19
C	16	7.77	8.69

*style 1 = sensitizers
style 2 = non-specific group
style 3 = avoiders

R = relaxation
I = information

RI = R and I
C = control

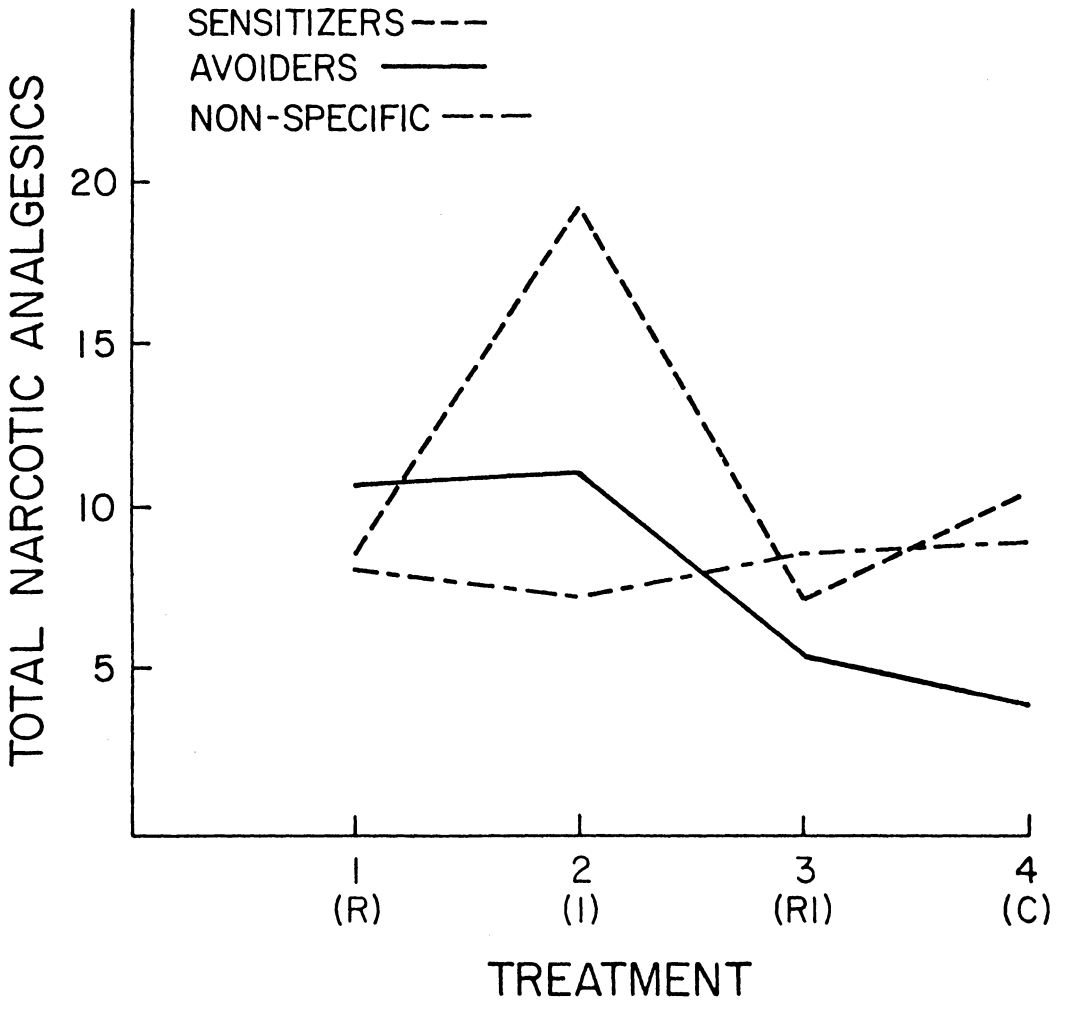

Figure 11a. Adjusted mean total narcotic analgesics received postoperatively for three levels of coping style across treatment groups.

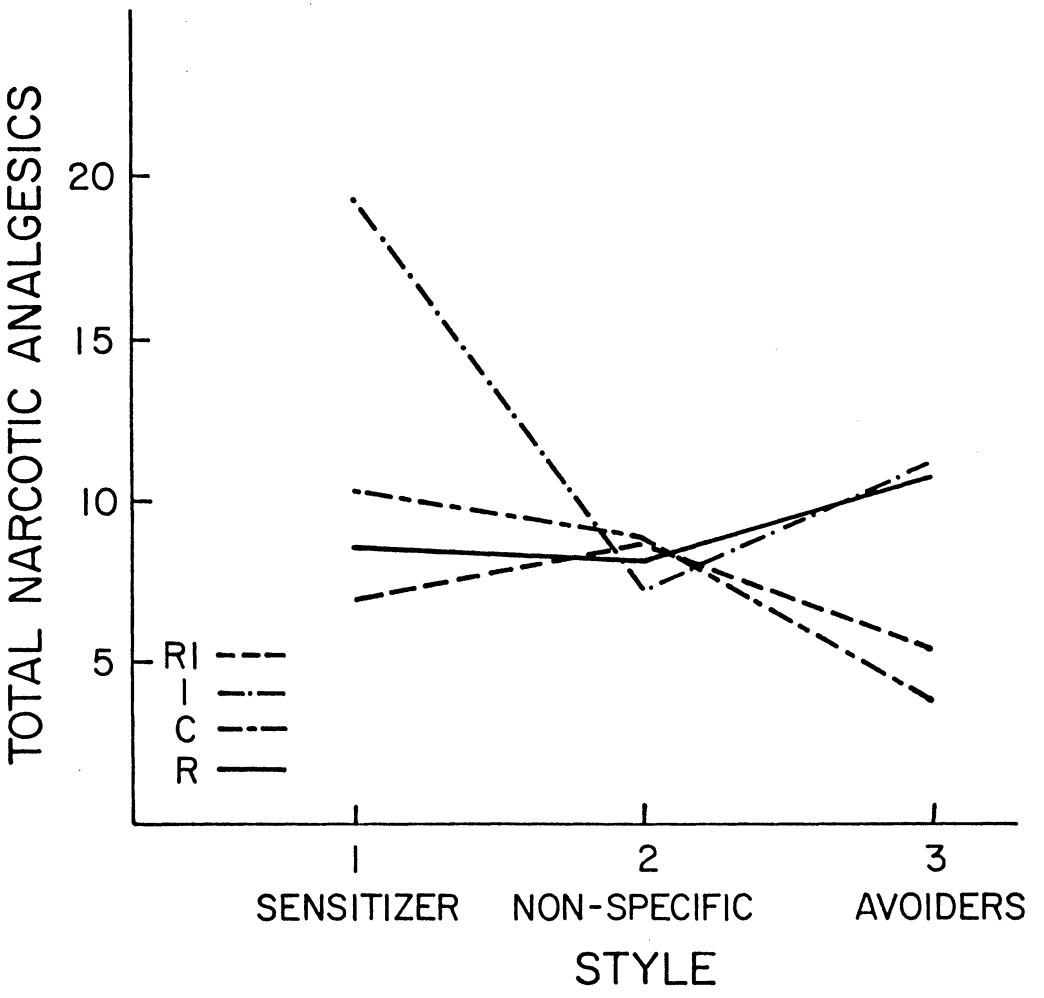

Figure 11b. Adjusted mean total narcotic analgesics received postoperatively for each treatment group across three levels of coping style.

style. Sensitizers in the information group received more narcotic analgesics than subjects in any other group. Avoiders in the relaxation plus information group and the control group received less narcotic analgesics than avoiders in the relaxation or information groups. There was essentially no difference across treatments for subjects in the non-specific group (style level 2).

There were also significant coping style and treatment effects for the total potency of narcotic analgesia measure as shown in Table 15. Again, using effect coding for comparisons between means, there were no significant differences. However, as shown in Table 15, sensitizers received more narcotic analgesia than the other two groups. Examination of treatment means also reveals that subjects in the information group received the highest potency of narcotic analgesia. There is essentially no difference across treatments for the non-specific group. Sensitizers in the information group received the most analgesia compared to all treatment groups. Avoiders received the highest amount of analgesia in the information group as well, but received the least amount of analgesia in the relaxation plus information and control groups. There was no difference across levels of style in the relaxation group.

Insert Table 15 about here

Table 15

Summary of Analysis of Covariance for Total Potency of Narcotic Analgesics with Type of Surgery, Sex, Age, and Race as Covariates and Three Levels of Style (n = 64)*

Source of Variance	df	Type IV SS	MS	F	p<
Style	2	127.98	63.99	3.30	.05
Treatment	3	244.30	81.43	4.20	.01
Style* Treatment	6	219.98	36.66	1.89	.10
Type	1	53.37	53.37	2.75	.10
Sex	1	4.44	4.44	.23	NS
Race	1	.54	.54	.03	NS
Age	1	3.06	3.06	.16	NS
Error	48	931.21	19.40		

Style	N	Adjusted Mean	Unadjusted Mean
1	17	11.88	10.96
2	31	9.05	9.29
3	16	7.74	7.94

Treatment	N	Adjusted Mean	Unadjusted Mean
R	16	7.51	7.61
I	16	13.46	11.73
RI	16	8.46	8.89
C	16	8.78	9.35

*style 1 = sensitizers
style 2 = non-specific group
style 3 = avoiders

R = relaxation
I = information

RI = R and I
C = control

Discussion

Measurement of Postoperative Pain

This study utilized two types of pain measures, a self-report measure and a behavioral measure of amount of analgesic usage. The McGill Pain Questionnaire (MPQ) was chosen since it provides several ways of measuring the subjective report of pain, with word descriptors to assess the sensory, affective, and evaluative aspects of pain experience, as well as ratings of the intensity dimension (Melzack, 1975). This device had also proven to be sufficiently sensitive to detect differences among different methods to relieve pain and there has been considerable consistency in the constellation of verbal descriptors chosen by patients to describe different types of clinical pain (Dubuisson & Melzack, 1976; Melzack, 1975). The behavioral measure of pain, analgesic usage, is widely utilized in the literature (Egbert et al., 1964; Fordyce et al., 1973; Langer et al., 1975; Wakeman & Kaplan, 1978) and is generally assumed to vary directly with the amount of self-reported pain. That is, patients who request more analgesics are assumed to experience more pain.

In the present study results revealed high positive correlations among the components of the MPQ, and a significant positive relationship between self-reported state anxiety and all components of the MPQ, in the preoperative and both postoperative sessions. These results are consistent with previous findings on the MPQ and the relation of anxiety to reported pain (Martinez-Urrutia, 1975, Melzack, 1975; Scott, Clum, & Peoples, 1981). The relationship between analgesic usage and self-report

of pain is not as clear. When considering the relationship between analgesia and pain report, on the sample as a whole, the correlations between self-report measures and analgesia are confounded by treatment effects. Also, self-report measures were taken on two separate post-operative days, whereas medication measures were tabulated for the entire postoperative period. Despite these limitations of the data, however, it appears that there is a significant positive correlation between self-report of pain and medication usage. When the relationship between medication and self-report measures was examined for the control group, to exclude the effect of differential treatment effects, the relationship was positive, but varied according to the postoperative day of measurement. The measure of present pain intensity (PPI) on Day 2 was significantly related to the total number of narcotics, medications overall, and the potency of narcotic analgesia. The evaluative scale also was related to total medications and narcotic potency. All of the self-report measures of pain and anxiety (excluding the miscellaneous scale), taken on the fourth postoperative day, were significantly correlated with the number of narcotic analgesics. Also, total medications and the potency of narcotic analgesia was significantly related to the sensory and evaluative scales and the PPI and PRI taken on Day 4.

The data suggest, even though based on a low sample size for the control group, that analgesic usage, especially narcotic analgesic usage, is significantly related to the subjective experience of pain. That is, people who report more pain, request more narcotic analgesia. This supports the notion that analgesic usage is another measure of pain.

The relationship between these measures, however, could be more clearly delineated if narcotic usage was tabulated for each day and compared to the self-report measures for that day. There also appears to be a significant positive relationship between reported anxiety and narcotic usage, which is also consistent with previous studies of surgical patients (Drew, Moriarty, & Shapiro, 1968).

Main Effects

Contrary to expectations, there were no significant treatment effects. Relaxation alone, for instance, did not appear to be an overall effective treatment for postoperative pain. Preparatory information similarly had no effect on patients overall. The effects of treatments are only apparent when considered with respect to the individual's coping style. It is also possible, however, that the treatments provided in this study may have been too brief to provide an adequate test of their effectiveness for patients in general. Most authors, for instance, use more extensive training in relaxation techniques (Gessel & Alderman, 1971; McAmmond, Davidson, & Kovitz, 1971). It is interesting to note, as well, that there were no significant effects for coping style. While sensitizer controls generally reported more pain and received more analgesia than avoider controls, these differences were only significant for the affective scale and PPI on postoperative Day 4. The significant difference in pain response, primarily medication usage, may only appear when considering the differences between extreme avoiders and extreme sensitizers, as suggested by the data with three levels of coping style. However, it is quite clear that avoiders do very well on their own, and do not appear

to need much improvement on their own coping mechanisms. Cohen (1973) suggests that avoiders may handle stress better when in a situation where the outcome is expected to be positive. However, the present study corroborates other findings (Cohen, 1973; Shipley, Butt, & Horwitz, 1979) that the avoidant patient recovers as well or better than sensitizing patients. It does not appear necessary for a patient to actively deal with the elements of a stressful situation as Janis (1959) has suggested. An avoidant method of coping is adequate to this situation and does not result in poorer recovery in elective surgery patients.

Interactions Between Treatment and Coping Style

The main purpose of this study was to examine the relationship between coping processes used by patients and their response to treatment interventions designed to reduce anxiety and pain postoperatively. The overall goal of such an approach is to develop optimum treatment strategies for specific types of individuals. As expected, in the present study, there were differences between the responses of sensitizers and avoiders to the interventions provided. As predicted sensitizers benefited most from relaxation training alone, and reported less pain as measured by the evaluative scale, present pain intensity (PPI), and the rating of worst pain experienced, on the second postoperative day, as compared to sensitizer controls. Only PPI and worst pain were significantly lower but relaxation training alone appeared to be the clearly superior treatment for sensitizers. On the fourth postoperative day, sensitizers also reported less pain in the relaxation training group, though not significantly less than sensitizer controls. Thus, it appears

that the relaxation training was effective in reducing pain reported immediately after surgery in sensitizers, rather than later in the postoperative course. There was also a trend in this direction for two of the medication measures of pain. These differences did not reach significance, but sensitizers in the relaxation group did request less combination drugs and received less narcotic analgesia overall, as measured by potency equivalence, than sensitizer controls.

Avoiders, were predicted to do best in the relaxation plus information group. This was expected since information had been shown in previous research (Andrew, 1970; Shipley, Butt, & Horwitz, 1979) to increase indices of distress in avoiders. Therefore, in a situation in which their anxiety was aroused by the presentation of information, the relaxation strategy would work best, since relaxation strategies have been shown to work best when the patient is anxious (Gessel & Alderman, 1971; McAmmond, Davidson, & Kovitz, 1970; Weisenberg, 1977). In the present study, the relaxation plus information intervention did appear to be the most beneficial of the treatments provided to reduce pain, at least up until the second postoperative day. Avoiders in this group also reported significantly less pain on the affective scale than avoider controls on postoperative Day 2. There was a trend for avoiders in the relaxation plus information group to report less pain, on the evaluative scale and the total PRI, than avoider controls. However, on the fourth postoperative day, avoiders reported less affective scale pain than avoider controls in both the information and information plus relaxation group, significantly less with information alone. Avoiders also reported

significantly less pain, on the miscellaneous scale, than controls, in the information alone and information plus relaxation groups. It is not possible to conclude, however, that information had a beneficial effect, since avoiders in the information group also reported significantly more pain, on the PPI, than avoider controls, on postoperative Day 4. Also, of significance, avoiders in the information only group requested significantly more combination medications than avoiders in any of the other three groups.

As with sensitizers, then, it seems that the expected effect, for the interaction of treatments and coping, appeared in patients' reports of pain on the second postoperative day. This trend was also in effect, on the fourth postoperative day, for both sensitizers and avoiders, except for the apparent discrepancy for avoiders who reported significantly less affective scale and miscellaneous scale pain, but reported significantly greater pain intensity (PPI) and requested more analgesics (combination medications) when receiving information alone. This discrepancy suggests that information may have had a palliative effect on the affective component of pain (i.e., descriptors such as fearful, tiring, sickening) and miscellaneous qualities (i.e., spreading, tight, nagging), but had a magnifying effect on estimates of intensity and contributed to greater analgesic usage, in avoiders. This conclusion must remain tentative, however, since previous evidence has consistently shown information alone to have a detrimental effect on avoiders, since it appears to conflict with their coping style.

There is also the question of whether an increase in analgesic usage indicates more pain or simply increased control of the environment. The former explanation seems most probable since analgesic usage was positively correlated with self-reported pain. Since increased control of the environment could be expected to reduce anxiety and pain, negative correlations between analgesic use and self-reported pain would have been necessary to support this explanation.

The Questionable Utility of Preparatory Information

As previously reported, preparatory information has been promoted by some authors (Janis, 1959; Johnson et al., 1978; Staub & Kellett, 1972). Others (Auerbach & Kendall, 1978; Averill, 1973; Epstein, 1973; Langer, Janis, & Wolfer, 1975) have shown that information can also be detrimental, causing subjects to focus attention on the discomfort or perceive greater threat in response to noxious stimulation. Proponents of information-giving have suggested that prior preparation for a stressor allows an individual to rehearse the upcoming event cognitively and develop strategies for coping with the stress. Information reduces the discrepancy between expectancies and actual experience and those who are prepared can prevent emotional shocks that could result from the unexpected (Janis, 1959). Shipley et al. (1978) also suggest that prior exposure to a stressful stimulus can promote desensitization to that experience. Shipley et al. (1979) and others (Andrew, 1970; DeLong, 1970) have noted, however, that the utility of prior information depends on the individual's characteristic coping process. That is, individuals who are sensitizers may benefit from information, since this is congruent

with their coping style, and avoiders may be adversely affected by information, since this conflicts with their stance of denial.

Perhaps the most significant finding of the present study is that information-giving had no effect or a negative effect on measures of postoperative pain. Sensitizers in the information alone group reported significantly more pain on the miscellaneous pain scale and more pain, though not significantly, on the PRI on postoperative Day 2, than sensitizer controls. Otherwise, contrary to expectations, information-giving had no effect on reports of pain or medication usage for sensitizers. Information, when added to relaxation training for sensitizers, resulted in increased state anxiety on post-op Day 2 and increased affective scale pain on post-op Day 4, although not significantly higher than controls, but significantly higher than for sensitizers who received relaxation training alone. Avoiders in the information group also reported significantly more pain (PPI) on the fourth postoperative day than avoider controls. Avoiders given information also received more analgesic potency and received significantly more combination medications than avoider controls. When examining the data on medication usage for three levels of coping, sensitizers received more narcotic analgesics and a greater potency of analgesia in the information group. Avoiders in the information only group also received a greater potency of analgesia.

Information-giving alone was expected to have a negative effect on avoiders, since receiving specific information can be expected to conflict with their stance of avoidance and denial. Although there was a minimal effect on self-report of pain, information was found to significantly

increase medication usage. This is consistent with Andrews (1970) findings for avoiders, although she used a dispositional measure of coping and provided more general information. Also, other studies (DeLong, 1970; Shipley et al., 1979) have found that avoiders do not respond well to preparation and, as previously noted, their own coping style may work quite well for them. Sensitizers, on the other hand, would have been expected to benefit from such information, since it is assumed to be congruent with their characteristic response to stress. It is apparent, however, that such information either had no effect or further sensitized them to the impending discomforts.

These results appear at first to conflict with studies that have reported positive effects for patient preparation. However, most of these studies used treatments with multiple components, which cannot be compared with the type of information provided in this study. For instance, Egbert et al. (1964) combined relaxation suggestions, exercise and breathing instructions, as well as specific information regarding expectations of pain. Wolfer and Visintainer (1975) combined information about procedures, supportive care from a nurse, and the training of the mother in supporting the child undergoing surgery. Melamed and Siegel (1975) showed children a film of another child undergoing various phases of hospitalization for hernia surgery, which also involved modeling as well as simple information-imparting.

Additionally, Johnson et al. (1978a and 1978b), who used information identical to the type provided in this study, failed to demonstrate any effect for information-giving on indices of pain or medication usage.

The only effect demonstrated in these two studies was a reduction in length of stay in the hospital. Wilson (1977), who also used cholecystectomy and hysterectomy patients and assessed patient's defensive style (different from sensitization-avoidance), found no effect for information-giving on measures of pain and distress. Langer, Janis, and Wolfer (1975) found preparatory information (although it did not include specific sensory information) had no positive effect on any of the indices of recovery. Andrew (1970), again using a more general form of preparatory information, found information to have no effect on sensitizers. It is clear, therefore, that the assumption of a demonstrated positive effect for information-imparting is inaccurate when the available clinical studies are closely examined.

Some support for the positive effects of information-imparting has been found in laboratory studies of pain. Several experimental studies, for example, (Johnson, 1973; Johnson & Rice, 1974; Staub & Kellett, 1972) have reported reduced pain reports when subjects were provided with specific information about the sensations they would experience. However, as Sternbach (1975) asserts, most experimental laboratory research has little applicability to the clinical situation, since clinical pain elicits greater affect and is of longer duration. Still other studies have reported anxiety-reduction effects for preparatory information in patients undergoing circumscribed medical procedures, such as cardiac catheterization (Kendall et al., 1979), dental surgery (Auerbach & Kendall, 1979), and endoscopic examinations (Johnson & Leventhal, 1974). These studies, however, only report reductions in anxiety or improved

ratings of adjustment while undergoing these procedures. It is difficult to compare adjustment to these special procedures to pain experience during major abdominal surgery.

Shipley et al. (1979) and Leventhal et al. (1979) also suggest two other possible explanations for the effect of information found in this study. First, Shipley et al. (1979), when looking at indices of anxiety and adjustment only, found that the benefit of videotape exposure to endoscopy prior to the procedure, increased as a function of the number of times exposed, for sensitizers. Thus, it may be the case that in order for sensitizers to benefit from preparatory information they may need to be prepared much more extensively prior to surgery than was the case in this study.

Secondly, Leventhal et al. (1979), who did not take into account the effect of coping style, but closely examined the mechanisms of providing specific sensory information, demonstrated a negative effect for information. Leventhal et al. (1979) found that subjects who received specific sensory information plus magnitude information, that is, information that the ice water would be painful, reported more pain distress than those receiving sensory information alone or controls. Leventhal et al. (1979) conclude that the information about painfulness caused subjects to process the stimulus as a threat. Thus, it is difficult to imagine that sensitizers, most of whom had had prior experience with surgery and also seek information about all aspects of their surgical experiences, including the pain in the recovery period, would not perceive the threatening aspects of the surgical situation. Leventhal

et al.'s (1979) results suggest that information-giving could have further sensitized them to the impending discomforts of surgery.

Conclusions

The results of this study suggest several conclusions that should be explored in further studies of patients in clinical settings. First, it appears that relaxation training alone is the most effective technique, of those examined here, for the reduction of postoperative pain and anxiety in sensitizers. This is apparently the case because of the anxiety-reducing effect of the technique and the fact that it encourages redirection of attention, away from discomforts. Further study should examine the effect of more extensive training in the relaxation technique prior to surgery. Secondly, avoiders appear to do quite well on their own in a situation where a positive outcome is expected. However, of those techniques provided here, relaxation plus information did reduce some indices of pain below that of controls for the avoider group. This effect may result since the presentation of information increases perception of threat and promotes usage of the relaxation technique, which works best when subjects are anxious. Further research should examine the effect of avoidance strategies in situations where outcome is more likely to be difficult. Third, information-giving alone does not appear to be beneficial to either sensitizers or avoiders. One likely explanation for this effect is that information contributes to further sensitization to discomforts for sensitizers and conflicts with avoidant processes in avoiders. Further study should determine if further exposure to information, such as more extensive preoperative preparation, would

promote habituation for sensitizers. Also, further examination of the combination of information and training in relaxation for avoiders is needed, to determine if this combination can improve on their response, in other settings.

References

Aiken, L. H. & Henricks, T. F. Systematic relaxation as a nursing intervention technique with open heart surgery patients. Nursing Research, 1971, 20, 212-217.

Andrew. J. M. Recovery from surgery, with and without preparatory instruction, for three coping styles. Journal of Personality and Social Psychology, 1970, 15, 223-226.

Auerbach, S. M., Cuttler, A. F., & Levit, N. R. Anxiety, locus of control, type of preparatory information, and adjustment to dental surgery. Journal of Consulting and Clinical Psychology, 1976, 445, 809-818.

Auerbach, S. M. & Kendall, P. C. Sex differences in anxiety response and adjustment to dental surgery: Effects of general vs. specific preoperative information. Journal of Clinical Psychology, 1978, 34(2), 309-313.

Auerbach, S. M. & Kilmann. Crisis intervention: A review of outcome research. Psychological Bulletin, 1977, 84(6), 1189-1217.

August, R. V. Hypnosis in obstetrics and in gynecology. In J. M. Schneck, (Ed.), Hypnosis in Modern Medicine. Springfield, IL: Thomas, 1963.

Averill, J. R. Personal control over aversive stimuli and its relationship to stress. Psychological Bulletin, 1973, 80, 286-303.

Barber, J. Hypnosis as a psychological technique in the management of cancer pain. Cancer Nursing, 1978, (5), 361-363.

Barber, T. X. The effects of "hypnosis" on pain. A critical review of experimental and clinical findings. British Journal of Medical Hypnotics, 1964, 15, 30-37.

Beecher, H. K. Relationship of significance of wound to the pain experienced. Journal of the American Medical Association, 1956, 161, 1609-1613.

Beecher, H. K. Measurement of subjective responses: Quantitative effect of drugs. New York: Oxford University Press, 1959.

Beecher, H. K. The placebo effect as a non-specific force surrounding disease and the treatment of disease. In R. Janzen, W. D. Keidel, A. Herz, C. Steichele, J. P. Payne, & R. A. P. Burt (Eds.), Pain: Basic principles, pharmolocology, therapy. Stuttgart, West Germany: Georg Thieme, 1962.

Beers, T. M. & Karoly, P. Cognitive strategies, expectancy, and coping style in the control of pain. Journal of Consulting and Clinical Psychology, 1979, 47, 179-180.

Benson, H. The relaxation response. New York: William Morrow and Company, Inc., 1975.

Benson, H., Klemchuk, H. P., & Graham, J. R. The usefulness of the relaxation response in the therapy of headache. Headache, 1974, 14, 49-52.

Benson, H., Shapiro, D., Tursky, B., & Schwartz, G. E. Decreased systolic blood pressure through operant conditioning techniques in patients with essential hypertension. Science, 1971, 173, 740-742.

Blitz, B. & Dinnerstein, A. J. Effects of different types of instruction on pain parameters. Journal of Abnormal Psychology, 1968, 73, 276-280.

Blitz, B. & Dinnerstein, A. J. Role of attentional focus in pain perception: Manipulation of response to noxious stimulation by instructions. Journal of Abnormal Psychology, 1971, 77, 42-45.

Bobey, M. J. & Davidson, P. O. Psychological factors affecting pain tolerance. Journal of Psychosomatic Research, 1970, 14, 371-376.

Bond, M. R. The relation of pain to the Eysenck Personality Inventory, Cornell Medical Index and Whiteley Index of Hypochondriasis. British Journal of Psychiatry, 1971, 119, 671.

Bond, M. R. Psychological and psychiatric aspects of pain. Anaesthesia, 1978, 33, 355-361.

Bond, M. R., Glynn, J. P., & Thomas, D. G. The relation between pain and personality in patients receiving pentazocine (fortral) after surgery. Journal of Psychosomatic Research, 1976, 20, 369.

Bowers, K. S. Pain, anxiety, and perceived control. Journal of Consulting and Clinical Psychology, 1968, 32, 596-602.

Budzynski, T. H., Stoyva, J. M., & Mullaney, D. J. EMG biofeedback and tension headache: A controlled outcome study. Psychosomatic Medicine, 1973, 35, 484-496.

Byrne, D. The repression-sensitization scale: Rationale, reliability, and validity. Journal of Personality, 1961, 29, 334-349.

Chapman, W. P. & Jones, C. M. Varieties in cutaneous visceral pain sensitivity in normal subjects. Journal of Clinical Investigation, 1944, 23, 81.

Chaves, J. F. & Barber, T. X. Cognitive strategies, experimenter modeling, and expectation in the attenuation of pain. Journal of Abnormal Psychology, 1974, 83, 356-363.

Cheek, D. B. Therapy of persistent pain states. I. Neck and shoulder pain of five years duration. American Journal of Clinical Hypnosis, 1966, 8, 281-286.

Clark, W. C. Pain sensitivity and the report of pain: An introduction to sensory decision theory. Anesthesiology, 1974, 40, 272-287.

Cohen, F. Psychological preparation, coping, and recovery from surgery. Unpublished doctoral dissertation, University of California, Berkeley, 1975.

Cohen, F. & Lazarus, R. S. Active coping processes, coping dispositions, and recovery from surgery. Psychosomatic Medicine, 1973, 35, 375-389.

Craig, K. D., Best, H., & Best, J. A. Self-regulatory effects of monitoring sensory and affective dimensions of pain. Journal of Consulting and Clinical Psychology, 1978, 46(3), 573-574.

Crasilneck, H. B. & Hall, J. A. Clinical hypnosis: Principles and application. New York: Grune and Stratton, 1975.

Davidson, P. O. & Bobey, M. J. Repressor-sensitizer differences on repeated exposures to pain. Perceptual and Motor Skills, 1970, 31, 711-714.

Davidson, P. O. & McDougall, C. E. Personality and pain tolerance measures. Perceptual and Motor Skills, 1969, 28, 787.

Davidson, P. O. & Neufield, W. J. Response to pain and stress: A multivariate analysis. Journal of Psychosomatic Research, 1974, 27, 25-32.

Davison, L. A. Adaptive to a threatening stimulus. Unpublished doctoral dissertation. University of California, Berkeley, 1963.

DeLong, R. D. Individual differences in patterns of anxiety arousal, stress-relevant information and recovery from surgery. Unpublished doctoral dissertation, University of California, Los Angeles, 1970.

Drew, F. L., Moriarty, R. W., & Shapiro, A. P. An approach to the measurement of pain and anxiety response of surgical patients. Psychosomatic Medicine, 1968, 30, 826-836.

Dubuisson, D. & Melzack, R. Classification of clinical pain descriptions by multiple group discriminant analysis. Experimental Neurology, 1976, 51, 480-487.

Early, C. E. & Kleinknecht. The Palmar Sweat Index as a function of repression-sensitization and fear of dentistry. Journal of Consulting and Clinical Psychology, 1978, 46(1), 184-185.

Egbert, L. D., Battit, G. E., Welch, C. E., & Bartlett, M. D. Reduction of postoperative pain by encouragement and instruction of patients. New England Journal of Medicine, 1964, 270, 825-827.

Elton, D., Vagg, P. R., & Stanley, G. V. Augmentation-reduction and pain: Reply to Petrie. Perceptual and Motor Skills, 1979, 49, 496-498.

Epstein, S. Expectancy and magnitude of reaction to a noxious UCS. Psychophysiology, 1973, 10, 100-107.

Epstein, S. & Fenz, W. The detection of areas of emotional stress through variations in perceptual threshold and physiological arousal. Journal of Experimental Research in Personality, 1967, 2, 191-199.

Epstein, L. H., Webster, J. S., & Abel, G. G. Self-managed relaxation in the treatment of tension headaches. In J. D. Krumboltz & C. E. Thoresen (Eds.), Counseling Methods. New York: Holt, Rinehart and Winston, 1976.

Fordyce, W. E., Fowler, R. S., Lehman, J. F., Delateur, B. J., Sand, P. L., & Treischman, R. B. Operant conditioning in the treatment of chronic pain. Archives of Physical Medicine and Rehabilitation, 1973, 54, 399-408.

Frederickson, L. Methodology in the measurement of pain. Behavior Therapy, 1978, 9, 486-488.

Gannon, L. & Sternbach, R. A. Alpha enhancement as a treatment for pain: A case study. Journal of Behavioral Therapy and and Experimental Psychiatry, 1971, 2, 209-213.

Gayton, W. F., Bassett, J. E., Tavormina, J., & Ozmon, K. L. Repression-sensitization and health behavior. Journal of Consulting and Clinical Psychology, 1978, 46(6), 1542-1544.

Gebhart, G. F. Narcotic and nonnarcotic analgesics for relief of pain. In A. Jacox (Ed.), Pain: A source book for nurses and other health professionals. Boston: Little, Brown, and Company, 1977.

Gessel, A. H. & Alderman, M. H. Management of myofascial pain dysfunction syndrome of the temporomandibular joint by tension control training. Psychosomatics, 1971, 12, 302-309.

Hackett, G. & Horan, J. J. Stress inoculation for pain: What's really going on? Journal of Counseling Psychology, 1980, 27(2), 107-116.

Hane, R. D. Denial of threat and emotional response to impending painful stimulation. Journal of Consulting and Clinical Psychology, 1966, 30, 359-361.

Haslam, D. R. Individual differences in pain threshold and level of arousal. British Journal of Psychology, 1967, 38, 139.

Hilgard, E. R. The use of pain-state reports in the study of hypnotic analgesia to the pain of ice water. Journal of Nervous and Mental Disease, 1967, 144, 506-513.

Hilgard, E. R. Pain as a puzzle for psychology and physiology. American Psychologist, 1969, 24, 103-113.

Hilgard, E. R. Pain: Its reduction and production under hypnosis. Proceedings of the American Philosophical Society, 1971, 115, 470-476.

Hilgard, E. R. The neodissociation interpretation of pain reduction in hypnosis. Psychological Review, 1973, 80, 396-411.

Holmes, D. S. & Houston, B. K. Effectiveness of situation redefinition and affective isolation in coping with stress. Journal of Personality and Social Psychology, 1974, 29(2), 212-218.

Holroyd, K. A. & Andrasik, F. Coping and the self-control of chronic tension headache. Journal of Consulting and Clinical Psychology, 1978, 46(5), 1036-1045.

Horan, J. J. & Dellinger, J. K. "In vivo" emotive imagery: A preliminary test. Perceptual and Motor Skills, 1974, 39, 359-362.

Horan, J. J., Layng, F. C., & Pursell, C. H. Preliminary study of effects of "in vivo" emotive imagery on dental discomfort. Perceptual and Motor Skills, 1976, 12, 105-106.

Jacox, A. K. Sociocultural and psychological aspects of pain. In A. Jacox (Ed.), Pain: A source book for nurses and other health professionals. Boston: Little, Brown, and Company, 1977.

Janis, I. L. Psychological stress: Psychoanalytic and behavioral studies of surgical patients. New York: Wiley, 1958.

Johnson, J. E. Effects of accurate expectations about sensations on the sensory and distress components of pain. Journal of Personality and Social Psychology, 1973, 27, 261-275.

Johnson, J. E. Stress reduction through sensation information. In I. G. Sarason, & C. D. Spielberger (Eds.), Stress and anxiety, Vol. 2. Washington: Halstead, 1975.

Johnson, J. E., Fuller, S. S., Endress, M. P., & Rice, V. H. Altering patients responses to surgery: An extension and replication. Research in Nursing and Health, 1978, 1(3), 111-121.

Johnson, J. E. & Leventhal, H. Effects of accurate expectations and behavioral instructions on reactions during a noxious medical examination. Journal of Personality and Social Psychology, 1974, 29, 710-718.

Johnson, J., Leventhal, H., & Dabbs, J. Contribution of emotional and instrumental response processes in adaptation to surgery. Journal of Personality and Social Psychology, 1971, 20(1), 55-64.

Johnson, J. E. & Rice, V. H. Sensory and distress components of pain: Implications for the study of clinical pain. Nursing Research, 1974, 23, 203-209.

Johnson, J. E., Rice, V. H., Fuller, S. S., & Endress, M. P. Sensory information, instruction in a coping strategy, and recovery from surgery. Research in Nursing and Health, 1978, 1, 4-17.

Kanfer, F. H. & Goldfoot, D. A. Self-control and tolerance of noxious stimulation. Psychological Reports, 1966, 18, 79-85.

Kendall, P. C., Williams, L., Pechacek, T. F., Graham, L. E., Shisslak, C., & Herzoff, N. Cognitive-behavioral and patient education interventions in cardiac catheterization procedures: The Palo Alto medical psychology project. Journal of Consulting and Clinical Psychology, 1979, 47(1), 49-58.

Keppel, G. Design and analysis: A researcher's handbook. Englewood Cliffs, NJ: Prentice Hall, Inc., 1973.

Klepac, R. K. Successful treatment of avoidance of dentistry by desensitization or by increasing pain tolerance. Journal of Behavioral Therapy and Experimental Psychiatry, 1975, 6, 307-310.

Langer, E. J., Janis, I. L., & Wolfer, J. Reduction of psychological stress in surgical patients. Journal of Experimental Social Psychology, 1975, 11, 155-165.

Lasagna, L., Mosteller, F., von Felsinger, J. M., & Beecher, H. K. A study of the placebo response. American Journal of Medicine, 1954, 16, 770.

Lazarus, R. S. Emotions and adaptation: Conceptual and empirical relations. Nebraska Symposium on Motivation, 1968, 16, 175-266.

Lazarus, R. S. & Opton, E. M. The study of psychological stress: A summary of theoretical formulations and experimental findings. In C. D. Spielberger (Ed.), Anxiety and behavior. New York: Academic Press, 1966.

Lea, P. A., Ware, P. D., & Monroe, R. R. The hypnotic control of intractable pain. American Journal of Clinical Hypnosis, 1960, 3, 5-8.

Leon, B. N. Pain perception and extraversion. Perceptual and Motor Skills, 1974, 38, 510.

Leventhal, H. Findings and theory in the study of fear communications. In L. Berkowitz (Ed.), Advances in experimental social psychology. Vol. 5. New York: Academic Press, 1970.

Leventhal, H., Brown, D., Shacham, S., & Engquist, G. Effects of preparatory information about sensations, threat of pain, and attention on cold pressor distress. Journal of Personality and Social Psychology, 1979, 37(5), 688-714.

Liebeskind, J. C. & Paul, L. A. Psychological and physiological mechanisms of pain. Annual Review of Psychology, 1977, 28, 41-60.

Lindeman, C. A. Nursing interventions with the presurgical patient. Effectiveness of group and individual preoperative teaching - Phase Two. Nursing Research, 1972, 21(3), 196-209.

Lynn, R. & Eysenck, H. J. Tolerance for pain, extroversion and neuroticism. Perceptual and Motor Skills, 1961, 12, 161.

Martinez-Urrutia, A. Anxiety and pain in surgical patients. Journal of Consulting and Clinical Psychology, 1975, 43, 437-442.

McAmmond, D. M., Davidson, P. O., & Kovitz, D. A comparison of the effects of hypnosis and relaxation training on stress reactions in a dental situation. The American Journal of Clinical Hypnosis, 1971, 13, 233-242.

Meichenbaum, D. Cognitive-behavior modification. New York: Plenum Press, 1977.

Melamed, B. G. & Siegel, L. J. Reducation of anxiety in children facing hospitalization and surgery by use of filmed modeling. Journal of Consulting and Clinical Psychology, 1975, 43, 511-521.

Melzack, R. The puzzle of pain. London: Penguins, 1973.

Melzack, R. The McGill Pain Questionnaire: Major properties and scoring methods. Pain, 1975, 277-299.

Melzack, R. & Casey, K. L. Sensory, motivational and central control determinants of pain: A new conceptual model. In The skin senses. D. Kenshalo (Ed.), 1968, 423-438.

Melzack, R. & Perry, C. Self-regulation of pain. The use of alpha-feedback and hypnotic training for the control of chronic pain. Experimental Neurology, 1975, 46, 452-469.

Merbaum, M. & Kazoaka. Reports of emotional experience by sensitizers and repressors during an interview transaction. Journal of Abnormal Psychology, 1967, 72, 181-185.

Mersky, H. Psychological aspects of pain. Postgraduate Medical Journal, 1968, 44, 297-306.

Mersky, H. & Spear, F. The reliability of the pressure algometer. British Journal of Social and Clinical Psychology, 1964, 3, 130.

Mersky, H. & Spear, F. Pain: Psychological and psychiatric aspects. London: Bailliere, Tindol, and Cassell, 1967.

Mischel, W. Introduction to personality. New York: Holt, Rinehart, and Winston, 1976.

Mitch, P. S., McGrady, A., & Iannone, A. Antogenic feedback training in migraine: A treatment report. Headache, 1976, 16, 267-270.

Notermans, S. C. & Tophoff, M. M. Sex differences in pain tolerance and pain apperception. Psychiatr. Neurol. Neurochir., 1967, 70, 23.

Parbrook, C. D., Dalrymple, D. G., & Steele, D. F. Personality assessment, postoperative pain, and complications. Journal of Psychosomatic Medicine, 1973, 17, 277-285.

Petrie, A. Individuality in pain and suffering. Chicago: University of Chicago Press, 1967.

Rofe, Y. & Lewin, I. Who adjust better: Repressors or sensitizers? Journal of Clinical Psychology, 1979, 35(4), 875-879.

Rollman, G. Signal detection theory measurement of pain: A review and critique. Pain, 1977, 3, 187-211.

Russ, K. L. Effect of two different feedback paradigms on blood pressure levels of patients with essential hypertension. Paper presented to the Biofeedback Research Society, Colorado Springs, CO, February, 1974.

Sargent, J. D., Green, E. E., & Walters, E. D. Preliminary report on the use of autogenic feedback training in the treatment of migraine and tension headaches. Psychosomatic Medicine, 1973, 35, 129-135.

Scarpetti, W. C. The repression-sensitization dimension in relation to impending painful stimulation. Journal of Consulting and Clinical Psychology, 1973, 40, 377.

Schalling, D. & Levander, S. Ratings of anxiety-proneness and responses to electrical pain stimulation. Scandinavian Journal of Psychology, 1964, 1, 5.

Schwartz, G. E. & Shapiro, D. Biofeedback and essential hypertension: Current findings and theoretical concerns. Seminars in Psychiatry, 1973, 5(4), 493-503.

Scott, L. E., Clum, G. A., & Peoples, J. B. Preoperative predictors of postoperative pain. Pain, (In press).

Shapiro, A. K. The placebo response. In J. G. Howell, (Ed.), Modern Perspectives in Psychiatry. New York: Brunner/Mazel, Inc., 1971.

Shipley, R. H., Butt, J. H., & Horwitz, E. A. Preparation to reexperience a stressful medical examination: Effect of repetitious videotape exposure and coping style. Journal of Consulting and Clinical Psychology, 1979, 47(3), 485-492.

Shipley, R. H., Butt, J. H, Horwitz, B., & Farbry, J. E. Preparation for a stressful medical procedure: Effect of amount of stimulus pre-exposure and coping style. Journal of Consulting and Clinical Psychology, 1978, 46(3), 499-507.

Siegel, L. J. & Peterson, L. Stress reduction in young dental patients through coping skills and sensory information. Journal of Consulting Clinical Psychology, 1980, 48(6), 785-787.

Sime, A. M. Relationship of preoperative fear, type of coping and information received about surgery to recovery from surgery. Journal of Personality and Social Psychology, 1976, 34(4), 716-724.

Spanos, N. P., Horton, C., & Chaves, J. F. The effects of two cognitive strategies on pain threshold. Journal of Abnormal Psychology, 1975, 84, 677-681.

Spear, F. G. Pain in psychiatric patients. Journal of Psychosomatic Research, 1967, 11, 187-193.

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. The state-trait anxiety inventory. California: Consulting Psychologists Press, 1974.

Staub, E. & Kellett, D. S. Increasing pain tolerance by information about aversive stimuli. Journal of Personality and Social Psychology, 1972, 21, 198-203.

Sternbach, R. A. Pain: A psychophysiological analysis. New York: Academic Press, 1968.

Sternbach, R. Psychophysiology of pain. International Journal of Psychiatry in Medicine, 1975, 6(½), 63-73.

Sternbach, R. A. & Tursky, B. Ethnic differences among housewives in psychophysical and skin potential responses to electric shock. Psychophysiology, 1965, 1, 241-246.

Turk, D., Meichenbaum, D., & Berman, W. Application of biofeedback for the regulation of pain: A critical review. Psychological Bulletin, 1979, 86(6), 1322-1338.

Tursky, B. Physical, physiological, and psychological factors that affect pain reaction to electric shock. Psychophysiology, 1974, 11, 95-112.

Tursky, B. The pain perception profile: A psychophysical approach. In M. Weisenberg & B. Tursky (Eds.), Pain: New perspectives in therapy and research. New York: Plenum Press, 1976.

Tursky, B. The measurement of pain reactions: Laboratory studies. In M. Weisenberg (Ed.), The control of pain. New York: Psychological Dimensions, 1977.

Wagstaff, G. F. Behavioral correlates of repression-sensitization: A reconciliation of some conflicting findings. Indian Journal of Psychology, 1977, 52(3), 195-202.

Wakeman, J. R. & Kaplan, J. Z. An experimental study of hypnosis in painful burns. American Journal of Clinical Hypnosis, 1978, 21(1), 3-12.

Weinberger, D. A., Schwartz, G. E., & Davidson, R. J. Low-anxious, high-anxious, and repressive coping styles: Psychometric patterns and behavioral and physiological responses to stress. Journal of Abnormal Psychology, 1979, 88(4), 369-380

Weisenberg, M. Pain and pain control. Psychological Bulletin, 1977, 84, 1008-1044.

Weinstein, J., Averill, J. R., Opton, E., & Lazarus, R. S. Defensive style and discrepancy between self-report and physiological indices of stress. Journal of Personality and Social Psychology, 1968, 10, 405-413.

Wilson, F. Determinants of recovery from surgery: Preoperative instruction, relaxation training and defensive structure. Unpublished doctoral dissertation, University of Michigan, 1977.

Winsberg, B. & Greenlick, M. Pain response in Negro and white obstetrical patients. Journal of Health and Social Behavior, 1967, 8, 222.

Wise, T. N., Hall, W. A., & Wong, O. The relationship of cognitive styles and affective status to post-operative analgesic utilization. Journal of Psychosomatic Research, 1978, 22(6), 513-518.

Wolfer, J. A. & Visintainer, M. A. Pediatric surgical patients' and parents' stress responses and adjustment, as a function of psychologic preparation and stress-point nursing care. Nursing Research, 1975, 24(4), 244-255.

Wolpe, J. Psychotherapy by reciprocal inhibition. Stanford: Stanford University Press, 1958.

Wolpe, J. The practice of behavior therapy. New York: Pergamon Press, 1969.

Woodrow, K. M., Friedman, G. D., Siegelamb, A. B. & Collen, M. F. Pain tolerance: Differences according to age, sex, and race. Psychosomatic Medicine, 1972, 34, 548.

Worthington, E. L. & Shumate, M. Imagery and verbal counseling methods in stress inoculation training for pain control. Journal of Counseling Psychology, 1981, 28(1), 1-6.

Zborowski, M. Cultural components of pain. Journal of Social Issues, 1952, 8, 16.

APPENDIX A

ANALGESIC POTENCY CONVERSION TABLE

ANALGESIC POTENCY CONVERSION TABLE*

Narcotic Analgesic	Usual Therapeutic Dose (mg)	Potency (morphine = 1)
Morphine	10-15 (IM)	1
Codeine	30-60 (Oral)	0.16-0.33
Dilaudid	2 (IM)	5
Demerol	50-100 (IM)	0.1
	50-100 (Oral)	0.05-0.1
@Nubain	10 (IM)	1
@Stadol	2 (IM)	5
+Oxycodone (in Percodan)	10-20 (Oral)	0.48-0.99
Propoxyphene HCL (in Darvon & Wygesic)	30-60 (Oral)	0.16-0.33
+Propoxyphene Napsylate (in Darvocet)	50-100 (Oral)	0.104-0.214

*Taken from Gebhart, G. F. Narcotic and non-narcotic analgesics for pain relief, In Pain, A source book for nurses and other health professionals, Ada K. Jacox, Ed., Boston: Little, Brown and Company, 1977, unless otherwise designated.

@Equivalence as presented in The Physician's Desk Reference, Charles E. Baker, Jr., Publisher, Oradell, NJ: Litton Industries, Inc., 1980.

+Csaky, T. Z. Cuttings handbook of pharmacology: The actions and uses of drugs. New York: Appleton-Century-Crofts, 1978.

APPENDIX B

CONSENT FORM, INTERVIEW, SELF-REPORT PAIN AND ANXIETY MEASURES, AND TREATMENT MATERIALS

I, _____ understand that I am participating in a study that is authorized by Lewis-Gale Hospital, Salem, and my surgeon. This study is designed to evaluate the effect of specific treatment strategies on a patient's response to surgery. Information obtained from this study will be used to develop treatment programs that may help surgery patients recover in less time and with less discomfort. My participation in this study will require that I answer questions concerning my adjustment to the hospital and the surgical experience, the amount and type of pain I am undergoing, and the amount of anxiety I am experiencing. My medical records will also be examined after discharge, to obtain information about the number of pain medications I received during recovery. I understand that I may be asked to cooperate by practicing specific treatment strategies and by answering questions about the amount of anxiety and pain I am experiencing on two different occasions after surgery. No drugs or procedures will be administered and the information from the questionnaires and medical records will be kept strictly confidential. I understand that my participation in this study is purely voluntary and my decision to participate or not to participate will in no way affect the quality of the care I receive. I also understand that I can withdraw from the study at any time if I should decide that I do not wish to continue.

_____
Signature of Patient

_____
Interviewer

_____
Date

INTERVIEW

(Cohen and Lazarus, 1973)

1. Have you ever had an operation before? What kind? When?

2. What has your doctor told you about your medical problem that you're here in the hospital for now?

Has he told you anything else about it?

Has he told you anything about how the operation itself will be performed?

Have you tried to obtain information about your operation?

What do you expect this operation to accomplish for you, in your particular case? (In other words, how do you expect to benefit from having this operation?)

3. When your doctor first told you that you needed surgery, what was your first reaction?

4. When you think about having this operation, what thoughts or ideas do you have about it? How does it make you feel?

(How do you deal with your feelings about it?)

(Do you try not to think about it?)

5. (Asked very rarely) If this were a serious operation (if they deny that their operation is serious), how would you feel about coming into the hospital?

What do you think you would do to deal with those feelings?

6. I'd like you to tell me what you think will happen tomorrow, starting from the time you wake up in the morning until you're back in your room again after your operation, as far as the procedure and things like that. What procedures do you expect tonight?

Do you think you'll feel any discomfort while you're in the operating room?

How do you think you'll feel when you wake up after your operation?

7. How long do you expect to stay in the hospital for your surgery?

8. What have other people told you to expect about your operation?

Have you talked with others about it? Does their information agree with what your doctor told you?

9. Do you feel that you have as much information about your operation as you would like to have? (If not) What other kinds of information would you like to know?

10. When was the first time you saw Dr. _____? How did you feel about your visit with him?

Has he ever operated on you before or on anyone that you know?

11. What does your wife (husband) think about your having this operation?

12. How are you feeling now?

13. How worried or concerned about your operation are you? If I asked you to rate yourself on a 10 point scale, with 1 being not very worried or concerned at all and 10 being very worried or upset about your operation, where would you put yourself from 1 to 10?

McGill Pain Questionnaire

1. What does your pain feel like?

Some of the words I will read to you describe your pain at present. Tell me which words best describe it. Leave out any word-group that is not suitable. Use only a single word in each appropriate group - the one that best applies.

1	2	3	4
1 flickering	1 jumping	1 pricking	1 sharp
2 quivering	2 flashing	2 boring	2 cutting
3 pulsing	3 shooting	3 drilling	3 lacerating
4 throbbing		4 stabbing	
5 beating		5 lancinating	
6 pounding			

5	6	7	8
1 pinching	1 tugging	1 hot	1 tingling
2 pressing	2 pulling	2 burning	2 itchy
3 gnawing	3 wrenching	3 scalding	3 smarting
4 cramping		4 searing	4 stinging
5 crushing			

9	10	11	12
1 dull	1 tender	1 tiring	1 sickening
2 sore	2 taut	2 exhausting	2 suffocating
3 hurting	3 rasping		
4 aching	4 splitting		
5 heavy			

13	14	15	16
1 fearful	1 punishing	1 wretched	1 annoying
2 frightful	2 gruelling	2 blinding	2 troublesome
3 terrifying	3 cruel		3 miserable
	4 vicious		4 intense
	5 killing		5 unbearable

17	18	19	20
1 spreading	1 tight	1 cool	1 nagging
2 radiating	2 numb	2 cold	2 nauseating
3 penetrating	3 drawing	3 freezing	3 agonizing
4 piercing	4 squeezing		4 dreadful
	5 tearing		5 torturing

2. How strong is your pain?

People agree that the following 5 words represent pain of increasing intensity?

People agree that the following 5 words represent pain of increasing intensity?

1 mild 2 discomforting 3 distressing 4 horrible 5 excruciating

To answer each question, pick the number of the most appropriate word to describe your discomfort:

1. Which word describes your pain right now? (PPI) _____

2. Which word describes it at its worst? (WORST) _____

3. Which word describes it when it is least? _____

4. Which word describes the worst toothache you ever had? _____

5. Which word describes the worst headache you ever had? _____

6. Which word describes the worst stomach-ache you ever had? _____

SELF-EVALUATION QUESTIONNAIRE

Developed by C. D. Spielberger, R. L. Gorsuch and R. Lushene

STAI FORM X-1

NAME _____ DATE _____

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you *feel* right now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm	①	②	③	④
2. I feel secure	①	②	③	④
3. I am tense	①	②	③	④
4. I am regretful	①	②	③	④
5. I feel at ease	①	②	③	④
6. I feel upset	①	②	③	④
7. I am presently worrying over possible misfortunes	①	②	③	④
8. I feel rested	①	②	③	④
9. I feel anxious	①	②	③	④
10. I feel comfortable	①	②	③	④
11. I feel self-confident	①	②	③	④
12. I feel nervous	①	②	③	④
13. I am jittery	①	②	③	④
14. I feel "high strung"	①	②	③	④
15. I am relaxed	①	②	③	④
16. I feel content	①	②	③	④
17. I am worried	①	②	③	④
18. I feel over-excited and "rattled"	①	②	③	④
19. I feel joyful	①	②	③	④
20. I feel pleasant	①	②	③	④

RELAXATION STRATEGY

People often experience nervousness when they know they are about to undergo a painful experience. There are ways of dealing with this nervousness that you, yourself, can control. You can often control your own emotions or feelings if you know how to. One way of relieving nervousness and tension is through certain techniques aimed specifically at reducing muscle tension and obtaining a calm state of mind. The following is a technique that will help you do this:

1. First, sit quietly in a comfortable position, either propped up in bed or sitting in a chair.

2. Close your eyes.

3. Deeply relax all your muscles, beginning with your feet and progressing up to your face. Take your time at this, searching your body for any areas where the muscles are tense and let the tension go - let the muscles go limp. Keep them relaxed.

4. Breathe through your nose (if this is possible). Become aware of your breathing. As you breathe out, say the word, "ONE," silently to yourself. For example, breathe IN . . . OUT, "ONE"; IN . . . OUT, "ONE"; etc. Breathe easily and naturally.

5. Continue this for 10 to 20 minutes. You may open your eyes to check the time, but try to remain quiet when doing so. When you finish, sit quietly for several minutes, at first with your eyes closed and later with your eyes open. Do not stand up for a few minutes.

6. Do not worry about whether you are successful in achieving a deep level of relaxation. Try to keep your mind clear and permit relaxation to occur at its own pace. When distracting thoughts occur, try to ignore them and return to repeating "ONE." Practice this at least twice a day or when you are feeling tense.

This technique will help you to relax during the days after surgery when you may be feeling tense and experiencing pain. When we are anxious, we tend to notice pain and discomforts more readily. Also, when our muscles are tense, especially the muscles around the incision, it will increase our discomfort. Thus, by using this technique, it will be possible to obtain a sense of calm and to reduce muscle tension. This will help you through the recovery from surgery with less discomfort.

Preoperative Instructions

This narrative is to help you prepare for your surgery and give you some idea of what to expect.

It is important that your skin be clean and free of hair near the area of the incision. Tonight or tomorrow morning, a large area of your abdomen will be shaved. Your stomach should be empty during the operation. This means that you are not to drink or eat anything (not even gum, water, or mints) after midnight tonight. However, it is a good idea to drink fluids before midnight so you will not be thirsty.

If the anesthesiologist (explain who this is, i.e., the doctor that will put you to sleep in the operating room) has not already visited you, you can expect to see someone from the anesthesiology department this evening. Ask him any questions you may have about the anesthetic.

To make sure you get a full night's sleep you may be given a sleeping pill. If not, you probably will be given one early the next morning. Although it takes 15 to 30 minutes for the sleeping pill to take effect, you should not get out of bed after you have taken the sleeping pill.

Tomorrow morning when you wake up or are awakened, you may go to the bathroom and carry out your usual routine. That is, you should empty your bladder, wash up, or bathe, etc. When you brush your teeth, do not swallow any water. If the I.V. has been inserted the night before you will want to go through this routine the night before. If you wear dentures, leave them in. If you wear a partial plate, place it in a container in your room. Also remove jewelry, hair pins, and eye glasses or contact lenses. You will be provided with a hospital gown and scrub cap to wear to the operating room. Put them on at this time.

About an hour before your operation you will be given an injection or shots. These shots will make you feel sleepy and light headed, but you will be able to stay awake when you want to. Surprisingly you will feel relaxed, free of worry and not bothered by most things. Your sense of balance will be affected, and the side rails of your bed will be raised to protect you. If you feel that you need to get out of your bed for any reason, put on your call light and wait for the nurse to come to your room.

A stretcher about the height of a hospital bed will be used to transport you to the operating room. You will wait a few minutes in a waiting room outside the operating room before you are taken to the operating table. The anesthetist will follow the procedure he described during his visit.

The next thing you will be aware of is being in the recovery room. You will wake up and then drop back into sleep off and on. The staff will check your blood pressure, pulse, and incision frequently. Just

about everyone has an I.V. in their hand or arm veins at this point. If you need it, the nurse will give you medication at time intervals ordered by your doctor. (Hysterectomy patients usually receive injections every 4 hours for the first 24 hours.) If you have received a spinal anesthetic your legs will feel as though they have fallen asleep.

As the anesthetic wears off, you will become aware of your incision. The incision will be tender, sensitive, and you will feel pressure, pulling, and smarting or burning sensations. These painful sensations may become sharp and seem to travel along the incision. Whenever you turn, cough, get out of bed, or move in other ways, you will probably have an increase in sensations such as pressure, pulling, and smarting in your incision. Even though moving and coughing cause discomfort, you should move and cough because these activities help you get well. After you become quiet, the sensations will gradually become less severe. You may be unaware of sensations in your incision when you are lying quietly. The incision will be the most sensitive right after surgery and each day it will become less sensitive. (Vaginal hysterectomy - There will be no abdominal incision, but most people experience mild to moderate cramping.)

You will be returned by stretcher to your own room and bed after about an hour in the recovery room. Your family and friends may visit after you return to your room and get settled.

As mentioned, you will have a bottle of intravenous fluid running into one of your arm or hand veins. You may feel awkward and restricted because you are aware of the I.V. Surprisingly, most people do not experience discomfort or pain in their arms and can use the arm to some extent. The nurses will check the intravenous fluid running into one of your arm veins frequently and also they will continue to take your blood pressure periodically.

There are other discomforts that you may experience. In particular, your mouth may feel dry, like it has cotton in it. A small amount of effort will make you feel tired, and the first day or two after the operation, you may feel dizzy or light-headed when you get out of bed. You may also find that your vision is blurred, and it is hard for you to concentrate. Because the body is conserving its energy for healing, you will find it very difficult to feel any interest in anything other than getting well. You will be urged to take deep breaths and cough about every hour or so. The checking on your condition, deep breathing, coughing, and turning are repeated several times during the evening and night following the operation. These activities keep your lungs free of mucous.

Most patients are helped to get out of bed either the evening or the morning after the operation. Standing and walking soon after the surgery stimulates circulation and keeps muscles in the legs from becoming weak from not being used. You will need help to get up the first few times.

When you have something to eat and drink varies with the type of surgery you have. After you have started to drink fluids, you will be urged to gradually increase the amount you drink and move on to solid food. The first meal will be either the evening of the operation or the next day. When you are allowed to have fluids and food, you may find them less appealing than usual because at first they may not seem to have true flavor. This is due to the medications you have received. You should gradually increase the amount of liquid and food you take.

The first morning of the operation you will be bathed or assisted to wash yourself, have your bed linen changed, and helped out of bed. You will be helped to get out of bed four times the day after your operation.

Information Presented Postoperatively as Well as Preoperatively

After the first day, you will be expected to get up and walk several times a day and to gradually increase the time up and the distance walked. While up, you can go to the bathroom, thus reducing the necessity to use a bedpan or urinal. The intravenous is often removed sooner or left in longer, depending on the type of operation you had. About the second or third day after surgery, often people feel they are bloated--a feeling of pressure or cramps in their stomachs. This may cause discomfort and is commonly called "gas pains." By the time you have gas pains, your stomach will be much less tender and painful. The doctors will visit you every day. Some days he will change your bandage and look at your incision. You may have some if not all of the stitches removed before you leave the hospital. The doctor (or nurse) will use sterile instruments, including scissors, to cut the sutures. Some doctors use skin clips, which look something like staples. When the stitches (or skin clips) are removed, you will feel a pulling and pinching sensation as the doctor pulls on and holds the suture so he can cut it.

We have tried to describe the experience that patients usually have when they have an abdominal operation. You should not be surprised when you experience the discomforts that are unavoidable after an operation. Even though your own experiences may vary some from the typical ones described, your experience should be similar in many ways to that of most patients.

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THE EFFECT OF RELAXATION AND PREPARATORY INFORMATION ON POSTOPERATIVE PAIN IN SENSITIZERS AND AVOIDERS

by

Linda Elizabeth Scott

(ABSTRACT)

The effectiveness of preoperative relaxation training and preparatory information, separately and in combination, on postoperative pain was examined with respect to surgical patients' coping style (avoidance-sensitization). Subjects were 64 patients undergoing elective cholecystectomy or hysterectomy (abdominal or vaginal) in a large private hospital. Experimenters were advanced clinical psychology graduate students and trained undergraduate research assistants.

On the afternoon prior to surgery, patients were contacted, completed an interview that was used to assess their coping style in the surgical situation (Cohen & Lazarus, 1973), and completed the state anxiety portion of the State-Trait Anxiety Inventory. Patients also completed the Pain Rating Index and the Present Pain Index of the McGill Pain Questionnaire. At this point in the preoperative session, patients were presented with materials and/or information corresponding to the group to which they were assigned. Treatments consisted of training in the Benson relaxation technique, receiving information about procedures and specific sensations they would experience, or a combination of relaxation training and information-imparting. Controls talked briefly with the experimenter of

feelings about surgery and experiences in the hospital. Patients in all groups were revisited on the second (counting the day after surgery as the first postoperative day) and fourth postoperative days, and again completed the pain measures and the state anxiety measure. Patients were also encouraged to practice the relaxation technique, instructed concerning procedures and sensations they had yet to experience, both, or neither, depending on the group to which they were assigned. After each patient was discharged, his/her medical records were examined and the number and type of analgesics administered during the postoperative period, from the day of surgery until discharge, was tabulated.

Preoperative interviews were rated according to coping style and patients were divided into two groups, sensitizers and avoiders. Data were analyzed in a 2 x 4 analysis of covariance. Results indicated that there were no main effects for treatment. It is possible that the treatments provided in this study were too brief to provide an adequate test of their effectiveness for patients in general. There were no significant main effects for coping style, although sensitizers generally reported more pain and received more analgesics than avoiders. An avoidant method of coping appeared to be an adequate method of adjustment to elective surgery and did not result in poorer recovery, as previous authors have suggested.

Significant effects on postoperative pain were primarily a function of the interaction between treatment and coping style. Sensitizers reported less pain with relaxation training alone than sensitizers in any of the other groups. This effect was apparently owing to the anxiety-

reducing nature of the technique and the fact that it encourages redirection of attention, away from discomforts. Avoiders reported low levels of pain and anxiety with no treatment. However, of the treatments provided, relaxation plus information did reduce some indices of pain below that of avoider controls.

Finally, information-imparting did not appear to be beneficial for either sensitizers or avoiders. It was suggested that specific information may contribute to further sensitization to discomforts for sensitizers and conflict with avoidant processes of coping in avoiders. It was also suggested that more extensive preoperative preparation of sensitizers may be necessary to promote habituation to the discomforts of surgery.