SELF-CONTROL OF POSTOPERATIVE PAIN:

EFFECTS OF HYPNOSIS AND WAKING SUGGESTION

by

© Paul Taenzer

A thesis submitted to the Faculty of
Graduate Studies and Research in
partial fulfillment of the requirements
for the degree of Doctor of Philosophy.

Department of Psychology
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Ph.D. Psychology

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Abstract

The present study evaluates the efficacy of self-hypnosis and its components--relaxation instructions and waking analgesia suggestions--for pain reduction in patients recovering from gallbladder surgery. Forty elective surgery patients were randomly assigned to one of the three experimental pain control procedures or to a standard treatment control group--preoperative teaching. The treatments were found to be equally credible and generated equivalent expectancies for success. Pain was assessed using multiple subjective and objective measures sampled across the postoperative period. Multivariate analysis of these data indicated that the experimental treatments were no more effective in diminishing postoperative pain than the control procedure. However, the analysis revealed several significant correlates and predictors of postoperative pain. These included trait anxiety, depression, stress coping style as well as interview and rating scale reports of cognitive coping strategies. Significant predictors of credibility-expectancy, treatment utilization and cognitive coping classifications were also found. Analysis of the pain measurement strategy indicated consistency among the subjective measures--the McGill Pain Questionnaire and visual analogue scales--which were relatively independent from the objective measures, which comprised electronically monitored gross motor activity and analgesic medication requirements. Possible interpretations and implications of these results as well as suggestions for future research are discussed.

Auto-contrôle de la douleur postopératoire:
Effets de l'hypnose et suggestions
d'analgésie au réveil

RESUME

La présente étude évalue l'efficacité de l'auto-hypnose et de ses composantes - consignes de relaxation et suggestions d'analgésie au réveil - à réduire la douleur chez des patients se rétablissant d'une intervention chirurgicale de la vésicule biliaire. Quarante patients devant subir cette intervention furent assignés au hasard à l'une des trois procédures thérapeutiques expérimentales pour contrôler la douleur ou à un groupe témoin dans lequel une procédure-type de séance préopératoire d'information était pratiquée. La confiance inspirée (crédibilité) par les diverses procédures se révéla égale et les attentes quant à leur succès, équivalentes. La douleur fut évaluée grâce à plusieurs mesures subjectives et objectives échantillonnées sur la période postopératoire. Une analyse vectorielle de ces données révéla que les procédures thérapeutiques expérimentales n'étaient pas plus efficaces à diminuer la douleur postoperatoire que la procédure contrôle. Toutefois, l'analyse révéla divers indices significatifs de corrélation et de prédiction de la douleur postopératoire. Ceux-ci comprennent l'anxiété (trait), la dépression, la façon-type de faire face au stress de même que les stratégies cognitives d'adaption telles que révelées en entrevue et à l'aide d'échelle d'évaluation. Des indices significatifs de prédiction furent également identifiés en ce qui concerne la crédibilité - attente quant au succès, l'utilisation comme telle de la procédure et les classements quant à l'adaptation cognitive. Une analyse des méthodes

pour évaluer la douleur indiqua une cohérence dans les mesures subjectives du Questionnaire McGill sur la douleur et celles des échelles d'analogie visuelle; ces mesures étaient relativement indépendantes des données objectives de concernant l'activité motrice grossière laquelle était évaluée electroniquement et les besoins de médication analgésique. Les interprétations et implications possibles de ces résultats de même que des suggestions pour des recherches futures sont discutées.

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GLOSSARY OF ABBREVIATIONS AND CONDENSATIONS USED IN FIGURES & TABLES

Psychological Test Battery:

STAIS	State-Trait Anxiety Inventory, State form
BDI(SF)	Beck Depression Inventory (Short Form)
Physical Status	Wolfer-Davis Recovery Index

Pain Measures:

(From the McGill Pain Questionnaire)

PPI	Present Pain Intensity
PRIS	Pain Rating Index: Sensory Score
PRIA	Pain Rating Index: Affective Score
PRIE	Pain Rating Index: Evaluative Score
PRIM	Pain Rating Index: Miscellaneous Score
PRIT	Pain Rating Index: Total Score
VASP	Visual Analogue Scale for Pain
VASD	Visual Analogue Scale for Distress

Gallbladder Pain History Interview Measures:

Medication	Analgesics used to control GB attacks.
Life Changed	Patient reports that life has changed as a result of GB attacks.
Someone Helps	Patient receives assistance during attacks.
Chronic Pain	Patient suffers from a chronic pain problem in addition to GB attacks.
Report from Others	Patient's recollection of information received from previous GB surgery patients.

Other Questionnaires and Interviews:

Credibility-Expectancy-1 -2 Credibility-3	Results of Credibility-Expectancy Questionnaires; 1: post-treatment 2: preoperative; 3: postoperative
Medication Bias	Bias towards using medication to control pain of any sort
Practice	Number of times experimental techniques practiced between training and admission to hospital
Tension Change	Reported change in tension level resulting from practice of self-hypnosis and self-relaxation
Technique Usage	Number of times experimental strategies were actually used postoperatively
Cognitive Coping Strategies	Results of postoperative cognitive coping strategies interview

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INTRODUCTION

There has recently been a phenomenal growth in interest in pain problems in both scientific and professional circles. The gate control theory of pain proposed by Melzack and Wall (1965; Melzack, 1973) has provided a conceptual model of pain mechanisms which integrates knowledge at many levels of scientific inquiry. The gate theory contends that pain perception is mediated by interacting processes at multiple sites in the central nervous system. This concept of interaction between diverse modulating influences has provided a paradigm for multidisciplinary pain clinics which assess and treat pain problems from a broad physio-psycho-social perspective.

Psychological factors, which had been ignored by 'specificity' theories of pain, are now seen as a major influence in clinical pain phenomena, and older dichotomous notions of organic versus psychogenic pain (Walters, 1961) are being replaced by models emphasizing multiple continuous dimensions (Chapman, 1977, Duncan, Gregg and Ghia, 1978; Sanders, 1979). A rapidly growing scientific literature based on laboratory and clinical research is clarifying many important issues related to the psychology of pain.

Overview of the Present Experiment

Studies which have explored the effectiveness of hypnotic analgesia using laboratory pain stimuli have produced conflicting results. The laboratory setting provides an opportunity for environmental control which is unattainable in the clinic, but the relevance of the results to clinical pain problems has been repeatedly questioned (Beecher, 1959; Hilgard, 1969). Among clinical pain phenomena, postoperative pain provides many of

the advantages of the laboratory setting particularly since the incision and other medical features are relatively similar from one patient to another; but at the same time, it is accompanied by the subjective meaning and personal involvement that is characteristic of clinical pain in general. The present experiment represents an attempt to systematically investigate the effectiveness of the therapeutic elements of hypnotic analgesia in controlling postoperative pain. Furthermore, clinical pain perception is known to be modulated by a multitude of individual difference factors, and where feasible, these were measured and utilized in the data analysis as covariates.

Hypnotic analgesia has been investigated in the laboratory by researchers whose interest lies primarily in theoretical notions regarding the existence, uniqueness and utility of the hypnosis in producing suggested alterations in experience, perception and behaviour. With the emergence of cognitive-behavioural interventions for pain-control, which share many similarites with hypnotic pain control procedures, the question of the usefulness of the hypnotic induction becomes a significant clinical issue as well. If, for example, the hypnotic induction does not enhance cognitive pain control in a clinical setting, clinical research and development in this area can focus on the essential elements of the cognitive strategies and individual differences that are directly related to analgesia effects. As yet, no studies comparing a cognitive analgesia strategy condition with a hypnotic strategy condition in a clinical setting have been reported.

Further goals of the present study were to evaluate recent advances in pain measurement technique in the postoperative setting, to investigate demographic, personal history, personality and situational influences on postoperative pain, and finally to relate therapeutic outcome to several

relevant therapy process measures. The literature on issues relevant to the design of the present experiment is examined in the following section.

Hypnotic Control of Pain

Since the early nineteenth century, numerous reports have extolled the utility of hypnotic procedures in controlling clinical pain. Most dramatic are the reports of hypnoanesthesia for major surgery (Esdaile, 1957; Meares, 1960; Chartok, Michaux and Droin, 1977; Rausch, 1980). Others have reported successful treatment of a variety of major clinical pain states: phantom limb pain (Siegel, 1979; Cedercreutz and Uusitalo, 1967; cancer pain (Erickson, 1959); labour pain (August, 1961); burn injury (Crasilneck, Stirman, Wilson, McCranie and Fogleman, 1955; Dahinterova, 1967; Schafer, 1975; Wakeman and Kaplan, 1978; Ewin, 1979); migraine headache (Harding, 1967); and chronic low back pain (Sachs, Feuerstein and Vitale, 1977; Crasilneck, 1979). While these reports are impressive, there is a dearth of controlled clinical trials comparing hypnotic procedures to either conventional medical regimens or credible alternative psychological approaches. In many instances, the patient's case history of successive failures by conventional medical interventions is presented as a "baseline" to which the results of hypnosis can be compared (Harding, 1967; Sachs et al., 1977). However, several controlled studies have been reported in which hypnotic analgesia has been compared to appropriate alternative treatments. These studies indicate that hypnotic treatment is an effective therapy for migraine headaches (Anderson, Basker and Dalton, 1975) labor pain (Davidson, 1962) and, when combined with biofeedback, several common forms of chronic intractable pain (Melzack and Perry, 1975). Furthermore, in numerous studies using laboratory pain stimuli, hypnotic analgesia procedures have been demonstrated to be superior to uninstructed control

conditions (see review by Barber and Hahn, 1962), placebo medication (McGlashan, Evans and Orne, 1969), and relaxation procedures (Sachs, 1970; McAmmond, Davidson and Kovitz, 1971).

Laboratory Studies of the Effectiveness of the Components of Hypnotic Analgesia Instructions

While these results are interpreted as experimental validation of 'hypnotic' analgesia, Barber and Hahn (1962) note that the unique contribution of the 'hypnotic' state cannot be inferred. It is possible that hypnotic analgesia procedures invoke a cognitive capacity to alter sensory perception which is independent of the induction of hypnosis. A series of controlled laboratory studies have been undertaken to explore this issue. The paradigm followed in these studies involves comparing an hypnotic analgesia (HA) group with a waking analgesia (WA) group which receives analgesia suggestions without prior hypnotic induction. Additional control groups receive the induction only or no intervention. In this research, hypnotic analgesia procedures are construed as a two stage process. The induction phase involves relaxation instructions as well as instructions to enter the 'hypnotized state'. A second 'analgesia suggestions' phase instructs the subject in a series of imaginings which are consistent with insensitivity to pain.

Studies employing independent groups designs have consistantly found that HA produced effects on pain experience equivalent to but not greater than those achieved by a group that received WA (Barber and Hahn, 1962; Barber and Calverley, 1969; Evans & Paul, 1970; Spanos, Barber and Lang, 1974; Spanos, Radtke-Bodorik, Ferguson and Jones, 1979) In contrast, studies using crossover experimental designs have found HA to be significantly more effective than WA (Stacher, Schuster, Bauer, Lahoda and Schulze, 1975; Hilgard, McDonald, Morgan and Johnson, 1978; Spanos and

Hewitt, 1980). The theoretical and methodological questions raised by these discrepant results are among the most crucial issues currently being explored in hypnosis research (Fromm and Shor, 1979).

Experimental Designs, Susceptibility, Expectency Effects and Demand Characteristics in Hypnotic versus 'Waking' Analgesia Research

Hilgard (1979) has based his argument for the use of crossover experimental designs on the increased statistical sensitivity of repeated measures analysis. He has noted that pain reductions with hypnotic and waking analgesia techniques are positively correlated with hypnotic susceptibility level in both experimental (Evans and Paul, 1970; Hilgard, Ruch, Lang, Morgan and Sachs, 1974; Spanos et al., 1979) and clinical (Gottfredson, 1973; Andreychuk and Skriver, 1975; Cedercreutz, Lahteenmaki and Tulikoura, 1976) samples. Averaged across the studies, the correlation is about 0.50. While the greatest pain reductions would be expected from highly susceptibile subjects, there is still considerable variation in their performance as well. Furthermore, Hilgard proposes on the basis of the availible data, that the additional increment in pain reduction of HA compared to WA is relatively small compared to the variation from subject to subject in pain reduction with either strategy. The enhanced effectiveness of HA over WA is therefore only likely to emerge in experiments where the effects of intersubject variance is minimized. Based on this logic, crossover designs using highly susceptible subjects would be the preferred experimental approach.

Another possible explanation for the discrepancy between studies using independent groups and crossover designs is the expectancy effects inherent in repeated measures experiments. That is, experiences in one experimental condition may affect performance in subsequent conditions. In hypnotic analgesia studies using crossover designs, it is possible that subjects who

are aware that they will be tested in both HA and WA conditions may inadvertantly withold maximal performance in the WA condition. Stam and Spanos (1980) have reported a study which tests this hypothesis using highly susceptible subjects. Their results clearly illustrate the role of subject expectancies in hypnotic analgesia research and suggest the need for caution in interpreting the results of experiments using crossover designs.

A further methodological problem with several of these studies (Barber and Hahn, 1962; Evans and Paul, 1970; Spanos et al., 1974) is related to the demand characteristics (Orne, 1962) of the instructions received by WA subjects. For example, Barber and Hahn (1962) intentionally confounded WA with task motivating (TM) instructions (e.g., "If you do not try to the best of your ability to carry out the instructions you will fail the test and ruin this part of the experiment", p. 412). The rationale for these instructions stems from Barber's social learning theory of hypnotic responsivity (Barber, 1969) which contends that one of the functional elements of the hypnotic situation is the subject's willingness to please the hypnotist. TM instructions have been used to generate an equivilant motivation to respond in unhypnotized (WA) subjects. Bowers (1967), however, has demonstrated that TM instructions can lead to falsification of subjects' reports. Furthermore, it has been demonstrated that demands for increased performance can themselves produce increases in pain tolerence (Wolff and Horland, 1967; Blitz and Dinnerstein, 1968; Strassberg and Klinger, 1972; Chaves and Scott, 1979; Scott, 1980). Thus, it is difficult to attribute the pain reports of Barber and Hahn's WA subjects to the analgesia suggestions. Spanos et al. (1979), however, using no TM intructions for WA subjects, failed to find an enhanced effect for HA in highly susceptible subjects.

Role of the Hypnotic Induction in Suggestion Produced Analgesia

The results of studies that compare hypnotic analgesia with waking analgesia raise serious questions regarding the role of hypnotic induction procedures in experimental settings. The data based on independent groups designs are consistent with Barber's theoretical position that the essential elements of the hypnotic induction can be defined in terms of social psychological principles and can be presented succinctly in Task Motivating (TM) instructions (Barber, 1969). He maintains that the essential elements of the hypnotic setting and induction procedures are effective in increasing responsiveness to test suggestions by stimulating positive attitudes, motivations and expectancies and thereby enhancing the subjects willingness to think along with and vividly imagine the phenomena suggested by the hypnotist (Barber and DeMoor, 1972).

The finding that an analgesia effect is sometimes associated with the induction presented alone (Barber and Calverley, 1969; Stacher et al, 1975) is also consistent with other theorists' notions of the role of the induction (Hilgard and Hilgard, 1975; Orne, 1980). For them, the induction is viewed as altering attentional focus and producing mental relaxation, and hence reducing anxiety as well as implicitly demanding increased pain tolerance. Insusceptible subjects would then be expected to demonstrate a typically small decrement in pain perception as a result of the induction alone (McGlasan et al., 1969; Hilgard and Hilgard, 1975; Hilgard, 1979). Highly susceptible subjects, on the other hand, would be expected to achieve additional pain relief as a result of the perceptual alterations associated with becoming involved with analgesia suggestions. Indeed, Spanos and Barber (1974) have noted that, while individual theorists disagree as to whether there is a uniquely definable hypnotic state, there is substantial agreement that responsive subjects are those who suspend

critical judgement and become imaginally involved in experiencing the suggested phenomena.

It is not surprising to find that in the laboratory setting, the anxiety-reducing and attention-focusing qualities of the induction would be of little benefit to motivated subjects. Indeed, in the laboratory, pain reports are typically not correlated with anxiety (Shor, 1962; Greene and Reyer, 1972; Chapman and Feather, 1973; Browne, Fader and Barber, 1973). On the other hand, in clinical settings where pain is being experienced or is expected, heightened anxiety is typically found (Spielberger, Aurerbach, Wadsworth, Dunn and Taulbee, 1973; Johnson, 1980). Further, pain relief is associated with diminished anxiety (Sternbach, 1968). It is perhaps in the clinical context that the induction would be most potent in enhancing responsiveness to suggestion-produced analgesia. The primary purpose of the present study is to empirically test this notion.

Cognitive Strategies and Pain Control

While the studies reviewed above cast doubt on the role of hypnotic induction procedures in diminishing pain, the existence of suggestion-produced analgesia has been well supported. The use of verbal instructions to decrease pain perception is, however, not unique to hypnosis. The commonalities between various behavioural and cognitive-behavioural interventions and hypnosis have been repeatedly cited (Weitzenhoffer, 1972; Spanos et al., 1973; Kroger, 1976; Spanos and Barber, 1976).

The extensive literature on laboratory and clinical investigations of cognitive-behavioural approaches to pain management has recently been reviewed by Turner and Chapman (1982 a, b) and Tan (1982). No one single approach (e.g., provision of preparatory information, relaxation instructions, and cognitive strategies such as diversion of attentional

focus, reinterpretation of the meaning of the pain or the pain-producing situation, and coping self-instructions) has been found to be universally effective when the results of all relevant studies are considered. The lack of a universally effective cognitive-behavioural intervention must, however, be viewed in the context of pain management techniques in general, which--including morphine--are also not effective in all cases (Beecher, 1959). Overall, cognitive-behavioural approaches which convey multiple intervention strategies, such as the stress inoculation training package of Meichenbaum and Turk (1976) appear to be the most promising. An advantage of the multiple strategies programs is that they acknowledge and reinforce the patient's own self-generated coping strategies as well as provide an opportunity to learn alternative techniques (Meichenbaum, 1977). While positive reports of therapy outcome studies using multiple cognitive-behavioural strategies have appeared in recent years (e.g.Mitchell and White, 1977, Stenn, Mothersill and Brooke, 1979; Brooks and Richardson, 1980; Hartman and Ainsworth, 1980; Wernick, Jaremko and Taylor, 1981), methodological issues such as appropriate control or comparison treatment groups, random assignment, adequate pain assessment, and evaluation of maintenance of pain reduction at follow-up have frequently been overlooked. Factors which may in part account for the discrepancies between studies have been illustrated by Meichenbaum and Turk (1976). Studies employing cognitive approaches to the control of postoperative pain are most relevent to the present study and will be now reviewed in more detail.

The provision of procedural and sensory information has been extensively studied (Reading, 1979). While many studies have investigated the effects of information in a clinical setting, many did not explicitly measure pain intensity or medication requirements. Only studies using one

or both of these will be reviewed. Several studies have found that information can lead to decreased medication requirements postoperatively (Andrews, 1970; De Long, 1971; Johnson, Fuller, Rice and Enress, 1978) and during a stressful medical procedure (Johnson and Leventhal, 1974). However, the effect of preparation may depend on the initial anxiety level of the patient (Johnson et al., 1978), the patient's stress coping style (Andrews, 1970; De Long, 1971) and the type of operative procedure performed (Johnson et al., 1978). Negative results have also been reported (Langer, Janis and Wolfer, 1975). In addition, in studies which measured subjective pain, positive results have not been found in two post-surgical samples (Johnson et al., 1978) and during cardiac catheterization (Kendall, Williams, Pechacek, Graham, Shisslak and Herzoff, 1979). Kendall et al. did find, however, that information reduced anxiety levels. Johnson et al. (1978) reported two experiments where the effects of procedural and sensory information as well as coping instructions were independently assessed. In their cholecystectomy sample, highly anxious instructed patients received less medications, but their subjective pain reports were not significantly less than those reported by uninstructed controls. No effects were found for low-anxious patients. For herniorrhaphy patients, instructions resulted in significantly higher pain distress scores.

As a whole, these studies do not provide support for the effects of preparatory information on clinical pain experience. These results do suggest, however, that medication requirements may be reduced for some patients depending on their stress-coping style and the type of medical procedure experienced.

The cognitive-behavioral interventions most frequently studied in the postoperative setting involve a combination of preparatory information and specific behavioural coping strategies such as coughing, breathing and leg

exercises, instructions in changing positions and brief relaxation instructions. Overall, these studies have reported significant improvements in analgesic requirements, diminished postoperative mood disturbances and earlier discharge from hospital (Roe, 1963; Egbert, Battit, Welch and Bartlet, 1964; Schmitt and Wooldridge, 1973; Johnson et al., 1978; Fortin and Kirouac, 1976). Subjective reports of pain, however, were not significantly altered by the interventions (Egbert et al., 1964; Johnson et al., 1978). Caution must also be exercised in interpreting the results for medication requirements as the coughing exercises included in the coping strategies instructions for these studies can independently reduce analgesic requirements (Reading, 1979).

Langer et al., (1975) studied the effects of a multiple cognitive coping strategies program consisting of reappraisal of anxiety provoking events, calming self-talk and attention diversion, in a mixed surgery population. Patients receiving cognitive coping instructions requested fewer analgesics and sedatives postoperatively, although subjective pain was not measured. Johnson et al. (1978) have cautioned that the results of the Langer et al. study may have limited generalizability due to the large number of patients that received relatively minor surgical procedures.

Taken together, the results of the studies which investigated multifacited preparation for surgery indicate consistent results regarding decreased medication requirements. However, since most studies have not measured subjective pain, no conclusions regarding pain can be made. The positive results for medication requirements reported by Langer et al. (1975) suggest that future investigation of a cognitive-coping approach with surgery populations are warranted.

A variety of relaxation training procedures have also been evaluated as a coping strategy to reduce postoperative pain and medication

requirements. Most studies have reported decreased pain (Flaherty and Fitzgibbon, 1978; Wilson, 1981) and analgesic requirements (Flaherty and Fitzgibbon, 1978; Voshall, 1980; Wilson, 1981). However, discrepant results have also been reported. The time course of diminished analgesic requirements has not been consistant (cf., Flaherty and Fitzgibbon, 1978; Voshell, 1980) and a study which used extensive training procedures initiated prior to hospital admission reported negative results for both subjective pain reports and analgesic requirements (Perri and Perri, 1979).

Since these studies used different patient populations, relaxation strategies, experimental procedures and postoperative measures, a thorough analysis of the inconsistencies in their results is not possible. While these results indicate that relaxation techniques can significantly reduce postoperative pain in some patients, more systematic research will be required before it will be possible to determine which relaxation techniques are effective for a specific surgical procedure. In addition, an examination of the procedures used in these studies indicates that the timing of the training may also be an important factor.

In summary, the results of studies using psychological interventions to prepare patients for surgery provide a preliminary indication of the utility of these approaches, particularly regarding diminished postoperative analgesic requirements. However, the results for postoperative pain are less encouraging although positive reports have appeared. Further reasearch with more refined experimental methodology will be necessary before the value of these training programs with specific populations can be established (Tan, 1982).

Factors that Influence Pain Perception

It is widely acknowledged that personality and situational factors

greatly influence pain perception (Melzack, 1973; Sternbach, 1974, 1980; Weisenberg, 1977). One major consideration in the design of the present study was to explore the relationship between postoperative pain and a broad spectrum of individual difference factors which had been previously demonstrated to affect pain perception. In addition, a number of factors were assessed which previous research studies had indicated would be significant determinants of how the patients would apply the treatment strategies to control their discomfort. This allowed an extensive examination of demographic, personality, and personal history factors related to postoperative pain and treatment utilization. The literature relevent to this aspect of the study will be reviewed in this section. The review will be focused on studies examining laboratory or postoperative pain.

Demographic and Personal History Factors

Age

The results of studies that examined the effects of age on threshold and tolerence for laboratory pain stimuli are contradictory. Reviews of this area (Woodrow, Friedman, Siegelaub and Collen, 1972; Weisenberg, 1977) have suggested that this is most likely due to the different pain stimuli which were used. For example, for cutaneous pain, threshold and tolerence appears to increase with age; but for deep pressure pain, they appear to decrease. For clinical pain, no relationship has been found between age and self-reports of postoperative pain (Parbrook, Steel and Dalyrmple, 1973). However, for pain measured during labour, Melzack, Taenzer, Feldman and Kinch (1981) found that, for primiparous women, pain decreased with age.

For postoperative analgesic requirements, either decreases (Parkhouse, Lambrechts and Simpson, 1971; Johnson et al., 1978)or no differences

(Keats, Beecher and Mosteller, 1950; Parbrook et al., 1973) have been found in relation to the age of the patient. The decreasing requirement for analgesics with age must be treated with caution as it may reflect staff reluctance to administer narcotics to older patients (Pilowsky and Bond, 1969; Cohen, 1980).

Sex

Weisenberg (1977) reviewed the available literature on sex effects on threshold and tolerance for experimentally induced pain. While the results are by no means consistent, there is a trend for females to report lower thresholds and tolerances than males.

Loan and Morrison (1967) reviewed the literature on sex differences in postoperative analgesic requirements. Two studies found no differences while one found that females had longer relief from a single dose of an analgesic. A more recent study of patients recovering from gallbladder surgery also found no sex differences (Wise, Hall and Wong, 1978). Pilowsky and Bond (1969) reported that ward staff are more likely to offer analgesics to female patients. Wolfer and Davis (1970) also reported that female patients received more medications, but found no differences for postoperative pain. The generalizability of the results of the Wolfer and Davis study may be limited due to the differences in operative procedures received by the female and male samples.

Overall, while the reports for sex effects on pain parameters are inconsistent, there appears to be a trend for female subjects to show lower thresholds and tolerances for experimental pain, and higher analgesic requirements in the surgical setting. The only study which addressed the issue of postoperative self-report of pain (Wolfer and Davis, 1970) had a serious methodological flaw. Therefore, this issue must await further

data.

Social Class

Higher socio-economic status and educational level have been reported to be associated with lower pain levels for labour pain (see Melzack et al., 1981 for a review) and higher thresholds for laboratory pain (Schuderman and Zubek, 1962). For postoperative pain, Parbrook and Dalrymple (1973) reported that lower social class was associated with higher subjective pain. However, the authors note that social class and neuroticism scores were highly confounded, and suggest that neuroticism may be the more important factor. No partial correlations were reported, so this conjecture must await further results before a firm conclusion may be made.

Previous Pain Experience

Rising tolerances for experimental pain are frequently seen in pre-test post-test designs (see, for example, Scott and Leonard, 1978; Worthington, 1978; Avia and Kanfer, 1980) suggesting that previous experience with a pain source enhances tolerance. For clinical pain, multiparous women report less labour pain than primiparous women (Melzack et al., 1981). Two studies with patients prepared for endoscopy examination by pre-exposure to a videotape of a patient receiving the procedure have indicated that repeated exposure decreased anxiety levels (Shipley, Butt, Horowitz and Farbry, 1978; Shipley, Butt and Horowitz, 1979). For patients with previous experience with endoscopy, only those with a sensitizing coping style benefited from exposure to the videotape. Unfortunately, the relationship between the number of previous examinations and the dependent measures was not reported. No studies were found which reported a relationship between the number of previous operations and postoperative pain. Graham and Conley (1971), however, found no

relationship between the number of previous operations and preoperative fear in their major surgery sample. Thus, while previous pain experience has been suggested to be an important determinant of current experience (Melzack, 1973), this relationship has received little attention in the literature on acute pain.

Emotion and Pain

The role of emotion as a mediator of pain perception and as a response to noxious stimulation has been recognized by pain theorists (see Melzack, 1973, for an historical account) and has received considerable attention by laboratory and clinical investigators.

Neuroticism, Anxiety and Fear

Sternbach (1968, 1974) has assigned a critical role to anxiety in his analysis of acute pain states associated with aversive stimuli. Anxiety is seen as a powerful modulator of pain perception and behaviour and, in turn, can be stimulated by pain experience. Several interrelated concepts are relevant to the assessment of anxiety in experimental and clinical settings.

Neuroticism refers to a dispositional or personality construct of emotional stability and proneness to anxiety. The term 'anxiety' is used to refer to phenomenological, behavioural and physiological responses associated with a dysphoric mental state for which the eliciting stimulus may be vague or unknown. While the concept of anxiety lacks a precise theoretical conceptualization, the distinction between characteristic (or "trait") anxiety and situational (or "state") anxiety is generally accepted (McReynolds, 1968). Trait anxiety refers to an individual's typical, or characteristic, responses across a wide variety of situations and over time; and hence, most closely parallels the concept of neuroticism. State anxiety refers to the individual's current, transient, emotional status.

The concept of fear seems closely related to situational anxiety where the threatening object or situation is known to the individual. A wide variety of tests have been used to psychometrically assess neuroticism, anxiety and fear. The degree of correlation between them is a function of the commonality of their conceptual basis and the characteristics of the testing situation.

The relationship between threshold and tolerance for laboratory pain and neuroticism, trait and state anxiety has been widely investigated. The results, however, have not been consistent: some studies report a decrease in threshold or tolerence associated with higher anxiety (Lynn and Eysenck, 1961; Nicols and Tursky, 1967; Shiomi, 1977; Dougher, 1979) and others report no effect (Levine, Tursky and Nichols, 1966; Davidson and McDougall, 1969; Mumford, Newton and Ley, 1973; Brown, 1973; Malow, 1981). Studies using signal detection methodology have been mixed regarding the effects of anxiety on sensitivity but consistent in findings indicating that anxiety increases response bias to report the stimuli as painful (Dougher, 1979; Malow, 1981). As noted previously, methodologies have varied considerably across studies with no two studies exactly replicating pain stimuli, instructions and measures of pain or anxiety. In addition, Malow (1981) noted that verbal report of anxiety may not be consistently associated with physiological arousal. In his study the most consistent results were found for subjects exhibiting both verbal and physiological indicators of heightened anxiety in the experimentral setting.

Studies assessing fear and anxiety in surgical pain have led to somewhat more consistent results. Six studies have found a positive relationship between preoperative assessment of trait or state anxiety and fear and postoperative pain (Johnson, Dabbs and Leventhal, 1970; Parbrook, et al., 1973; Martinez-Urrutia, 1975; Chapman and Cox, 1977; Johnson et

al., 1978; Ray and Fitzgibbon, 1981). Two studies have failed to find this relationship (Breugel, 1971; Wise et al., 1978). However, as with the laboratory studies, even those studies reporting positive results have shown inconsistencies across measures and across time (Johnson et al., 1970; Martinez-Urrutia, 1975; Chapman and Cox, 1977).

Considering the diversity of the patient populations, and the measures of anxiety and pain used in these studies, the lack of consistency in results is to be expected. However, while each study has used at least one standardized anxiety measure with documented construct and concurrent validity, pain measurement scales have been used without apparent regard for the validity and psychometric properties of the scale or consideration for the natural course of postoperative pain.

The relationship among neuroticism, anxiety and postoperative analgesia requirements has also been investigated. Three studies have found that higher levels of neuroticism (Parbrook et al., 1973), preoperative anxiety and psychiatric disturbance (Wise et al., 1978), and preoperative fear (Sime, 1976), are associated with higher analgesic requirements. Only one study (Johnson et al., 1970) did not find this effect.

The relationship between preoperative mood and postoperative emotional adjustment has been extensively studied following Janis' (1958) "work of worry" hypothesis which suggested a curvilinear relationship between preoperative fear and postoperative emotionality. Subsequent work has failed to confirm Janis' findings (Johnson et al., 1970; Wolfen and Davis, 1970; Spielberger et al., 1973; Chapman and Cox, 1977; Johnson et al., 1978). These studies have found a linear relationship between pre- and postoperative mood. Ray and Fitzgibbon (1981) have suggested that the failure to confirm Janis' findings may be due to poor assessment of

adaptive coping (the "work of worry") by traditional anxiety scales. They propose that the scale developed by Mackay, Cox, Borrows and Lazzerini (1978), which has independent indices of arousal and stress, would be more appropriate. While they found the predicted inverse relationship between preoperative arousal and postoperative stress ratings, no empirical evidence was cited to indicate that the arousal index is related to the adaptive cognitive processes that Janis called "work of worry". Overall, the evidence clearly suggests that pre- and postoperative anxiety are linearly related. Ray and Fitzgibbon's point is well taken, however, in that the cognitive processes associated with low, medium and high anxious patients have not been examined in a manner which elucidates the role of cognitive preparation in postoperative outcome.

Depression

Depressive mood has traditionally been associated with chronic pain states both as a precipitant (Gallemore and Wilson, 1969) and as a reaction to prolonged suffering (Bradley, 1963; Sternbach, 1968, 1974). Morgan and Horstman (1978), however, found that depression scores contributed significantly to the prediction of laboratory pain reports. Wise et al. (1978), however, found no relationship between preoperative depression and postoperative pain reports. However, a significant positive correlation was found between depression and postoperative analgesic requirements.

Other Psychological Influences

Extroversion

In his review of laboratory pain studies, Barnes (1975) concluded that, overall, these studies support a relationship between social extroversion and lower sensitivity to pain both for threshold and tolerance. Eysenck initially hypothesized this relationship based on data indicating that extroverts are less aroused then introverts, and

demonstrate more adaptation/inhibition to continued stimulation (Eysenck, 1967, p. 110, cited in Barnes, 1975). Clinically, with the exception of a study of labour pain where retrospective pain reports were used (Eysenck, 1961), this relationship has not been supported. In contrast, a study of patients who were recovering from low-back surgery found that extroverts reported significantly more pain (Bond, Glynn and Thomas, 1976). Two studies have indicated that patients who score high on both neuroticism and extroversion receive more analgesic medication (Bond, 1971; Parbrook et al., 1973).

Stress Coping Style: Repression versus Vigilance

A patient's coping responses to stress have been suggested as a possible factor that underlies individual differences in the course of postoperative recovery (Cohen and Lazarus, 1973). Data presented by Volicer (1978) confirm the expected relationship between a situational stress measure, the Hospital Stress Rating Scale (Volicer and Bohannon, 1975), and postoperative pain. On the other hand, a more general stress measure, the Schedule of Recent Events (Holmes and Rahe, 1967) was not found to be related to a multidimensional recovery index (Cohen and Lazarus, 1973). Subjective pain reports were not included in this recovery index nor were pain reports included in other studies that examined the interaction between coping style, psychological preparation for surgery and postoperative outcome (Andrew, 1970; De Long, 1971). The results of these studies demonstrate a complex interaction between coping styles, preparation and the recovery measures examined. There is a trend, however, for patients that show repressing or denying coping styles to be either unchanged or worse when exposed to preoperative psychological preparation and for sensitizers or vigilant copers to remain unchanged or to improve. This tentative generalization is supported by a study that examined the

interaction between coping style and videotape pre-exposure in patients scheduled to undergo endoscopy examination (Shipley et al., 1979). On the other hand, in two laboratory pain studies, tolerence increased for repressors who were pre-exposed to the painful stimulus (Bobey and Davidson, 1970; Neufeld and Davidson, 1971). However, a recent study found no effect for coping style on pain tolerance (Beers and Karoly, 1979). Cohen and Lazarus (1973) have indicated that the inconsistent results reported in this area may be due in part to the relatively low correlation ($r = 0.37$) between the dispositional measures of coping style used in these studies. However, the situational measure they proposed was more highly correlated with self-report of preoperative fear ($r = 0.48$) while the dispositional measures were not.

A fresh approach to the measurement of coping style was recently reported by Weinberger, Schwartz and Davidson (1979), who eliminated the confound with anxiety and provided psychophysiological data to support their distinction between repressors, low-anxious and high-anxious subjects. As yet, no studies using this classification system with a pain population have been reported. The present experiment seemed a good opportunity to investigate this new classification system.

Locus of Control

The concept of locus of control refers to stable beliefs about personal control over the outcome of events in one's life. "Internals" are conceptualized as individuals who believe that events are contingent on their own behaviour while "externals" believe that events are not under personal control but rather under the influence of luck, fate or powerful others (Rotter, 1975). Rotter notes that the scale which he developed (Rotter, 1966) was constructed to measure the general dimension of locus of control. It would be expected to have only limited predictive power in

specific test situations, although more specific scales could be developed to measure locus of control beliefs in circumscribed domains. Walston and Walston (1976) have developed a Health Locus of Control Scale which is being used increasingly in health related research. While the locus of control construct has not received much attention in the experimental pain literature, one study (Craig and Best, 1977) found higher tolerance for electric shock for internal subjects. Three studies have examined the relationship between locus of control and postoperative recovery (Johnson et al., 1970; Wiesse et al., 1978; Clum, Scott and Burnside, 1979). None of these reported a relationship to subjective pain reports although Johnson et. al. did find that internals received significantly more medications.

The relationship between locus of control and treatment outcome has been assessed in several clinical outcome studies. Auerbauch, Kendall, Cutler and Levitt, (1976) found that internal subjects showed a better adjustment to dental surgery when provided with specific information about their disorder and the procedure than when provided with general information about the clinic. Externals, on the other hand, responded better to the provision of general information. Holroyd, Andrasik and Westbrook, (1977) found no differences for the locus of control variable in responses to a cognitive-behavioural intervention for tension headache pain. Finally, Clum et al., (1979) found no differences between internal and external cholecystectomy patients (using the Health Locus of Control Scale) in the amount of information they possessed prior to surgery. However, internals with more information reported more pain and received more analgesic medications.

Overall the data on the relationship between the locus of control variable and pain and medication requirements is inconclusive. However,

none of the studies have addressed the issue of patients' attempts to exercise control over pain in ways other than medication requirements. For example, the locus of control concept would predict that internal subjects would utilize self-control strategies more frequently than external subjects (Chaves and Brown, 1978).

Specific Self-Control Behaviors

While the two factors reviewed thus far assess general cognitive response dispositions to environmental demands, they do not assess specific self-controlling behaviours engaged in by the individual to meet these demands. Rosenbaum (1980a) has recently reported a new instrument, the Self-Control Schedule (SCS) which assesses the individual's tendency to use specific cognitive and behavioural self-controling responses. In a laboratory study (Rosenbaum, 1980b), subjects scoring high on the SCS (HSC) tolerated cold pressor pain significantly longer than low self-control subjects (LSC). In addition, they reported using more self-control strategies during the painful stimulation. In a recent clinical report (Courey, Feuerstein and Bush, 1982), HSC subjects reported lower-intensity migraine headaches over a seven-week self-monitoring period, used prophylactic medication more regularly and reported lower sensory scores on the MPQ during a representative headache. Taken together, these studies provide initial support for the use of the SCS in experimental and clinical research concerned with the self-control of pain.

Subject/Patient Generated Cogitive Strategies

One nearly universal reaction to pain is the motivation to terminate, or at least minimize, the aversive qualities of the experience. Indeed, pain is the most common symptom motivating physician consultations (Engel, 1970). Recent evidence from interviews with patients in pain indicate that they are also engaged in dealing with pain through cognitive

coping strategies (Copp, 1974; Chaves and Brown, 1978; Brown and Chaves, 1980). Using transcripts from these interviews, Chaves and Brown (1978) and Brown and Chaves (1980) have demonstrated that independent raters can reliably classify patients' reports as indicating primarily "coping" or "catastrophizing" cognitive strategies. (Catastrophizing refers to thoughts and images of impending threats or disaster or personal powerlessness against a current threat.) In a dental study (Chaves and Brown, 1978), catastrophizing strategies were associated with more stress during the dental procedure, and for chronic pain patients, (Brown and Chaves, 1980), with more pain, higher trait anxiety and more frequent prescriptions for psychoative medications. Furthermore, coping versus catastrophizing cognitive strategies could be reliably predicted by personality, demographic and situational variables (Chaves and Brown, 1978).

In the laboratory, subjects have been found to disregard or modify the instructions they received (Kanfer and Goldfoot, 1966; Scott and Barber, 1977a; Scott, 1978) and control subjects have used their own strategies that mimic those presented to subjects in the experimental groups (Kanfer and Goldfoot, 1966; Barber and Cooper, 1972; Spanos et al., 1979). Spanos et al. (1979) failed to find a significant difference in the number of strategies used by subjects instructed in the use of a pain-control strategy and uninstructed controls. Spanos, Brown, Jones and Horner (1981) found that instruction in a cognitive pain-control strategy diminished pain reports only for subjects who had engaged in catastrophizing cognitions during a previous exposure to the pain stimulus and who subsequently used the experimental strategy. Subjects who have used their own coping strategies did not benefit from the experimental instructions. Scott (1978)

notes that subject-generated strategies are of particular concern in experiments designed to explore differences in efficacy between highly specific strategies. This problem is clearly not limited to laboratory investigations, as clinical investigators have also begun to report the 'spontaneous' strategy problem as a confound in clinical outcome studies (Holroyd and Andrasik, 1978; Tan, 1980).

Taken together, these results indicate that subject/patient-generated cognitive strategies are an important yet often overlooked individual difference dimension which both mediates and confounds the results of experimental cognitive manipulations. These results further indicate that evaluation of subjects' cognitions during painful stimulation should be a methodological requirement of future pain-control research. It is possible that even non-cognitive interventions may profoundly influence subjects' cognitions. It is tempting to spectulate, for example, that one aspect of the placebo response may be to diminish catastrophizing cognitions which may coincide with untreated pain.

Expectancy Effects

The expectancy for symptomatic relief is thought to be an essential component of the non-specific effects that accompany all forms of medical and psychological interventions (Shapiro, 1971). Expectancy manipulations have been used as a control procedure in several experimental pain studies. Positive effects compared to no-treatment or low-expectancy control groups were found by Chaves and Barber (1974), Neufeld and Thomas (1977) and Scott and Leonard (1978). Similarly, Knox, Handfield-Jones and Shum (1979) found that acupuncture was effective in decreasing pain ratings only when combined with instructions to expect pain reduction. Conversely, Chaves and Doney (1975) and Beers and Karoly (1979) did not find an effect for the expectancy manipulations employed in their studies. Inspection of the

instructions given to the subjects in these studies suggests that positive effects are frequently associated with instructions providing a personally relevent rationale for changes in pain experience from pre- to post-test. For example, instructions that emphasized the beneficial effects of previous exposure to the pain source in reducing anticipatory anxiety were effective, whereas statements regarding the purpose of the experiment or the results of previous research were often not effective. This analysis, however, must be considered as conjecture since none of the studies explicitly measured the efficacy of their instructions on the subject's expectancy for performance.

The role of the subject's perceptions of the treatment's credibility and his own performance expectancy has become a major issue in therapy outcome research. Kazdin and Wilcoxson (1976) have reviewed the outcome literature on systematic desensitization (SD) therapy and concluded that in studies where SD and the control procedure generate equivalent expectancies, the outcome typically does not support the enhanced effectiveness of SD treatment. However, in studies where the placebo or non-specific control treatment generates lower levels of credibility and expectancy, SD is usually found to be superior. The need to create control procedures that generate credibility and expectancy equivalent to experimental treatments or, alternatively, to measure credibility and expectancy over the course of treatment is emerging as a methodological requirement for controlled therapy outcome research (Jacobson and Baucom, 1977; Bandura, 1977).

The results of the studies presented in this section indicate that instructions designed to manipulate subject expectancies can affect pain perception. That none of the laboratory studies examined in this literature review have measured these variables appears to represent a

methodological shortcoming of the literature on laboratory pain control as a whole. Among the clinical studies, only Holroyd et al. (1977) has reported credibility and expectancy data.

Issues Related to Experimental Design

The Choice of Appropriate Control Groups

While it has become a tradition to include a placebo or non-specific treatment control group in therapy outcome studies, several significant, logical, practical and ethical questions have been raised concerning the appropriateness of these experimental designs (Jacobson and Baucom, 1977; O'Leary and Borkovec, 1978; Kazdin, 1979).

The most basic issue concerns the types of hypotheses which can be addressed through comparisons between placebo and treatment groups. These hypotheses must involve questions related to the efficacy of the supposedly active components of the experimental treatment compared to non-specific therapy effects. If the experimental hypothesis is not of this type, the inclusion of a placebo group is logically superfluous (Kazdin, 1979). Since the primary purpose of the present study is to compare the relative effectiveness of self-hypnosis and its components, a placebo group is not necessary.

Johnson et al. (1978) have recommended that investigations of psychological preparation for surgery use factorial experimental designs, including a no-treatment control condition. While this provides an elegant strategy for testing the effects of treatment components, some care must be taken in evaluating this suggestion. Cohen (1980) provides an example of the potential risks of withholding treatment. Cohen reports on a sophisticated factorial design employed in her dissertation research to evaluate the components of preoperative preparation for patients with

different coping styles. The results of the experiment were extremely difficult to interpret. Cohen concluded that the surgeons and nurses had continued to prepare their patients with information that confounded her elegant experimental design.

Several alternative designs have been suggested which are relevent to the present study. The first involves comparing the experimental treatment to the "best available alternative treatment" (Jacobson and Baucom, 1977). This design allows the empirical clinical question of relative efficacy to be answered directly and avoids the ethical issue of voluntarily withholding treatment. It however does not address the theoretical issues related to evaluating the active or efficacious elements of the experimental treatment.

The "component control" group strategy (Stuart, 1973) involves comparing the treatment to control groups consisting of its procedural elements presented separately. This design is more likely to produce equivalent expectancies for improvement than the traditional placebo control design (Borkevec and Nau, 1972).

The experimental design utilized in the present study combines both the "best alternative" and "component control" strategies. After the widely publicized work of Egbert et al. (1964), preoperative teaching has become a routine part of the services provided to elective surgery patients. This makes preoperative teaching the most obvious and appropriate best alternative. In addition, considering Cohen's (1978) experience, it was decided to provide routine preoperative teaching to all patients participating in the study. A control group would receive no additional instructions and hence provide a best alternative treatment comparison. Subjects in the experimental groups received either self-hypnosis or its components: relaxation instructions comprising the

hynotic induction procedure or waking analgesia suggestions.

Methodological Considerations in Pain Measurement

While laboratory studies have relied primarily on traditional psychophysical notions of threshold and tolerance to assess the efficacy of experimental manipulations, clinical studies must necessarily emphasize the patient's subjective pain report. A number of important psychometric, theoretical and clinical issues are relevent to the adequacy of measures of subjective pain reports.

Subjective pain has traditionally been measured with unitary intensity scales. Verbal rating scales which offer patients four to six categories to rate their pain have been criticized for their lack of sensitivity in estimating pain relief (Huskisson, Shenfield, Taylor and Hart, 1970; Ohnhaus and Adler, 1975). Graphic rating scales, with descriptors at discrete points or numbers (the "pain thermometer") along a horizontal or vertical line representing the intensity dimension have been found to produce non-uniform distributions of scores (Huskisson, 1974; Scott and Huskisson, 1976). On these scales, patients often positioned their responses adjacent to the descriptors or preferred numbers, hence increasing measurement artifact and thereby decreasing the scales sensitivity. Huskisson has recommended the visual analgue scale (VAS) as being the most sensitive measure of pain. However, clinical studies have indicated that the VAS method is inappropriate for seven to eleven per cent of patients who are unable to use the scale to rate their pain (Huskisson, 1974; Kremer, Atkinson and Ignelzi, 1981).

Intensity scales as a whole have been criticized for mapping a richly varied, complex, perceptual, affective and cognitive experience onto a single abstract dimension (Melzack, 1975). Melzack and Torgeson (1971) have proposed a multi-dimensional pain rating scheme, the McGill Pain

Questionaire (MPQ), developed with multi-dimensional scaling tecniques, to assess the sensory, affective-motivational and cognitive-evaluative dimensions of subjective pain experiences. Subsequent reliability and validity studies have indicated adequate test-retest reliability, the validity of the multidimensional structure, and the questionnaire's sensitivity for diagnostic discrimination and measurement of treatment outcome (see review by Reading, 1983).

In addition, several authors have called for the development of objective measures to assess the reaction or behavioural component of pain experience (Frederiksen, Lynd and Rose, 1978; Sanders, 1979). Chambers and Price (1967) have developed a composite scale, including assessment of pain behaviour to be used with postoperative patients. However, this scale does not appear to have been subjected to formal reliability or validity evaluation. Other promising approaches, such as behavioural observation (Rybstein-Blinchik, 1979, Tan, 1980) and time out of bed (Fordyce, 1976), have not been applied to the postoperative setting. Ambulation has been assessed through patient interview (Johnson, et. al, 1970) but objective measures of ambulation (McPartland, Foster, Kupfer and Weiss, 1976) have not been studied. It is also worthy of mention that in spite of extensive research, no reliable physiological indicators of pain have emerged (Hilgard, 1969). Hilgard has concluded that the most reliable and valid indicator of pain is the subject's own verbal report.

A final issue relates to the number of times pain is measured and where these measurements fall in relation to the course of postoperative pain. Reviews of the literature on postoperative pain (Keats, 1956; Gildea, 1968) have indicated that pain of sufficient severity to require analgesic medication has usually abated by 48 hours after surgery. A recent report by Nayman (1979), however, found that substantial pain

continues into the third postoperative day. The logical deduction from this finding is that pain assessment should be undertaken during the first three postoperative days.

In summary, the above considerations indicate that an adequate postoperative pain measurement strategy would include multidimensional subjective and objective measures which are sampled repeatedly across the most relevant portion of the postoperative phase. In addition, Frederiksen et al. (1978) have suggested that multiple subjective and objective measures be used when possible so that the interrelationships among measuring systems can be empirically determined. None of the studies included in this review meet all of these standards. In view of the standards of postoperative pain measurement used in previous studies, the inconsistancies in results related to individual difference factors and treatment outcome becomes more understandable. One of the aims of the present study was to examine the effects of background factors of personality, preoperative emotional state, and demographics using an adequate pain measurement strategy.

Population Chosen for the Study

Cholecystectomy (surgical removal of the gallbladder) was chosen as the source of pain to be examined. It satisfies the criteria of 1) being relatively intense (Loan and Dundee, 1967; and Parkhouse, Lambrechts and Simpson, 1961), 2) having a rapidly declining course after the third postoperative day (Nayman, 1979) with an average hospital stay of one week, and 3) being in adequate supply at the Montreal General Hospital hence insuring a reasonable time frame for the study. In addition, a number of previous investigators have found this pain syndrome to reflect individual differences in dimensions of personality (Wolfer and Davis, 1970; Dalrymple, Parbrook and Steel, 1973) and to be responsive to psychological

interventions (Johnson et al., 1978; Wilson, 1981).

Hypotheses of the Present Study

It was hypothesized that, in the postoperative situation self-hypnosis would be significantly more effective in diminishing postoperative pain and analgesic requirements than waking analgesia instructions. No differences were expected between waking analgesia and relaxation instructions, although all three experimental cognitive pain-control preocedures were hypothesisd to be more effective than the standard treatment control group.

The review of the literature on interactions between individual difference factors and treatment outcome suggested several additional hypotheses. Firstly, it was hypothesized that hypnotic susceptibility scores would be correlated with the degree of pain relief for patients in the self-hypnosis and waking analgesia groups. Secondly, it was hypothesized that the pain-control techniques would be used more frequently by patients who 1) rated the treatments as more credible and who had higher expectancies for successful pain reduction, 2) are more internal on the locus of control variable and 3) report greater use of self-control techniques in general (higher scorers on the Self-Control Schedule). Finally, it was hypothesized that the patients who used the techniques most frequently during the postoperative period would have the greatest pain relief.

A number of further hypotheses were based on the review of the literature on individual difference factors influencing post operative pain, mood and analgesic requirements. It was hypothesized that 1) higher scores on the postoperative outcome measures would be associated with higher scores on the following psychological variables: trait anxiety, neuroticism, extroversion, preoperative fear and depression; 2) patients classified as demonstrating a repressing coping style will report less pain

and affective disturbance than low anxious or high anxious patients; 3) patients that report more cognitive coping and less catastrophizing during the postoperative period will report less pain and 4) among the demographic indices, lower scores on the postoperative measures would be found for patients who are older, male, more highly educated and who had had previous surgery.

METHODS

Subjects

The subjects were 40 patients (12 male, 28 female) between the ages of 20 and 65 (mean = 47; SD = 11.4 years) who underwent elective gallbladder surgery at the Montreal General Hospital. Of 72 patients who were scheduled to undergo elective cholecystectomies during the period of the study (May, 1980 to May, 1981), 50 consented to participate. The subjects were patients of 9 staff surgeons who were informed of the project which had been approved by the university ethics committee. Those patients who met the inclusion criteria for the study were contacted by telephone by the author. Those who expressed interest in participating in the project were given an appointment for the initial session. The inclusion criteria were: (1) acceptable comprehension of English, (2) absence of medical disorders that would interfere with postoperative recovery and (3) a period of at least 5 days before scheduled surgery to enable the patients to practice and develop skill with the treatment procedures. Ten patients were dropped from the study for the following reasons: 4 experienced postoperative complications; 4 were sleeping at 3 or more data collection points and hence provided insufficient postoperative data; 1 patient did not practice the pain-control techniques prior to surgery; and 1 patient's surgery was cancelled. These patients were evenly distributed across treatment groups.

Experimenters

The experimenters who participated in the training of the subjects and the collection of data were the author (E1), a Research Assistant (E2), and a Skills-Teaching Assistant (E3).

E1 initially contacted the prospective participants, conducted the

initial session, introduced the subjects to E2 (who collected the postoperative data), and conducted the Postoperative Cognitive Coping Strategies Interview and the follow-up session. Since E1 was aware of the subject's group assignment, postoperative data collection was conducted by E2, who was unaware of the nature of the experiment. E2 was told only that the experiment involved psychological aspects of pain-control and was instructed to discourage subjects from discussing the details of their treatment procedures. The preoperative teaching component of the initial session was conducted jointly by E1 and E3, a nurse with training in dealing with pain patients.

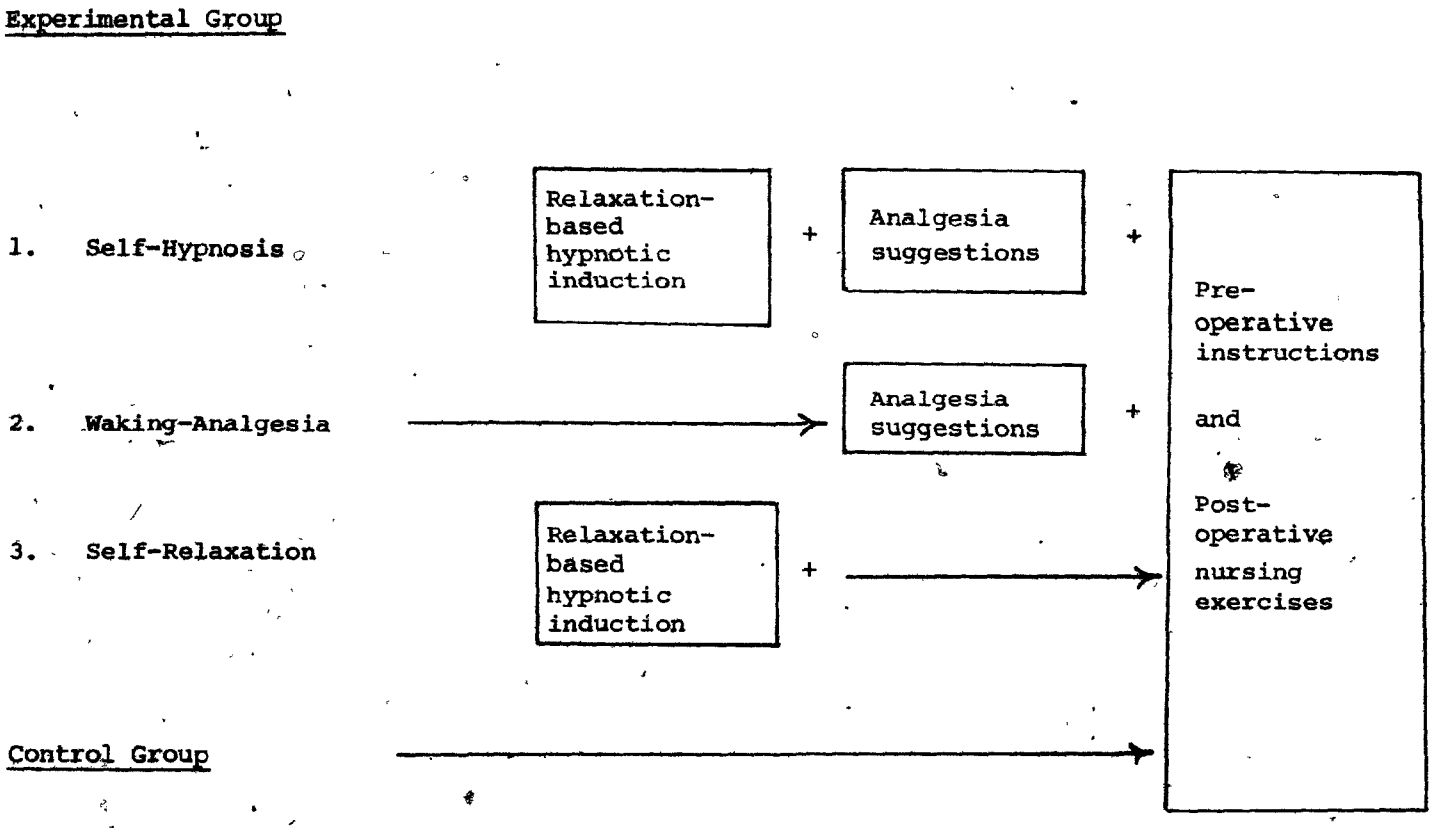
Overview of the Experiment

Patients about to undergo elective gallbladder surgery were trained in self-hypnosis or its component procedures (experimental groups) approximately two weeks prior to surgery. In addition, all subjects received the standard preoperative instructions and postoperative exercises given at the Montreal General Hospital. A control group received these instructions with no additional training in pain-control procedures (see Figure 1). Subjects were instructed to practice the pain-control and postoperative exercises prior to their hospitalization and to utilize them postoperatively as adjuncts to the usual pharmacological pain control. Postoperative data collection was conducted by an experimenter who was unaware of the experimental hypothesis. Follow-up data were collected approximately one month after discharge from the hospital.

In all, five types of information were obtained from the subjects: (1) psychological status before and after surgery, (2) pain levels postoperatively (3) activity levels and medication intake postoperatively, (4) information concerning pain history and coping strategies, collected

FIG. 1

Training Procedures



during structured interviews, and (5) questionnaires related to credibility, expectancy, drug bias and other variables (see Figure 2).

Assessment Materials

1. The Psychological Test Battery

A battery of paper-and-pencil self-report psychological tests was assembled to assess variables that have been found in previous work (see Introduction) to influence clinical and/or experimental pain. These were:

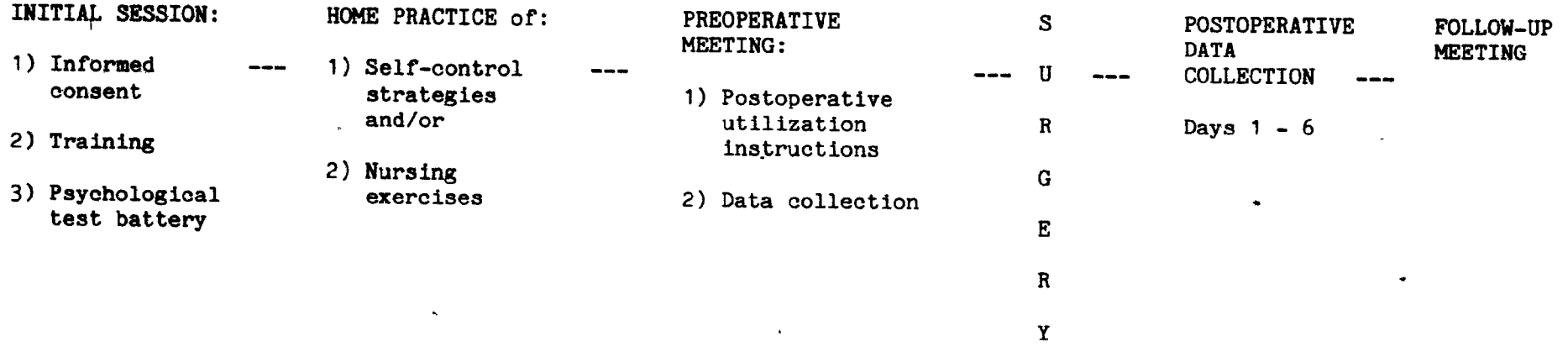
State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsch and Luschene, 1970). This 40-item instrument is widely used in psychological research to measure both situational ("state") and dispositional ("trait") anxiety. In previous research with surgical populations, the STAI-Trait scale has been shown to be stable, while the STAI-State scale has been sensitive to changes in affect that accompany the surgical experience (Spielberger, et al., 1973).

Beck Depression Inventory (BDI) (Beck, Ward, Mendelson and Erbaugh, 1961). This 21-item self-report inventory covers a wide range of somatic and psychological symptoms and has been widely used in clinical research on depression. A short form of 13 items has been developed for use as a screening test in general medical practice (Beck and Beck, 1972). In this research, the full form was used in the initial test battery and the short form was used in the postoperative assessment package. Reliability and validity data for both forms of the BDI have recently been reported by Reynolds and Gould (1981).

Eysenck Personality Inventory (EPI) (Eysenck and Eysenck, 1968). This 57-item self-report inventory, widely used in pain research, measures two independent personality dimensions: extraversion-introversion and neuroticism-stability. The EPI has been used in many previous

FIG. 2

Flow Diagram of the Experimental Procedure



investigations of the relationship between personality and postoperative recovery.

Rotter Locus of Control Scale (I-E) (Rotter, 1966). Rotter's Internal-External Locus of Control Scale is a 29-item forced choice scale. The I-E scale has been used in previous laboratory and clinical pain research (Craig and Best, 1977; Johnson et al., 1970; Clum et al., 1979).

Health Locus of Control Scale (HLOC) (Wallston and Wallston, 1976). This 11-item scale measures the dimension of locus of control for health related behaviour. Correlations of 0.25 and 0.46 between the HLOC and Rotter's I-E scale (Wallston and Wallston, 1976) indicate that the scales are indeed measuring associated but not identical dimensions.

Absorption Questionnaire (ABS) (Tellegen and Atkinson, 1974). Absorption is conceptualized "as a disposition for having episodes of 'total' attention that fully engage one's representational (i.e., perceptual, enactive, imaginative and ideational) resources" (Tellegren and Atkinson, 1974, P. 268). The essence of the hypnotic experience has been theorized to be closely related to the absorption concept (J. Hilgard, 1970; Barber and De Moor, 1972; Sarbin and Coe, 1972). The Absorption questionnaire has been shown to correlate significantly with measures of hypnotic susceptibility (Tellegren and Atkinson, 1974).

Stanford Hypnotic Clinical Scale (SHCS) (Hilgard and Hilgard, 1975). This is a 5-item structured susceptibility assessment utilizing one motor and four cognitive items. The SHCS was designed for use with chronic pain patients and has the advantage over the Stanford Hypnotic Susceptibility Scale, Form C (SHSS:C) (Weitzenhoffer and Hilgard, 1962) of taking 20 rather than 45 minutes to administer. Validity studies reported by Hilgard and Hilgard (1975) found a highly significant correlation ($r = .72$) with the SHSS:C. Video tapes of the SHCS were rated by E1 and a second rater

who is experienced in the administration and scoring of this procedure.

Self-Control Schedule (SCS) (Rosenbaum, 1980a). This 36-item self-report instrument assesses individual differences in the tendency to engage in self-control responses to a variety of behavioural problems. Reliability and validity data for the SCS has been reported by Rosenbaum (1980. a, b).

Repressing-Sensitizing Defensive Style. In the present study, the Marlowe-Crowne Scale (MCS) (Marlowe and Crowne, 1960) will be used with the STAIT in the same manner as Weinberger et al. (1979) to explore the relationship between defensive style and the postoperative outcome measures. The Weinberger et al. system classifies patients into repressing, low-anxious, high anxious, and defensive high anxious groups.

Self-Statement Inventory (SSI). This instrument was devised to assess cognitive activity during the postoperative period. The format was borrowed from the inventory developed by Kendall et al. (1979). Specific items were reworked or developed to be relevant to postoperative recovery from gallbladder surgery. The original version developed for this study contained coping and catastrophizing items (see Appendix A1). A later version, introduced into the design at subject number 20, included 8 additional coping items related to the specific cognitive strategies utilized in this study. Six further catastrophizing items were also added (see Appendix A2). Data on the reliability and validity of this measure are presented in the results section.

2. Pain Measurement

Visual Analogue Scales. The measurement of the subjective qualities of pain has largely been limited to scales measuring along a single intensity dimension (Huskisson, 1974; Weisenberg, 1977). The scales used in this study consisted of 10 centimeter lines between the anchors "no

pain" and "worst possible pain" for the intensity scale, and "not at all" to "severely" for the distress scale. Both scales are included on the same form as the McGill Pain Questionnaire.

McGill Pain Questionnare (MPQ) (Melzack, 1975). The MPQ consists of 20 short lists of adjective descriptors of pain which measure 3 dimensions of pain experience: sensory, affective and an overall evaluative dimension. Quantitative scores for each dimension as well as a total score are derived from the adjectives the patient uses to describe their pain experience. In addition, there is an adjective scale to measure present pain intensity and several groups of miscellaneous words (see Appendix B). Reliability and validity data are discussed in Melzack (1975) and Reading (1983).

Medication Intake. After subjects were discharged from the hospital, medications were recorded from the patient's hospital chart (see Appendix C1 for the recording form). For the purposes of data analysis, narcotic analgesic dosages were converted to morphine equivalents (see Appendix C2 for conversion chart).

Activity Monitor (ACTM). The LSI motor activity monitor (ACTM) developed at the Western Psychiatric Institute and Clinic, University of Pittsburgh (McPartland et al., 1976) provides a quantitative measure of gross motor activity which correlates with measures of energy expenditure and is sensitive to variations in the quality and extent of gross motor activity in human subjects (Laporte, Kuller, Kupfer, McPartland and Mathews,1979). The units used in this study were facsimilies of the Pittsburgh design and were developed by the author and the Psychology Department Engineer utilizing more modern and less expensive electronic components (see Appendix D for details). Six units were manufactured for use in this study. On 3 occasions, the battery wire became detached resulting in missing data for that time period. In this study, the monitor

was positioned at the subject's ankle on the morning of the first postoperative day and removed on the evening of the third day. The counts accumulated by the monitor were read by E2 at each data collection point.

3. Interviews

Protocols for structured interviews were designed to assess the subject's previous pain experiences and coping strategies. In addition, structured interviews were carried out after the operation. Altogether, 3 interviews were conducted, and all were audiotaped with the subject's consent. One patient refused; her responses were written verbatim during each interview.

Gallbladder Pain History Interview (GBPHI). A structured interview guide was devised for this study to assess experiences with gallbladder attack pain, previous pain experience in general, and anticipatory fear of surgery (see Appendix E). The format included open-ended questions, visual analogue scales and adjective check lists.

Postoperative Cognitive Coping Strategies Interview. This interview was devised to assess the subject's postoperative cognitive activity and his experiences with the treatment strategies (see Appendix F1). A scoring manual was devised for this purpose and follows the manual developed by Brown and Chaves (1978). For the present study, an additional classification -- non-cognitive coping -- was added for those subjects whose coping strategies were largely activity oriented (see Appendix F2). Responses to the coping strategies questions in the GBPHI as well as responses to the Postoperative Cognitive Coping Strategies Interview were scored with this manual. The transcripts were independently scored by 2

raters. Inter-rater reliability was 0.81.

Follow-Up Interview. This was designed to encourage subjects to give an overall evaluation of the program as well as specific feedback on which aspects were useful or not useful, and what additional preparation they would have wished to receive. It also provided an opportunity for subjects to obtain additional information about the research program (see Appendix G).

4. Questionnaires and Evaluations

Credibility and Expectancy Evaluations. Treatment credibility and outcome expectancy were assessed in this study by a questionnaire based on the work of Borkavec and Nau (1972). The 3-question form, using the visual analogue format, was administered three times during the course of the experiment (just after the training had been completed, the evening before surgery, and on the sixth postoperative day) in order to provide a simple measure of the extent to which the subject's evaluation of the treatment and his preoperative expectations coincided with measures of postoperative outcome (see Appendix H).

Medication Bias Assessment. It is known that some patients readily take all prescribed medications while others have a strong bias against taking them. A single visual analogue question (number 4) was added to the first Credibility-Expectancy Questionnaire to determine the subject's attitude toward taking medication.

5. Additional Outcome Measures

Wofler-Davis Scale (W-D) (Wolfer and Davis, 1970). This 9-item "Recovery Inventory" was devised to assess patients' perceptions of their postoperative physical status (see Appendix I). In the original study, the W-D was given only postoperatively. In the present study, the scale is also given preoperatively to establish a baseline level of physical

functioning for each subject. Postoperative and follow-up scores are expressed as difference scores relative to baseline functioning.

Impact of Stress Scale (ISS) (Horowitz, Wilner and Alvarez, 1979). This self-report inventory was designed to measure the subjective impact experienced as a result of a specific stressful event. There are 2 empirically devised subscales, intrusion and avoidance, with 7 items in the intrusion subset and 8 in the avoidance subset. Intrusion refers to "unbidden thoughts and images, troubled dreams, strong pangs or waves of feeling and repetitive behavior" (Horowitz et al., 1979, p. 210). Avoidence includes "ideational constriction, denial of meanings and consequences of the event, blunted sensation, behavioral inhibition or counterphobic activity and awareness of emotional numbness" (ibid.).

PROCEDURE

The Initial Meeting

1. Overview

The initial meeting took place at E1's office at the Pain Center of the Montreal General Hospital. The goals of this session were the same for all subjects although the content varied according to the experimental group. Each participant was given a detailed overview of the study and then completed a consent form (see Appendix J), an Initial Anxiety Scale (STAI-State), and the Gallbladder Pain History Interview. E1 then proceeded with the intervention phase which included the treatment rationale, review of the treatment protocol and instructions for practicing the treatment at home before admission to the hospital. Finally, a second anxiety scale was administered and the instructions for the initial psychological test battery were given. This session lasted between 90 minutes and 2 hours. The individual components of this session are described in the following sections.

2. Patient's Introduction to the Aims and Procedures of the Study

The protocol for this section is presented in Appendix K. Its purpose was to orient the participant to the reasons for the study, the benefits expected to be achieved through participation, and the rights and responsibilities of participants. The rationale for the study was presented as a comparison of several treatment approaches designed to help patients achieve more control over their postoperative pain.

Each experimental group received a brief rationale and description of the treatment. This included a demonstration of the activity monitoring device. If a subject had many questions, the detailed rationale for psychological self-control of pain and the specific rationale for the

appropriate experimental group were presented at this point. This practice is in accordance with the observation that patients who do not share a common conception of a problem with the therapist (in this case, E1) are unlikely to benefit from the treatment (Frank, 1961). The subject then signed the informed consent form.

3. Initial Anxiety Assessment

Subjects were then given the Speilberger's State Trait Anxiety Inventory, Form X-1 (STAI-State), in order to obtain an initial pre-treatment anxiety measurement.

4. The Gallbladder Pain History Interview

The protocol for this interview is in Appendix E. Three subjects denied having experienced a gallbladder attack. For these subjects, the questions specific to gallbladder attacks, Section 1 of the interview, were omitted.

5. Treatment Rationale

The protocol for this section is presented in Appendix L. This is a general rationale for psychological self-control of pain and was identical for all three experimental groups. The Control Group did not receive this. The format of the treatment rationale follows that of Turk (1977). The aims were, first, to provide a conception of pain which is both easy to understand and consistent with the subject's experience and observations, and second, to provide the subject with basic ideas about pain mechanisms, allowing him to perceive the treatment program as both reasonable and worthy of strongly positive outcome expectancies.

The subjects were presented with a simple model (Beecher, 1959) which explains how psychological factors influence pain perception. Examples were taken from the subjects' experiences which were described during the Gallbladder Pain History Interview. Subjects were also asked to provide

further examples from their own or others' experiences to insure that they understood the model.

6. Specific Treatment Rationales

(a) The Self-Hypnosis Group. Authorities on clinical hypnosis stress that the preparation of the subject prior to the initial induction is an essential element of the treatment process (Hartland, 1971). It should include an opportunity for the subject to express his views on the nature of hypnosis and the hypnotic experience thus allowing the therapist the opportunity to correct misconceptions, allay fears and provide the subject with an understanding of hypnotic phenomena which is consistent with the goals of treatment.

Appendix M1 contains the protocol for the preparation for self-hypnosis used in this study. After the preparation phase, E1 gave a standard explanation of typical hypnotic experiences and explained how the ideas reviewed in the general rationale could be utilized in self-hypnosis to control postoperative pain. It was also emphasized that it takes practice to develop skill in utilizing self-hypnosis to control pain.

(b) Waking Analgesia Group. For this group the rationale and treatment will be discussed as a unit. The protocol for this section is presented in Appendix M2. The subjects were exposed to a series of ideas and short exercises following the same order and wording as those given to the Self-Hypnosis Group.

The first group of suggestions involved the use of attention-diversion strategies. E1 pointed out that postoperative pain is not dangerous and that, consequently, it is all right to pay attention to other things while the body is healing from surgery.

The second group of suggestions involved the use of imagery to alter sensory perception of the operative incision. These suggestions follow

those recommended by Spiegel and Spiegel (1978) for pain patients with good to excellent hypnotic capacity.

The third group of suggestions involved a dissociation strategy whereby E1 indicated that the patient might become so good at the sensory alteration that he might not notice the sensations at all.

Finally, E1 reminded subjects that their capacity to use these suggestions to control postoperative pain would be dependent on home practice. He pointed out that their pain control would improve as they used the strategies. He recommended practicing once per day with the cassette tape recording which was supplied.

It is important to discuss here the rationale for the selection of the above-mentioned specific analgesia suggestions. They were chosen to cover a broad range of skills and ideas because none of the pain coping strategies (i.e., sensory alteration, dissociation strategies, attention-diversion strategies) are universally effective (Tan, 1982). By combining these techniques with the suggestion that postoperative pain is a natural sign of healing, and the suggestion to expect ever-increasing control, an attempted was made to create a multiple strategies "package" that would be broadly applicable to this patient population.

(c) Self-Relaxation Group. The specific rationale for this group is presented in Appendix M3, and empahasizes the roles of both physical and mental tension and relaxation in pain perception.

(d) Control Group. The Control Group which received the standard preoperative teaching package utilized at the Montreal General Hospital was given a brief rationale emphasizing that knowledge of what to expect during their hospitalization will help them to be less apprehensive and that practicing the nursing postoperative exercises will help them to diminish pain and recover more quickly. The general rationale for self-control of

pain was not given to the Control Group.

7. The Training Phase

After the rationales had been explained and questions answered, E1 demonstrated the self-control treatments. For each of the experimental groups the treatment strategy was demonstrated "live" by E1, and a cassette tape of the strategy, with E1's voice, was given to the subject for use during home practice sessions. Both techniques were used because (1) recent research indicates that "live" instructions are more effective than taped instruction for relaxation strategies and hypnosis (Paul and Trimble, 1970; Israel and Beman, 1977; Johnson and Weisse, 1979); and (2) taped instructions provide a reliable stimulus for home practice. To insure consistency in the treatment delivery, E1 read the transcripts of the treatment protocol to the subjects in the Self-Hypnosis and Self-Relaxation Groups.

(a) Self-Hypnosis Treatment.

The protocol for the self-hypnosis treatment is presented in Appendix N1. This protocol consists of four distinct elements: the hypnotic induction, suggestions to enhance the effectiveness of the analgesic suggestions, analgesic suggestions and wake-up instructions.

The hypnotic induction and wake-up instructions are a modification of the procedure presented by Barber (1977). Experience with many relaxation-type induction strategies has suggested that this induction was most likely to exert a significant effect with inexperienced subjects. The suggestions for enhanced effectiveness of the analgesic suggestions were tailored to this study from the ego-strengthening procedure of Hartland (1971). The analgesia suggestions were discussed in Section 6 (b).

After the treatment protocol had been delivered, E1 asked the subject what he had experienced, answered any further questions and encouraged home

practice. The explicit home practice instructions are presented in Appendix O. E1 also presented the Self-Hypnosis Home Practice Recording Forms at this time (see Appendix P).

Following this, E1 introduced the preoperative teaching tape in the manner already discussed. Details of the delivery of the preoperative teaching instructions are the same for all subjects and will be discussed in the section describing the Control Group procedure.

(b) Waking Analgesia Group.

The delivery of this treatment package has already been discussed in the specific rationale section.

(c) Self-Relaxation Group.

Subjects in this group received the same induction and wake-up instructions as subjects in the Self-Hypnosis Group with the exception that specific references to hypnosis were deleted. Between these protocols, a brief series of suggestions was inserted to encourage subjects to practice and to remember to use the strategy whenever they felt that they would like to be more relaxed (see Appendix N2). No specific analgesia suggestions were made.

As in the Self-Hypnosis Group, E1 demonstrated the instructions during the session, answered questions, illustrated the use of the Home Recording Form, gave the subject the cassette tape, and introduced the preoperative teaching instructions in the usual manner.

(d) Control: Preoperative Teaching and Postoperative Exercises.

This treatment condition was identical for all subjects. It was the only treatment condition delivered to subjects in the Control Group. The protocol for this treatment is presented in Appendix Q. This protocol is nearly identical to the "Preoperative Teaching Instructions" booklet developed for use at the Montreal General Hospital. Changes were made to

improve the flow of the information for audio tape presentation.

The preoperative instructions emphasized: (1) preparation for hospitalization, (2) what to bring to the hospital, (3) procedural information including medication practices, (4) typical postoperative pain sensations and experiences, and (5) postoperative nursing exercises (see Appendix Q).

After E1 had presented the rationale for this section, he played the audio tape of this treatment protocol leaving the subject alone to listen to the tape and returning with E3 when the tape had finished. E3 asked for questions or concerns and demonstrated the use of the spirometer, an instrument used postoperatively to help patients re-expand their lungs. In closing, E3 told subjects that they could call her any time with any further questions.

8. Psychological Test Battery

The concluding section of the initial session was the assignment of the psychological test battery. Here, E1 reviewed the instructions for the individual instruments. Subjects were asked to complete the post-treatment Speilberger STAI-State, the Beck Depression Inventory and the Credibility-Expectancy Evaluation Form 1 (Appendix H1) prior to leaving. The other tests in the battery, which are measures of stable attributes, were to be completed at home before they returned to the hospital for their operation. The homework battery included the HLOC, SCS, EPI, STAI-Trait, BDI, and I-E.

Telephone Check-Up

At approximately the midway point between the initial session and admission, E1 telephoned subjects in the experimental groups to insure that they were practicing and to answer any additional questions. This contact

lasted two to five minutes. In order to remain consistent with the routine hospital preoperative teaching program, subjects in the Control Group were not called.

Preoperative Data Collection

On the afternoon prior to surgery E1 and E2 visited each subject in his/her hospital room. The purposes of this meeting were (1) to introduce E2, (2) to collect the preoperative data, and (3) to deliver the postoperative utilization instructions to patients in the experimental groups.

E1 greeted the subject, introduced E2, and reminded the subject that it would be E2 who would visit them twice each day after their operation to collect data on their recovery. E1 asked to see the homework test battery and left while E2 administered the preoperative instruments. These included the STAI-State, BDI short form, the Wolfer-Davis Recovery Index, and the Credibility-Expectancy Evaluation Form 2 (appendix H2).

Once these had been completed, E1 gave the postoperative utilization instructions to subjects in the experimental groups (see Appendix R). These instructions emphasized using the self-control strategies as frequently as possible with or without the tape and reminded subjects to consider them as an adjunct to medication. All subjects were reminded to use the postoperative nursing exercises as prescribed.

Postoperative Data Collection

Days One Through Three. At approximately 9 a.m. and 4 p.m., E2 visited the subject in his/her hospital room to collect pain, mood and activity data. Whenever possible E2 requested the subject to fill out the forms themselves. If, however, the subject was weak or tired, E2 read the

questions. If, at the 4 p.m. data collection time, the subject had visitors present, E2 would read the activity monitor and leave the forms to be filled in as soon as the visitors had left.

The following data were collected at the morning data collection point: the McGill Pain Questionnaire, the Visual Analogues Scales for pain and distress and the activity monitor reading. The evening data collection point included all of the above plus the STAI-State and the BDI short form.

Day Four Data Collection. On the morning of the fourth postoperative day, E1 visited the subject for the first time since the operation in order to conduct the Postoperative Cognitive Coping Strategies Interview (see Appendix F). The purpose of this interview was to determine if the patient used the prescribed self-control strategies, how often they were used and what other strategies were utilized. E1 also thanked the subject for their cooperation and informed them that E1 would telephone in two weeks to find out how they were and to arrange the follow-up appointment.

Day Six Data Collection. This was the final data collection point while the subject was hospitalized. The following data were collected at this point: The MPQ, Visual Analogues Scales of pain and distress, the STAI-State, the BDI short form, the Wolfer-Davis Recovery Index, the Self-Statement Inventory and the Credibility-Expectancy Form 3 (see Appendix H3).

Follow-Up Data Collection

Whenever possible, the follow-up data collection was scheduled to coincide with the subject's follow-up visit with his or her surgeon. This was usually three to six weeks after the operation.

Data collected at this session were the following: the Follow-Up

Interview, the STAI-State; the BDI short form, the Wolfer-Davis Recovery Inventory, the Telengen-Atkinson Absorption Scale, the Horowitz Impact of Stress Scale, and the Stanford Hypnotic Clinical Scale.

The introductory remarks for the hypnotizability scale are included in Appendix S. Six of the scales were videotaped and rated blind. The inter-rater reliability was 0.97 for individual scale items and 1.0 for level of susceptibility: low (0-1), medium (2-3), high (4-5).

RESULTS

The results of the statistical analyses of data obtained in this study are presented in the following manner: A) Comparability of groups on demographic and psychological variables, B) Results related to the main hypotheses of the study, C) Determinants of postoperative pain, distress and narcotic usage, D) Relationships among the dependent (outcome) variables and, E) Relationships among the independent (demographic, personality, pain history) and process (credibility, expectancy, technique usage, cognitive strategy assessment) variables.

A. Comparablity of Groups

1. Demographic and Gallbladder Pain History Variables

One-way ANOVAs revealed that there were no significant differences between the four groups on age, or number of years of schooling, previous illnesses, previous operations, and current medical disorders. Table 1 contains means, standard deviations and F values for the above variables.

The groups were further compared on the following variables derived from the Gallbladder Pain History Interview: number of months since onset of gallbladder attacks, frequency of attacks per month, intensity and duration of pain episodes. (Two subjects in the self-hypnosis group and one subject in the relaxation group denied experiencing gallbladder pain.) Again, no significant differences between the groups were found (see Table 1).

2. Personality Variables

One way ANOVAs were used to compare the groups on the results of the psychological test battery. No significant differences were noted for trait anxiety, depression, neuroticism or extroversion. Further ANOVAs

TABLE 1

Means and Standard Deviations for the Four Groups on Background Variables (Comparability Data), N=10 per Group

VARIABLE	GROUPS (INTERVENTION CONDITIONS)									
	Self-Hypnosis		Waking Analgesia		Self-Relaxation		Control			P
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	F	value
Age	44.9	12.5	45.4	13.6	45.3	11.2	55.1	4.0	2.0	ns
Educational Level	13.1	1.9	13.8	2.7	12.6	2.5	11.7	3.0	1.2	ns
N of Previous Illnesses	.9	.88	1.6	1.7[1]	1.8	1.6	1.3	1.3[2]	.73	ns
N of Previous Surgeries	1.7	1.9	2.2	1.6	2.4	2.1	1.5	.85	.61	ns
N of Current Illnesses	.5	.7	.8	1.0	.5	.7	.6	.7[1]	.31	ns
Time Since Onset of GB Attacks (note 3)	11.1	15.3	42	60	39	58	21	38	.86	ns
Frequency of Attacks	10.6	12.8	13.2	12	3.8	9.8	8.6	10.1	1.1	ns
Intensity of Attacks (PPI)	2.5	1.6	3.6	1.1	3.0	1.4	3.0	.93	1.2	ns
Duration of Attacks	2.1	1.6	17.5	28.9	25.7	28.0	3.4	2.8	2.6	ns

Note 1: n=9 (data missing for one subject)
Note 2: n=7 (data missing for three subjects)
Note 3: Three subjects deny experiencing gallbladder pain

yielded no significant differences on the following variables also measured in the test battery: social desirability, locus of control, health locus of control, and self-control behaviours. Table 2 contains the means, standard deviations and F statistics for these variables.

3. Treatment Process and Other Variables

Scores for questions 1 through 3 on the Credibility-Expectancy Form 1 (Appendix H) were summed to provide an overall measure of credibility and expectancy for the interventions when they were first presented. Similarly, questions 1, 3, and 4 were summed on Form 2 in order to provide the same measure the afternoon before surgery. One-way ANOVAs indicate that there were no significant differences between the groups at either assessment point. Examination of the mean values indicate that all groups rated the interventions as highly credible and generated high expectancies for success. Table 3 presents the means, standard deviations and F statistics for the variables presented in this section.

The one-way ANOVA calculated for the number of days between the initial session and the surgery demonstrated a significant difference between the groups; $F(3,36) = 4.6$, $p = 0.008$. The Newman-Keuls procedure for multiple comparisons revealed that the mean for the Waking Analgesia Group was significantly higher than the other three groups (see Table 4). Examination of the raw data suggests that this is due to two subjects whose surgeries were each delayed for one month.

Subjects in the experimental groups kept records of the number of times they practiced the intervention strategies and, where applicable, the degree of relaxation achieved. A one-way ANOVA of the practice data revealed no significant group differences. A t-test revealed that the Self-Relaxation Group achieved a significantly greater subjective depth of relaxation compared to the Self-Hypnosis group; $t(16) = 2.6$, $p = .02$.

TABLE 2

Means and Standard Deviations for the Four Groups on Personality Variables (Comparability Data), N=10 per Group

VARIABLE	GROUPS (INTERVENTION CONDITIONS)									
	Self-Hypnosis		Waking Analgesia		Self-Relaxation		Control		F	p
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	(3,36)	value
Trait Anxiety	29.4	5.0	36.1	8.3	36.7	10.1	33.6	6.6	1.8	ns
Depression: Initial Level	3.8	4.5	6.0	5.3	7.5	4.5	4.5	4.3	1.3	ns
Neuroticism	5.9	2.8	10.5	6.2	9.5	4.7	9.2	4.8	1.7	ns
Extroversion	11.7	2.4	10.5	3.3	11.1	5.2	10.2	4.5	0.3	ns
Social Desirability	21.7	4.5	18.7	5.4	19.7	7.3	20.1	6.2	0.44	ns
Locus of Control(I-E)	6.5	3.8	8.2	3.6	11.0	4.0	8.3	3.9	2.3	ns
Health Locus of Control	34.5	7.3	33.5	6.1	35.4	10.7	40.8	3.6	1.9	ns
Self-Control Schedule	47.6	14.3	38.5	20.1	36.2	23.8	27.9	19.1	1.7	ns

TABLE 3

Means and Standard Deviations for the Four Groups on Treatment Process and Preoperative Affective Variables (Comparability Data), N=10 per Group

VARIABLE	GROUPS (INTERVENTION CONDITIONS)									
	Self-Hypnosis		Waking Analgesia		Self-Relaxation		Control		F	p
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	(3,36)	value
Credibility-Expectancy:										
1. Post-Training	246.2	63.2	252.6	37.5	263.4	27.1	250.4	48.9	0.25	ns
2. Preoperative	226.6	89.7	243.3	35.8	233.3	44.1	239.5	70.4	0.13	ns
Days Between Training and Surgery	10.8	4.2	18.7	9.0	11.9	1.8	13.3	2.2	4.6	.008
N of Times Practiced	7.1	3.0	11.7	16.0	7.9	5.0	---	---	0.96	ns
Tension Change	3.6	1.3	---	---	5.4	1.7	---	---	2.6	.02
Preoccupation with Surgery (note 1)	45.8	29.4	46.0	26.7	48.6	35.6	40.1	27.2	0.14	ns
Fear of Surgery (note 1)	33.0	26.7	27.9	23.3	45.2	36.4	34.7	22.1	0.69	ns
Preoperative:										
1. Anxiety	30.6	8.0	36.9	7.2	43.7	11.9	37.6	13.9	2.6	ns
2. Fear of Surgery	21.2	14.8	42.7	25.4	66.9	25.3	38.4	35.8	5.1	.005
3. Depression	0.3	0.7	1.9	1.7	2.6	2.3	1.7	2.2	2.8	.054
4. Physical Status	45.6	4.7	42.4	5.4	40.6	10.0	44.7	5.3	1.1	ns

Note 1: Measured during the initial session an average of 2 weeks prior to surgery
* t-test, df=16

TABLE 4

Summary of Newman-Keuls Method of Multiple Comparisons Applied to Group Means for the Number of Days Between Training and Surgery, N=10 per Group

Group	Mean
1. Self-Hypnosis	10.8
3. Self-Relaxation	11.9
4. Control	13.3
2. Waking Analgesia	18.7

Table of Q

	1	3	4	2
1		.67	1.5	4.8**
3			.86	4.2*
4				3.3*
2				

* $p<.05$, df=36
** $p<.01$, df=36

Further ANOVAs also yielded no significant differences between the groups on preoccupation with surgery and fear of surgery measured during the initial session. Similarly, there were no significant differences in preoperative anxiety or self-rated physical status. The data for preoperative depression were marginally significant; $F(3,36) = 2.80$, $p = 0.054$. The Newman-Keuls procedure indicates that this effect was due to the Self-Hypnosis group having significantly lower scores than the Self-Relaxation Group; $Q = 3.99$, $df = 36$, $p<.05$. All other comparisons did not reach statistical significance. Finally, fear of surgery, as assessed the afternoon prior to the operation, reveals highly significant differences between groups; $F(3,36) = 5.1$, $p = 0.005$. The Newman-Keuls procedure, indicates that this effect was due to higher preoperative fear ratings by the Self-Relaxation Group in comparison to the other groups (see Table 5).

B. Results Related to the Main Hypothesis of the Study

1. Major Outcome Measures

The outcome for the four groups was analysed with multivariate analysis of variance and covariance with repeated measures for the postoperative pain, affect, medication and activity variables.

There were 11 instances in which subjects did not complete postoperative data forms, accounting for 4% of the data set. Of these, 9 instances were encountered on the first postoperative day. These data were estimated conservatively using the grand mean for that data point (Cohen and Cohen, 1975).

A matrix of correlations between demographic, pain history, personality variables and the outcome measures was examined to determine the covariates. Three variables were chosen as covariates on the criteria

TABLE 5

Summary of Newman-Keuls Method of Multiple Comparisons Applied to Group Means for the Preoperative Rating of Fear of Surgery, N=10 per Group

Group	Mean
1. Self-Hypnosis	21.2
4. Control	38.4
2. Waking Analgesia	42.7
3. Self-Relaxation	66.9

Table of Q

	1	4	2	3
1		2.1	2.6	5.5**
4			.52	3.4*
2				2.9*
3				

* p<.05, df=36
** p<.01, df=36

of: 1) being significant correlations with most outcome measures, and 2) being nonredundant. They are trait anxiety, preoccupation with surgery and preoperative depression. These correlations are discussed in detail in Section C.

Multivariate analysis of covariance with repeated measures for the indices of the McGill Pain Questionnaire and Visual Analogue Scales revealed no significant main effect for groups or group x repetitions interaction. A highly significant main effect for repetitions reflect decreasing pain scores across the postoperative period. Analyses of variance for numbers of doses of analgesics received, and for activity level as well as analysis of covariance for postoperative depression also yield no significant groups main effects or group x repetitions interaction. Analysis of covariance of the postoperative anxiety measure revealed a significant main effect for groups ($F(3,33) = 4.2$, $p<.05$) as well as for repetitions ($F(5,180) = 17$, $p<.01$). There was no groups x repetitions interaction. The Newman-Keuls method of multiple comparisons indicated that the groups main effect was due to the Self-Hypnosis and Control Groups reporting less anxiety than the other two groups. These results are summarized in Tables 6 through 10. The repetitions main effect remained significant when tested with conservative degrees of freedom (Geisser and Greenhouse, 1958).

2. Additional Outcome Measures

In order to examine the effect of the experimental interventions on postoperative physical status, pre- to postoperative (day 6) difference scores were calculated for the Wolfer-Davis Recovery Index. These scores provide an index of self-rated change in physical status across the postoperative period. A one-way ANOVA was calculated using these data and yielded no significant effect for the experimental groups.

TABLE 6

Means and Standard Deviations for the Four Groups on the Postoperative Pain Measures Averaged Across Data Collection Points, N=10 per Group

VARIABLE	GROUPS (INTERVENTION CONDITIONS)							
	Self-Hypnosis		Waking Analgesia		Self-Relaxation		Control	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
PPI	1.67	0.4	1.73	0.73	1.83	0.37	1.87	0.37
PRI: Sensory	10.9	4.0	11.1	5.8	14.3	4.9	11.0	3.9
Affective	1.11	0.88	1.69	1.1	2.39	1.8	1.66	0.87
Evaluative	1.21	0.52	1.60	0.84	1.43	0.61	1.47	0.95
Misc.	2.8	1.2	3.14	1.5	3.71	1.8	3.34	1.5
Total	16.0	5.9	17.5	8.6	21.8	8.4	17.5	6.5
VAS: Pain	29.5	8.9	38.6	16.0	45.8	18.0	40.7	16.0
Distress (note 1)	23.8	7.0	37.6	14.0	41.0	19.0	39.8	16.0

Note 1: $F(3,36)=2.97$, $p=0.04$

TABLE 7

Multivariate Analysis of Covariance Summary Table for the Postoperative Pain Variables, N=10 per Group

Source	Variable	Mean Square	Univariate F	df	p value	Multivariate F (note 1)	df	p value
1. Groups (note 2)	PPI	0.45	0.21	3,33	ns	0.74	21,78	0.77
	PRIS	103	0.74	3,33	ns			
	PRIA	6.2	0.76	3,33	ns			
	PRIE	0.97	0.27	3,33	ns			
	PRIM	4.5	0.28	3,33	ns			
	VASP	749	0.56	3,33	ns			
	VASD	1135	1.0	3,33	ns			
2. Repetitions	PPI	9.4	26.0	6,218	0.0001	5.52	42,998	0.0001
	PRIS	730	27.5	6,218	0.0001			
	PRIA	28.6	14.4	6,218	0.0001			
	PRIE	12.0	14.1	6,218	0.0001			
	PRIM	105	22.9	6,218	0.0001			
	VASP	6809	33.5	6,218	0.0001			
	VASD	5463	22.8	6,218	0.0001			
3. Groups X Repetitions	PPI	0.28	0.79	18,218	ns	0.96	126,1402	0.61
	PRIS	25.9	0.97	18,218	ns			
	PRIA	2.24	1.13	18,218	ns			
	PRIE	0.44	0.51	18,218	ns			
	PRIM	5.77	1.26	18,218	ns			
	VASP	196	0.96	18,218	ns			
	VASD	197	0.82	18,218	ns			

Note 1: F-approximation for Wilks' Criterion.

Note 2: Covariates are trait anxiety, preoccupation with surgery and Preoperative Depression

TABLE 8

Means and Standard Deviations for the Four Groups on the Outcome Measures of: Mood, Doses of Narcotic Analgesics and Activity, N=10 per Group

VARIABLE	GROUPS (INTERVENTION CONDITIONS)							
	Self-Hypnosis		Waking Analgesia		Self-Relaxation		Control	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Anxiety (STAIS)	29.0	6.7	36.6	6.1	40.9	7.0	32.4	5.7
Depression (BDI-SF)	1.95	1.7	4.0	2.9	2.88	2.5	1.58	1.24
Doses of Narcotics	7.8	2.7	9.6	5.5	10.6	3.5	7.2	3.5
Activity Level	726	651	734	413	893	694	1175	736

TABLE 9

Summary of Analyses of Variance and Covariance for Postoperative Affects, Doses of Narcotic Analgesics and Activity Level

Source	Anxiety (note 1) df	M.S.	F	Depression (note 1) df	M.S.	F	Doses of Narcotics df	M.S.	F	Activity (note 2) df	M.S.	F
Group	3	586	4.2*	3	18.0	1.5	3	6.3	1.6	3	12000	.94
Covariates	3	981	7.0**	3	85	6.9**	---	---	---	---	---	---
Error	33	139		33	12.0		36	3.9		32	13000	
Repetitions	5	912	17**	5	28	8.5**	2	53	77**	2	64000	17**
Group X Repetition Interaction	15	53	.99	15	5	1.5	6	.34	.5	6	2800	.75
Error	180	54		180	3.3		72	.68		64	3800	

Note 1: Covariates are trait anxiety, initial level of depression, preoccupation with surgery
Note 2: Data missing for four subjects
* $p<.05$ ** $p<.01$

TABLE 10

Summary of Newman-Keuls Method of Multiple Comparisons Applied to Group Means for Postoperative Anxiety, N=10 per Group

Group	Mean
1. Self-Hypnosis	29.0
4. Control	32.4
2. Waking Analgesia	36.6
3. Self-Relaxation	40.9

	Table of Q			
	1	4	2	3
1		1.7	3.7*	5.9**
4			2.1	4.2*
2				2.1
3				

* $p<.05$, df=36
** $p<.01$, df=36

ANOVA was used to examine the effect of the experimental interventions on Impact of Stress Scale (ISS) scores. The number of days between operation and the administration of the ISS at the follow-up meeting was used as a covariate. This analysis revealed the expected significant effect for the covariate; ($F(1,34) = 8.8$, $p<.01$) and no main effect for groups.

Overall, the results of these analyses reflect the pattern found for the primary outcome measures: significant effects for repetitions with no differential effects for the interventions. Taken together, these analyses fail to support the two main hypotheses of this study. The experimental groups did not report less postoperative pain and emotional distress than the Control Group; nor were any differences found among the experimental groups.

C. Determinants of Postoperative Pain, Affect and Narcotic Requirements

The analyses presented in the previous section clearly indicate that the variances observed in the postoperative outcome measures cannot be reliably attributed to the effects of the interventions employed. In this section, the relationship between the outcome measures and the demographic, pain history, personality and process measures will be explored. In order to accomplish this, pain and affect measures were averaged across the postoperative period (day 1 through day 6). Total scores were calculated for number of doses of narcotics and for activity level. Data on the number of milligrams of morphine equivalents of narcotics received is highly correlated with the number of doses administered; $r = 0.83$. For this reason it was considered redundant to report data on both measures.

1. Correlations Between Outcome Measures and Demographic Variables

In order to explore the relationship between the outcome measures and the demographic variables, Pearson product-moment correlations were calculated. Table 11 presents the statistically significant correlations. (Where a priori hypotheses had been made, one-tailed probability levels were used to test the significance of the correlation coefficients. Notes at the bottom of the tables indicate to which variables this applied. In all other instances, two-tailed probability levels were used.) Perhaps the most striking feature of Table 11 is how few statistically significant relationships exist between these variables. The number of previous operations is not related to any of the postoperative measures, while the number of previous or current illnesses is only related to one measure each. Female patients scored higher on the sensory dimension of the McGill Pain Questionnaire and received more narcotics. On the other hand, older patients received fewer narcotics. Interestingly, patients with more education reported less pain across four of the eight pain measures.

2. Pain history measures derived from the Gallbladder Pain History Interview

These correlations are presented in Table 12. Once again there is a strikingly small number of significant relationships. The frequency, intensity and duration of gallbladder attacks appear to be largely unrelated to the postoperative measures. Only the duration of attacks is correlated with more than two postoperative indices. Patients experiencing longer attacks reported more pain on the Visual Analogue Scales and received more analgesics. Self-administration of analgesics for the gallbladder attacks was unrelated to the outcome measures. Self-report of pain behaviour was associated with higher postoperative anxiety and higher narcotic intake. Those patients who acknowledged another person's help

TABLE 11

Pearson Correlations Between the Outcome Measures and Demographic Variables, N=40

	PPI	PRIS	PRIA	PRIE	PRIM	PRIT	VASP	VASD	STAIS	BDI	Analgesics	Activity
Sex		.26*									.37**	
Age											-.34*	
Educational Level		-.31*				-.28*	-.28*	-.25*				
N of Previous Surgeries												
N of Previous Illnesses (note 1)							.37*					
N of Current Illnesses (note 2)					.30*							

* p<.05 ** p<.01; based on one-tailed probability levels for the following variables only: Sex, Age, Educational level, N of previous surgeries

Note 1: data missing for three subjects

Note 2: data missing for one subject

TABLE 12

Pearson Correlations Between the Outcome Measures and Gall Bladder Pain History Interview Measures, N=37

	PPI	PRIS	PRIA	PRIE	PRIM	PRIT	VASP	VASD	STAIS	BDI	Analgesics	Activity
Time Since Onset of GB Disease				.33*								
Frequency of Attacks/Mnth.									-.36*			
PPI(GB)												
Duration of Attacks							.33*	.35*			.31*	
Medication												
Pain Behaviour									.30*			
Prefers to be Alone in Pain					-.39**							
Someone Helps?											.35*	
Life Changed?											.36*	
Chronic Pain	.31*						.31*					

* $p<.05$ ** $p<.01$; based on two-tailed probability levels for all variables

during gallbladder attacks and those who felt that their life had changed as a result of these attacks also received more postoperative narcotics. Patients with ongoing or chronic pain problems (N = 13; 33%) reported more pain on measures involving a single intensity scale (PPI, VASP).

3. Personality Measures

These correlations are presented in Table 13. Three variables: trait anxiety, depression measured during the initial session, and neuroticism are highly related to the outcome measures. Several points concerning this relationship are worth noting. First, these variables are highly intercorrelated (see Table 14). Second, with several exceptions, they are most highly correlated with postoperative affect measures and the affective measures of pain (PRIA, VASD). This finding contributes to the impression that there is a distinct affective dimension of pain. Taken together these relationships suggest that an overall "emotionality" dimension is highly related to postoperative outcomes including pain, distress and analgesic requirements.

Extroversion was associated with higher PPI scores and higher medication intake. No significant relationships were found between the pain measures and measures of locus of control, health locus of control, self-control behaviours, absorption or hypnotizability.

Postoperative depression, was associated with internal health locus of control and high absorption. Higher levels of postoperative activity were associated with external locus of control and lower initial depression scores.

4. Therapeutic Process and Other Measures

Pearson correlations between these variables and the outcome measures are presented in Table 15. Examination of the results for the credibility-expectancy measure suggests no significant relationship with

TABLE 13

Pearson Correlations Between the Outcome Measures and Personality Measures, N=40

	PPI	PRIS	PRIA	PRIE	PRIM	PRIT	VASP	VASD	STAIS	BDI	Analgesics	Activity
Trait Anxiety	.26*	.30*	.43*	.28*		.33*	.35**	.47***	.53***	.42**	.28*	
Depression (Initial Level)		.25*	.26*			.26*	.35**	.47***	.50***	.51***	.39**	-.26*
Neuroticism	.27*			.27*			.36**	.44**	.52***	.47***	.32*	
Extroversion	.30*										.42**	
Locus of Control (I-E)												
Health Locus of Control										-.34*		.30*
Self-Control Schedule												
Absorption (note 1)										.41*		
Hypnotizability (note 1)												
Social Desirability												

Note 1: Subjects in the Self-Hypnosis and Waking Analgesia groups only, N=20 for Absorption; N=17 for Hypnotizability
* $p<.05$ ** $p<.01$ *** $p<.001$; based on one-tailed tests for the following variables only: Trait Anxiety, Depression, Neuroticism, Extroversion, Absorption and Hypnotizability

TABLE 14

Intercorrelations Among Affective Measures Recorded Prior to Surgery, N=40

	STAIT	EPIN	BDIIT	STAISPO	BDIPO
Trait Anxiety (STAIT)		.75***	.64***	.54***	.59***
Neuroticism (EPIN)			.64***	.42**	.50***
Depression: Initial Level (BDIIT)				.44**	.52***
Preoperative: Anxiety (STAISPO)					.57***
Depression (BDIPO)					

** p<.01 *** p<.001; based on two-tailed probability levels

TABLE 15

Pearson Correlations Between the Outcome Measures and Therapeutic Process and Other Measures, N=40

	PPI	PRIS	PRIA	PRIE	PRIM	PRIT	VASP	VASD	STAIS	BDI	Analgesics	Activity
Credibility-Expectancy 1												
Practice												
Credibility-Expectancy 2												
How Well Learned Techniques												
Credibility 3	-.34*											
How Helpful Was the Program?	-.41**			-.35*	-.31*	-.30*						
Reports from Others (note 1)									-.38*		-.43*	
Preoccupation with Surgery		.36*	.41**	.32*		.38*				.35*		
Fear of Surgery (Initial Level)		.38**	.53***		.26*	.41**		.26*	.44**	.35**	.30*	

continued on next page...

TABLE 15 Continued

Pearson Correlations Between the Outcome Measures and Therapeutic Process and Other Measures, N=40

	PPI	PRIS	PRIA	PRIE	PRIM	PRIT	VASP	VASD	STAIS	BDI	Anal-gesics	Activity
Fear of Surgery (Preoperative)			.29*						.62***	.42**	.25*	
Preoperative:												
Anxiety			.29*					.28*	.65***		.44**	
Depression	.26*	.27*	.42**	.27*		.32*	.54***	.60***	.63***	.50***	.30*	
Physical Status							-.31*	-.40**	-.58***	-.56***		
Technique Usage (note 2)			-.32*									
Self-Statement Inventory									-.46**		-.29*	
Cognitive Coping Strategies (note 3)	-.39**	-.30*	-.32*	-.37**		-.34*	-.40**	-.39**	-.41**	-.25 [4]		

Note 1: Subjects report of what they had heard about the post-operative period from relatives and friends (n=27)
Note 2: Subjects in the pain control techniques groups only (data missing for one subject, n=29)
Note 3: N=39, data missing for one subject
Note 4: P=.06
* p<.05 ** p<.01 *** p<.001; based on one-tailed probability levels for the following variables only: Fear of surgery, Preoperative Anxiety and Depression, Self-Statement Inventory, Cognitive Coping Strategies

the outcome measures for both the post-training and preoperative assessment points. This is also true for the number of times the interventions were practiced preoperatively as well as the subjects' ratings of how well they had learned the treatment strategies. Credibility measured postoperatively was related only to present pain intensity measure and to activity level. An additional question, using the visual analogue format, asked patients how well they had been able to control pain or discomfort with the techniques they learned. These scores were negatively correlated with four of the MPQ measures. Taken together these data indicate that the subjects' evaluation of the credibility of the treatment and their expectations that it would help them were unrelated to postoperative outcome. On the other hand, subjects who experienced relatively less pain appeared to attribute this to the effectiveness of the treatment.

Twenty-seven of the subjects recalled hearing about the postoperative period from friends and relations, and reported this during the GBPHI. These responses were scored as negative (e.g. "It's hell for the first few days", "The pain is unimaginable" etc.), mixed, or positive ("There's nothing to it", "It was a nice rest" etc.), and were given the scores -1, 0, +1 respectively. These scores were significantly negatively correlated with postoperative anxiety and medication intake, but not with the postoperative pain measures.

During the initial session, subjects rated how preoccupied and how worried they were about the upcoming operation. Fear of surgery was assessed again the afternoon prior to surgery. Several interesting relationships emerge between these variables and the outcome measures. First, the preoccupation and <u>initial</u> fear of surgery measure are related to most measures of postoperative pain. The <u>preoperative</u> fear of surgery measure is only correlated with PRIA. Moreover, PRIA is most strongly

correlated with the initial fear measure and with preoccupation. Second, for the postoperative affect measures, the time sequence appears reversed. While all three measures are correlated with postoperative anxiety and depression, they are more highly correlated with the preoperative fear of surgery measure. Finally, analgesic intake is associated with both of the fear of surgery measures and not with the cognitive preoccupation measure.

On the afternoon prior to surgery, state anxiety, depression and physical status measures were taken. The general anxiety measure (STAI-State) follows a similar pattern to the more specific fear of surgery measure collected at that time. That is, it is only correlated with affective pain scores (in this case PRIA and VASD) as well as being highly correlated with postoperative anxiety and analgesic intake. Preoperative depression, however, correlates with all the postoperative measures except PRIM and activity level. Preoperative self-rated physical status is correlated with postoperative affect (anxiety and depression) and visual analogue scales. It is interesting to note that preoperative affect measures are most highly correlated with the affective pain measures, again adding to the concurrent validity of the affective pain dimension. Overall, these correlations suggest that the better the patient feels before surgery, both physically and mentally, the better he or she will feel postoperatively as well.

The number of times the pain control techniques were used by subjects in the experimental groups was significantly correlated only with PRIA, suggesting that the effect of the interventions was primarily on the affective dimension of pain. The correlations for PRIS and PRIT approached significance; $r = -.28$, $p = .07$ and $r = -.25$, $p = .09$ respectively. This trend suggests that with a larger sample size a significant effect might be found for the sensory dimension as well.

Data were collected on the use of cognitive pain control strategies in two ways: the Postoperative Cognitive Coping Strategies Interview and the Self-Statement Inventory. The transcripts of the interview were scored as follows: equal coping and catastrophizing scored 0; primarily coping scored 1; and only coping scored 2. (There were no patients whose transcripts were classified as catastrophizing only or primarily catastrophizing). Correlations between this classification for coping strategies and the outcome measures are significant for all measures except PRIM and narcotic intake. These data suggest that the less a patient engaged in catastrophizing cognitions regarding the pain, the less postoperative pain and distress they experienced.

The results of the Self-Statement Inventory were expressed as a ratio of the scores for coping self-statements divided by non-coping or catastrophizing self-statements. This score was significantly correlated only with postoperative anxiety and medication intake. Correlations for the affective pain measures and postoperative depression approached significance.

5. Predictors of Postoperative Pain, Distress and Narcotic Requirements

The correlations presented thus far provide insight into the relationships of the postoperative outcome measures to relevant antecedent and process measures. This section will explore the extent to which these variables can be used to predict the level of postoperative pain, distress and analgesic requirements. To accomplish this, variables which were significantly correlated with the outcome measures were included in hierarchical step-wise multiple regression analysis for each outcome measure (Draper and Smith, 1966; Cohen and Cohen, 1975). The order of inclusion of predictor variables was based upon 1) the hypothesized extent of their influence and 2) the logical time sequence of their action or

influence. Specifically, the classes of variables were included according to the following scheme:

1) Demographic and personality variables

2) Variables associated with parameters of and responses to gallbladder disease

3) Affective and process measures recorded during the initial session

4) Preoperative measures

5) Postoperative process measures

The inclusion of predictor variables into the regression analysis was based on the level of the univariate correlation coefficient. All variables whose one-tailed univariate probability level reached .05 were included in these analyses. Therefore some variables with two-tailed probability levels between 0.1 and .05 were included. The problem of shared variances among the measures was approached by specifying a minimum F value of 2.0 for new variables to enter the regression equation (Nie, Hull, Jenkins, Steinbrenner and Brent, 1975). The results of these analyses are presented in Tables 16 through 26.

Perhaps the most striking feature of these analyses is the high level of prediction obtained. Significant regressions were obtained for each pain measure with an average of 45% of variance in pain scores explained. Significant prediction was also obtained for other outcome measures as well: 61% for postoperative anxiety, 48% for depression and 64% for narcotic requirements. This is impressive in that although the predictor variables are correlated with each other, a great deal more variance is explained with this multivariate procedure then with univariate correlations. The analysis for the activity data was not significant, reflecting the overall independence of this measure from other variables

TABLE 16

Results of Hierarchical Step-Wise Multiple Regression Analysis to Determine Statistically Reliable Predictors of Average Present Pain Intensity Scores

PREDICTOR VARIABLE	Pearson r	Multiple R^2	Change in R^2	df	F	p value
Extroversion	.30	.09	.09	1,37	3.7	ns
Trait Anxiety	.26	.18	.09	2,36	3.9	.05
Chronic Pain	.31	.25	.07	3,35	3.8	.05
Medication Bias	.31	.30	.05	4,34	3.7	.05

TABLE 17

Results of Hierarchical Step-Wise Multiple Regression Analysis to Determine Statistically Reliable Predictors of Average Pain Rating Index: Sensory Scores

PREDICTOR VARIABLE	Pearson r	Multiple R^2	Change in R^2	df	F	p value
Educational Level	-.31	.09	.09	1,37	3.8	ns
Trait Anxiety	.30	.16	.07	2,36	3.7	.05
Coping Style	***	.46	.30	5,33	5.5	.01
Depression (Initial Level)	.25	.49	.03	6,32	6.1	.01

*** This variable was contrast coded.

TABLE 18

Results of Hierarchical Step-Wise Multiple Regression Analysis to Determine Statistically Reliable Predictors of Average Pain Rating Index: Affective Scores

PREDICTOR VARIABLE	Pearson r	Multiple R^2	Change in R^2	df	F	p value
Trait Anxiety	.43	.18	.18	1,34	7.7	.01
Coping Style	***	.50	.32	4,31	8.0	.01
Prefers to be Alone in Pain	-.29	.54	.04	5,30	7.1	.01

*** This variable was contrast coded

TABLE 19

Results of Hierarchical Step-Wise Multiple Regression Analysis to Determine Statistically Reliable Predictors of Average Pain Rating Index: Evaluative Scores

PREDICTOR VARIABLE	Pearson r	Multiple R^2	Change in R^2	df	F	p value
Trait Anxiety	.28	.08	.08	1,34	2.9	ns
Time Since Onset of Gallbladder Attacks	.33	.17	.09	2,33	3.3	.05
Chronic Pain	.26	.22	.05	3,32	3.0	.05
Medication Bias	.32	.27	.05	4,31	2.9	.05
Preoccupation with Surgery	.32	.32	.05	5,30	2.8	.05

TABLE 20

Results of Hierarchical Step-Wise Multiple Regression Analysis to Determine Statistically Reliable Predictors of Average Pain Rating Index: Miscellaneous Scores

PREDICTOR VARIABLE	Pearson r	Multiple R^2	Change in R^2	df	F	p value
Coping Style	***	.19	.19	3,33	2.5	ns
Prefers to be Alone in Pain	-.39	.30	.11	4,32	3.3	.05

*** This variable was contrast coded

TABLE 21

Results of Hierarchical Step-Wise Multiple Regression Analysis to Determine Statistically Reliable Predictors of Average Pain Rating Index: Total Scores

PREDICTOR VARIABLE	Pearson r	Multiple R^2	Change in R^2	df	F	p value
Trait Anxiety	.34	.11	.11	1,34	4.3	.05
Educational Level	-.28	.17	.06	2,33	3.6	.05
Coping Style	***	.45	.28	5,30	5.0	.01

*** This variable was contrast coded

TABLE 22

Results of Hierarchical Step-Wise Multiple Regression Analysis to Determine Statistically Reliable Predictors of Average Visual Analogue: Pain Scores

PREDICTOR VARIABLE	Pearson r	Multiple R^2	Change in R^2	df	F	p value
N of Previous Illnesses	.37	.14	.14	1,31	5.0	.05
Neuroticism	.36	.36	.22	2,30	8.4	.01
Educational Level	-.28	.46	.10	3,29	8.2	.01
Duration of Gall-bladder Attacks	.33	.51	.05	4,28	7.4	.01
Medication Bias	.43	.56	.05	5,27	6.9	.01
Preoperative Depression	.53	.60	.04	6,26	6.6	.01
Chronic Pain	.30	.63	.03	7,25	6.2	.01
N of Patients in Room	.33	.67	.04	8,24	6.1	.01

TABLE 23

Results of Hierarchical Step-Wise Multiple Regression Analysis to Determine Statistically Reliable Predictors of Average Visual Analogue: Distress Scores

PREDICTOR VARIABLE	Pearson r	Multiple R^2	Change in R^2	df	F	p value
Trait Anxiety	.47	.22	.22	1,33	9.2	.01
Educational Level	-.25	.27	.05	2,32	5.8	.01
Duration of Gall-bladder Attacks	.35	.35	.08	3,31	5.6	.01
Neuroticism	.43	.42	.07	4,30	5.4	.01
Prefers to be Alone in Pain	-.29	.47	.05	5,29	5.1	.01
Medication Bias	.41	.51	.04	6,28	4.9	.01
Preoperative Depression	.60	.58	.07	7,27	5.3	.01

TABLE 24

Results of Hierarchical Step-Wise Multiple Regression Analysis to Determine Statistically Reliable Predictors of Postoperative Anxiety

PREDICTOR VARIABLE	Pearson r	Multiple R^2	Change in R^2	df	F	p value
Trait Anxiety	.53	.29	.29	1,32	12.8	.01
Locus of Control	.28	.35	.06	2,31	8.2	.01
Fear of Surgery (Initial Level)	.44	.44	.09	3,30	7.9	.01
Preoperative Depression	.63	.54	.10	4,29	8.7	.01
Fear of Surgery (Preoperative)	.50	.58	.04	5,28	7.8	.01
Self-Statement Inventory	-.46	.61	.03	6,27	7.0	.01

TABLE 25

Results of Hierarchical Step-Wise Multiple Regression Analysis to Determine Statistically Reliable Predictors of Postoperative Depression

PREDICTOR VARIABLE	Pearson r	Multiple R^2	Change in R^2	df	F	p value
Neuroticism	.47	.22	.22	1,37	10.4	.01
Health Locus of Control	-.34	.36	.14	2,36	10.1	.01
Depression (Initial Level)	.51	.41	.05	3,35	8.1	.01
Preoperative: Physical Status	-.55	.48	.07	4,34	7.8	.01

TABLE 26

Results of Hierarchical Step-Wise Multiple Regression Analysis to Determine Statistically Reliable Predictors of the Total Number of Postoperative Narcotics

PREDICTOR VARIABLE	Pearson r	Multiple R^2	Change in R^2	df	F	p value
Extroversion	.42	.17	.17	1,34	7.1	.05
Age	-.34	.30	.13	2,33	7.2	.01
Trait Anxiety	.28	.39	.09	3,32	6.8	.01
Sex	.37	.46	.07	4,31	6.7	.01
Duration of Gall-bladder Attacks	.31	.54	.08	5,30	7.1	.01
Neuroticism	.32	.57	.03	6,29	6.5	.01
Self-Statement Inventory	-.29	.64	.07	7,28	7.2	.01

measured in this study.

A second feature that is shared by the results as a whole is the pervasive influence of trait anxiety (STAI-Trait) and neuroticism (EPIN). At least one of these two variables are significant predictors for all the pain measures except PRIM accounting for an average of 15% of the total variance in pain scores.

Trait anxiety accounts for nearly half of the explained variance in postoperative anxiety. This is approximately 30% of the total variability in this measure. A similar relationship exists between neuroticism and postoperative depression, with EPIN accounting again for nearly half the explained variance.

Focusing on the results for the pain outcome measures (Tables 16 through 23), the contributions of several additional predictor variables are noteworthy. Among the demographic variables recorded, only educational level contributes to the prediction of more than one pain measure, explaining an average of 8% of the variance in 4 pain measures (PRIS, PRIT, VASP, VASD).

The coping style measure of Weinberger et al. (1979) also plays a significant role in the prediction of pain scores, accounting for an average of 27% for the variance in PRIS, A, M and T (Tables 17, 18, 20, 21). This variable was contrast coded for inclusion in the regression analyses (Cohen and Cohen, 1975). The first contrast compared the means of the low anxious and repressor groups, the second compared these groups to the high anxious group, while the third contrast compared the defensive high-anxious group to the other three groups. The resulting F ratios for the individual contrasts are presented in Table 41. What is remarkable about the results for this variable is that the prediction is largely due to significantly higher pain scores for the defensive high-anxious group

which was not represented in Weinberger's college student sample. Further exploration of the relationship of "coping style" to the personality and process measures will be presented in Section E.

While anxiety has traditionally been stressed in the literature on both acute pain and postoperative emotional distress, the role of depressive affect is scarcely mentioned. These analyses indicate that once the contribution of trait anxiety and neuroticism have been accounted for, depression still makes a contribution to pain ratings. Depression makes a small but significant contribution to PRIS, VASP, and VASD (Tables 17, 22, 23).

Pain measures comprising a single intensity dimension, PPI, PRIE and VASP, have two common predictors beyond the influence of trait anxiety and neuroticism. These are the presence of a chronic pain syndrome and the bias towards utilizing analgesics.

Among the gallbladder attack parameters, the duration-of-attacks measure contributes to the prediction of pain measured with the Visual Analogue Scales. The time since the first attack contributes only to PRIE scores.

The results of the Postoperative Cognitive Coping Strategies Interview, which are highly correlated with the outcome measures, do not make a significant contribution to the multivariate prediction of these measures. This is a consequence of shared variance between the cognitive coping variable and several of the personality variables. These personality variables entered the hierarchical regression analyses before the cognitive coping variable, so that all of the common variance is attributed to personality factors. The relationship of the cognitive coping variable to other variables measured in this study are presented in Section E.

The literature on postoperative distress has assigned a central role to the influence of preoperative anxiety and fear of surgery. These analyses confirm the contribution of the specific fear of surgery variable to postoperative anxiety. Both the preoperative rating and the one taken approximately two weeks prior to surgery make a significant contribution, together accounting for 13% of the total variance in postoperative anxiety. In order to appreciate the magnitude of this effect, it is important to note that trait anxiety, which entered the analysis first, accounts for 29% of the total variance. Preoperative anxiety (STAI-State) does not make a significant contribution whereas preoperative depression accounts for 10% of the total variance. On the whole, these data, while supporting the role of fear of surgery in contributing to postoperative anxiety, suggest that other variables measuring the patients' affective status may be equally or even more important in determining postoperative distress. Subjects reporting a higher proportion of coping to catastrophizing on the Self-Statement Inventory also reported less postoperative anxiety (Table 24).

Neuroticism accounts for nearly half of the explained variance in postoperative depression scores (Table 25). The depression score taken as part of the initial psychological test battery makes a small yet significant additional contribution as does preoperative self-rated physical status. External health locus of control is predictive of higher postoperative depression. (The opposite relation appears between Rotter's I-E scale and postoperative anxiety.) As with postoperative anxiety, the demographic and gallbladder pain history measures fail to contribute to the prediction of postoperative depression levels.

Extroversion scores account for the largest proportion of explained variance in narcotic requirements (Table 26). Other significant predictors

include the age and sex of the subject as well as trait anxiety, neuroticism, duration of gallbladder attacks and proportion of coping to catastrophizing cognitions on the SSI. Overall, these results indicate that higher narcotic requirements are reliably associated with extraverted, younger, female, anxious patients who reported relatively longer gallbladder attacks and more catastrophizing cognitions during the postoperative period.

D. Relationships Among the Dependent (Outcome) Measures

1. The Experience of Postoperative Pain

The results of the MANOVA presented in Section B revealed a highly significant main effect for repetition of the pain measures across time. Inspection of Figure 3 which displays average PRIT scores for each data collection period indicates a steady decrease in pain scores across the postoperative period. In order to compare the intensity of post-cholecystectomy pain to other clinical pains, the mean PRIT scores for other acute and chronic pains are also indicated on this figure (Melzack, 1975). While it is imprudent to use these data as a precise comparison of overall intensity of clinical pain syndromes, they do indicate that during the first two postoperative days, post-cholecystectomy pain treated with routine narcotic analgesia is in the range of other forms of clinical pain previously measured with the MPQ.

While most methods of pain assessment require the patient to rate their experience along an abstract intensity dimension, the MPQ has the advantage of using the richness and subtlety of language to describe the precise phenomena experienced by the patient. One benefit of this approach is that it is then possible to describe the collective experience of persons experiencing the same pain problem in a precise qualitative manner.

The descriptive words chosen by 30% or more of the subjects at each data collection point are displayed in Figure 4. There are 13 descriptors that meet this criterion. Overall, these data suggest a pattern of relatively higher intensity descriptors (e.g. stabbing, exhausting, throbbing) being used predominantly on the first postoperative day and diminishing in frequency rapidly across days 2 and 3. Relatively less intense descriptors (e.g. pulling, nagging, tight, tender, sore) show a more consistent pattern throughout the data collection period.

2. Relationships Among the Postoperative Outcome Measures

Intercorrelations among the postoperative outcome measures are displayed in Table 27. The correlations to the left of the dotted line represent the interrelationships among the MPQ indices. All correlations except that between PPI and PRIA have P values less than .001. The exceptionally high correlation between PRIT and its three major components, PRIS, PRIA and PRIM, is worthy of special attention. It suggests that while PRIT is perhaps the best overall measure by virtue of being the sum of the other PRI measures, it is clearly redundant when presented along with its components. Overall, the levels of the correlation coefficients are similar to those previously reported with a chronic pain population by Melzack (1975).

Inspection of the correlation between the MPQ indices and the Visual Analogue Scales reveal consistent highly significant correlations ($P<.001$). The mean of those correlations is .55 implying that the two systems of pain measurement are highly related and yet not redundant. On the other hand, the correlation between the two Visual Analogue Scales is so high, $r = .88$, that clearly, little additional information is gained from using two rather than one scale for the measurement of postoperative pain.

The correlations between the pain measures and postoperative anxiety

TABLE 27

Intercorrelations Among Dependant Measures, N=40

	PPI	PRIS	PRIA	PRIE	PRIM	PRIT	VASP	VASD	STAIS	BDI	Analgesics	Activity
PPI		.66	.36	.54	.65	.66	.65	.65	.28	.17	.34	.10
PRIS			.71	.62	.79	.97	.62	.60	.51	.18	.35	-.13
PRIA				.48	.65	.80	.50	.53	.50	.43	.06	-.11
PRIE					.71	.72	.53	.49	.40	.34	.24	-.03
PRIM						.88	.59	.64	.39	.28	.34	.04
PRIT							.65	.64	.43	.27	.32	-.10
VASP								.88	.42	.20	.22	-.07
VASD									.51	.26	.28	.04
STAIS										.61	.44	.09
BDI											.30	-.19
Analgesics												-.08
Activity												

r .25; p<.05
r .35, p<.01
r .45, p<.001; based on one-tailed probality levels

are all statistically significant, confirming the expected relationship between situational anxiety and pain experience. The relationship between the pain measures and postoperative depression scores are on the whole weaker than those for postoperative anxiety (the average r = .26). What is interesting, however, is that five of the eight pain measures are significantly correlated to postoperative depression, again with the highest correlation among the PRI measures being with PRIA and the highest correlation among the Visual Analogue Scales being with VASD.

The total number of narcotics administered during the postoperative course is significantly correlated with five of the eight pain measures (average r = .27) as well as with postoperative anxiety and depression. It is surprising that while narcotics are administered to relieve pain, the relationship between the subjective measures of pain and total number of doses is not strong.

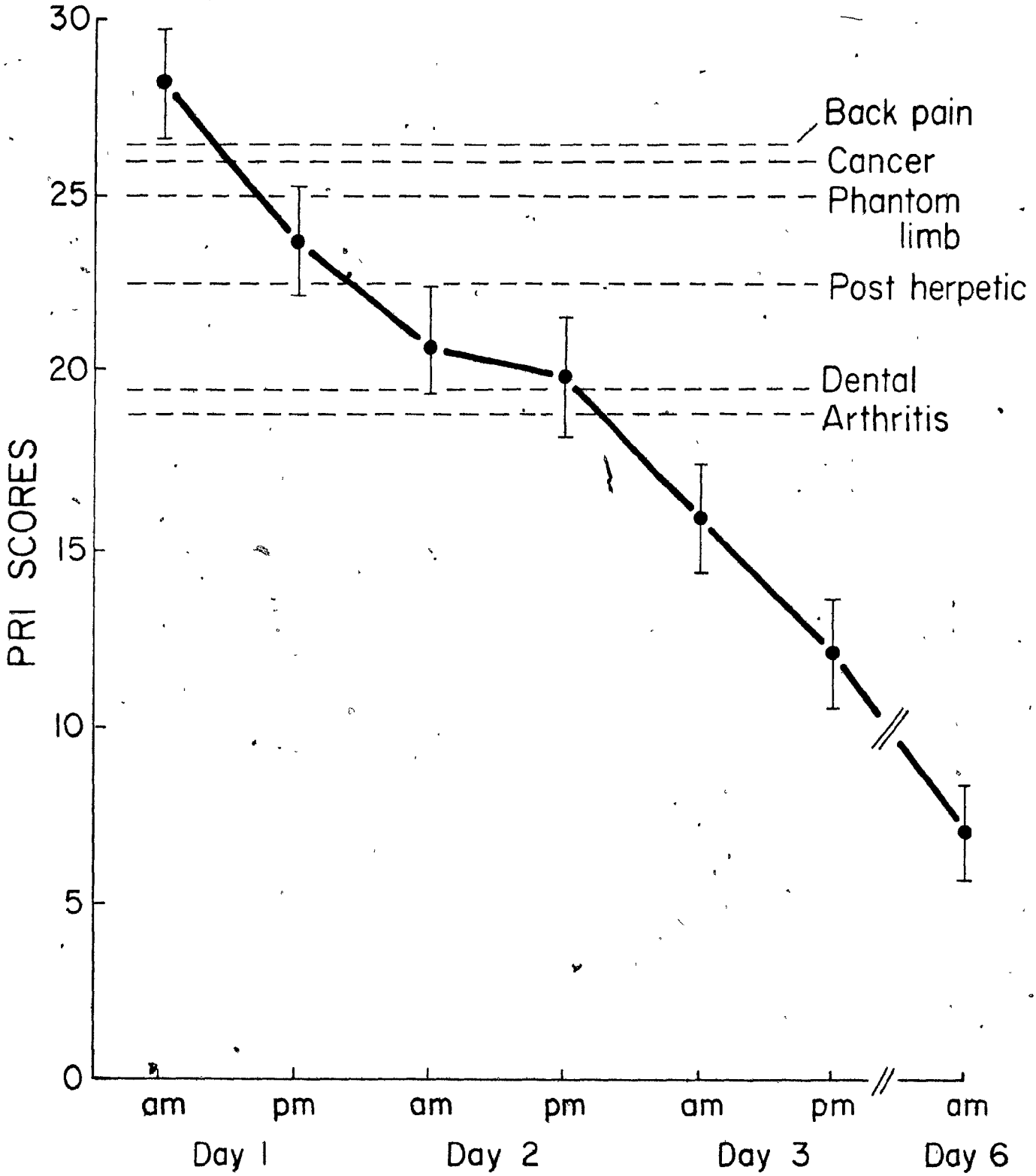
Activity monitor counts were not significantly correlated with any of the other outcome measures. The mean number of daily counts did, however, increase across the postoperative period: day 1 = 125, day 2 = 308, day 3 = 413. Taken together these data, while supporting the validity of the counts as a measure of activity, further suggest that the ankle placement for the device does not produce a measure of activity level that is sensitive to fluctuations in pain level.

3. <u>The Measurement of Pain in Relation to the Course of Post-Cholecystectomy Pain</u>

By measuring pain seven times during the postoperative course, it has been possible to accurately describe the average course of the postoperative pain experience (see Figure 3). These data are also valuable in so far as they can be used to address the following question: How many samplings (and at what times) are sufficient to accurately represent the

Fig. 3

Mean PRI : Total Scores During the Post Operative Recovery Period



total course of postoperative pain?

For each pain measure, Pearson correlations were calculated: 1) between scores for the individual sampling points and the average for the remaining samplings (Table 28, columes 1 through 7, and 2) between two sampling points on days 2 and 3 and the remaining 5 data collection points (columnes 8 and 9). Inspection of these results for the single sampling points on days 1 through 3 reveals high average correlations (across pain measures) but also high variability for individual measures. The day 6 correlations are both low and highly variable. Correlations for the two sampling points on days 2 and 3 on the other hand are consistently high for all pain measures (mean = .77, range .68 to .87 for the day 2 and 3 afternoon ratings). This suggests that measuring pain at these two time periods provides an adequate estimation of the total course of postoperative pain for any of the pain indices used in this study.

E. Relationships Among Independent and Process Variables

1. Factor Structure of the Personality and Affective Variables

The personality and preoperative affective variables were included in a principle components analysis with varimax rotation. Four factors emerged with eigenvalues greater than one. Together these factors account for 73.5% of the variance in the factor matrix. The factor loading matrix is presented in Table 29. The first factor has high loading exclusively for the trait and situational affective measures, and would appear to reflect a generalized emotionality dimension. The second factor has high loading for the self-control schedule, the absorption scale and hypnotizability and would appear to represent a capacity for goal-directed fantasy. The third factor has high loading for the two locus of control variables and clearly represents this dimension. The last factor

TABLE 28

Pearson Correlations Between Average Pain Scores and Those Measured at Individual Points During the Postoperative Course

PAIN MEASURE	Day 1 AM	Day 1 PM	Day 2 AM	Day 2 PM	Day 3 AM	Day 3 PM	Day 6	Day 2,3 AM	Day 2,3 PM
PRI:Sensory	.60	.56	.64	.73	.74	.50	.33	.76	.75
Affective	.60	.30	.77	.71	.69	.65	.14	.69	.80
Evaluative	.60	.38	.59	.57	.66	.46	.30	.70	.68
Misc.	.45	.30	.55	.54	.53	.49	.10	.62	.70
Total	.67	.49	.67	.72	.78	.54	.30	.76	.79
PPI	.67	.72	.39	.55	.62	.56	.50	.68	.76
VAS: Pain	.76	.62	.56	.71	.78	.70	.57	.76	.87
Distress	.53	.47	.59	.61	.85	.73	.67	.78	.82
Mean ($\bar{X}$)	.61	.48	.60	.64	.70	.58	.36	.72	.77

TABLE 29

Factor Loading Matrix Produced by Principle Components Factor Analysis with Varimax Rotation of Scores on the Personality and Affective Variables, N=40

VARIABLE	Factor 1	Factor 2	Factor 3	Factor 4
Trait Anxiety	.86	-.12	.04	.06
Depression (Initial Level)	.78	.16	-.02	.33
Neuroticism	.82	-.09	.05	.28
Preoperative Anxiety	.71	.32	.25	-.23
Preoperative Depression	.80	-.12	.00	-.25
Self-Control Schedule	-.50	.62	-.37	-.01
Hypnotizability (note 1)	.08	.82	.11	.03
Absorption	.00	.77	-.11	.08
Locus of Control	.15	.13	.75	.01
Health Locus of Control	-.06	-.25	.80	.04
Extroversion	-.20	.38	-.08	.70
Social Desirability	-.39	.18	-.16	-.75

Note 1: N=26

encompasses a high positive loading for extroversion and a high negative loading for social desirability, and appears to represent a dimension related to disclosure of information which is potentially threatening to self esteem. Overall, the factor structure of the standardized tests used in this study adheres remarkably well to the theoretical dimension on which these instruments are based.

2. Postoperative Pain Control Technique Use by Subjects in the Experimental and Control Groups

Data on the average number of times subjects in the experimental groups used the prescribed pain control exercises as well as the number of times the control group used the postoperative nursing exercises were included in a one-way ANOVA. This analysis revealed a significant difference between the groups. The Newman-Keuls procedure for multiple comparisons revealed that this difference was due to the higher group mean for the control group. This result is not surprising considering that the instructions for the postoperative exercises stressed hourly performance, while the instructions for the pain control exercises stressed that the exercises should be done as frequently as the subjects wished. There were no significant differences between the experimental groups. These analyses are summarized in Table 30.

The correlations presented in Section C indicated that more frequent use of the pain control techniques was associated with significantly lower PRIA scores and marginally significant decreases in PRIS and PRIT. These data suggest that although there were no differences in efficacy among the experimental groups, the use of any of the pain control techniques was associated with less pain. However, since Trait anxiety is significantly correlated with both technique usage and the measures of postoperative pain, it is not possible to definitively attribute the pain reductions to

TABLE 30

Summary of Means, Standard Deviations, One-Way ANOVA and Newman-Keuls Method of Multiple Comparisons for Postoperative Technique Usage

A.

	Self-Hypnosis	Waking Analgesia	Self-Relaxation	Control	df	M.S.	F	p value
N (note 1)	10	9	10	8	3,33	23.3	5.1	.005
Mean	2.6	3.4	2.0	5.8				
S.D.	2.2	2.8	1.2	2.3				

B.

Table of Q

	3	1	2	4
3		.85	2.0	5.4*
1			1.1	4.5*
2				3.4*
4				

Note 1: Data missing for 3 subjects

* $p<.05$

the use of the pain control techniques.

Significant Pearson correlations between antecedent variables and the number of times the pain control techniques were used are presented in Table 31. Overall, there is a strong correspondence between the variables that are correlated with technique usage and those that have been determined as predictors of postoperative pain, e.g. neuroticism, medication bias, preoccupation with surgery, and duration of gallbladder attacks. Note that the direction of the relationship is reversed for these variables. Technique use is most strongly correlated with the Self-Control Schedule, suggesting that subjects who use self-control techniques to deal with a wide spectrum of life problems are more likely to use them postoperatively as well.

In order to determine statistically reliable predictors of technique usage these data were analysed using hierarchical step-wise multiple regression in the manner described previously. These results are summarized in Table 32. This analysis accounts for 65% of the variance in technique usage with nearly half of this variability explained by scores on the Self-Control Schedule (SCS). The absence of a significant contribution for trait anxiety, neuroticism and medication bias results from shared variance with the SCS. Overall, these results suggest that while subjects who used the techniques more experienced less pain, the subjects who could benefit the most, those with high neuroticism scores, preoccupation with surgery and a bias toward using medication, were the subjects who used the strategies least (Table 31).

3. <u>The Credibility of the Interventions and Expectancy for Beneficial Results</u>

Credibility-expectancy measures were computed for each sampling period by summing the two credibility and single expectancy questions on each

TABLE 31

Pearson Correlations Between Relevant Anticedant Variables and the Average Number of Times the Pain-Control Techniques Were Used by Subjects in the Experimental Groups, N=29, (note 1)

Variable	r	p value
Self-Control Schedule	.54	.001
Neuroticism	-.44	.02
Preoccupation with Surgery	-.39	.05
Medication Bias	-.38	.05
Duration of Gallbladder Attacks	.35	.05
Health Locus of Control	-.30	=.056

Note 1: *Data missing for one subject
(All p values bases on two-tailed probability levels.)

TABLE 32

Results of Hierarchical Step-Wise Multiple Regression Analysis to Determine Statistically Reliable Predictors of the Use of the Pain-Control Techniques

PREDICTOR VARIABLE	Pearson r	Multiple R^2	Change in R^2	df	F	p value
Self-Control Schedule	.54	.29	.29	1,24	9.8	.01
Age	.34	.35	.06	2,23	6.3	.01
Duration of Gallbladdder Attacks	.35	.42	.07	3,22	5.2	.01
Credibility-Expectancy Preoperative: Q3	.33	.47	.05	4,21	4.6	.01
Preoccupation with Surgery	-.39	.54	.07	5,20	4.7	.01
Health Locus of Control	-.30	.61	.07	6,19	4.9	.01
Credibility-Expectancy Preoperative: Q2	.32	.65	.04	7,18	4.8	.01

questionnaire. The intercorrelations between questionnaire items are presented in Table 33. All p values for the intercorrelations are less than .001 and alpha reliabilities for the summed scores are .80, .88 and .81 respectively. These analyses provide definitive statistical support for this measurement strategy.

The intercorrelations between the combined measures and the variables measured in this study are presented in Table 34. One of the most interesting features of this pattern of relationships is the virtual absence of significant correlations with the measures that are strongly associated with the outcome measures e.g., trait anxiety, neuroticism, coping style and medication bias.

Hierarchical step-wise multiple regressions were calculated in the manner described previously, in order to ascertain which of these variables could be considered statistically reliable predictors of the credibility-expectancy measures. These results are presented in Table 35. The overall pattern here suggests that internal health locus of control and the capacity for goal-directed fantasy (high hypnotizability and absorption) are the most consistent predictors. This combination of attitude and cognitive skill is not, however, related to postoperative outcomes (see Section C).

Taken together, the results presented in this section provide statistical validity for a combined measure of credibility and expectancy as well as providing insight into the personality dimensions relevant to individual differences on this measure of non-specific treatment effects. In addition, these results clarify the independence of non-specific treatment effects and postoperative outcome.

TABLE 33

Correlations Among the Credibility and Expectancy Questionnaire Items, N=40

Post-Training Questionnaire

Question Number:	1	2	3
1		.55	.50
2			.66
3			

Preoperative Questionnaire

Question Number:	1	3	4
1		.66	.74
3			.77
4			

Postoperative Questionnaire

Question Number:	1	2	3
1		.52	.73
2			.51
3			

note: All p values less than .001; based on two tailed probability levels

TABLE 34

Pearson Correlations Between Credibility-Expectancy Measures and Other Variables, N=40

Variable	Post-Training r	Post-Training p value	Preoperative r	Preoperative p value	Postoperative r	Postoperative p value
Sex	.33	.05	---	ns	---	ns
Self-Control Schedule	.43	.01	---	ns	---	ns
Hypnotizability (note 1)	.53	.01	.46	.02	.45	.02
Absorption	.47	.005	.51	.001	---	ns
Health Locus of Control	-.35	.02	-.32	.05	-.30	.05
N of Gallbladder Attacks per Month (note 2)	---	ns	.39	.02	.32	.05
Life Change from Gallbladder Attacks	.34	.05	---	ns	---	ns
Fear of Surgery (Initial)	.37	.02	---	ns	---	ns
Preoccupation with Surgery	.44	.01	.37	.01	---	ns

Note 1: N=26
Note 2: N=37
(All p values based on two-tailed probability levels.)

TABLE 35

Results of Hierarchical Step-Wise Multiple Regression Analysis to Determine Statistically Reliable Predictors of Credibility and Expectancy

PREDICTOR VARIABLE	Pearson r	Multiple R^2	Change in R^2	df	F	p value
A. POST-TRAINING:						
Hypnotizability	.53	.28	.28	1,20	7.9	.05
Health Locus of Control	-.35	.39	.11	2,19	6.1	.01
Preoccupation with Surgery	.44	.46	.07	3,18	5.2	.01
B. PREOPERATIVE:						
Absorption	.51	.28	.28	1,20	8.0	.01
Hypnotizability	.46	.36	.08	2,19	5.3	.05
C. POSTOPERATIVE:						
Hypnotizability	.45	.20	.20	1,20	5.1	.05
Health Locus of Control	-.30	.28	.08	2,19	3.8	.05

4. Cognitive Coping Strategies: Interview Data

As reported in Section C, the results of the day 4 Cognitive Coping Strategies Interview correlated significantly with 8 of the 11 outcome measures.

A two-way ANOVA was calculated to assess the effects of the experimental interventions on postoperative cognitive coping and the changes in cognitive coping from gallbladder attacks to postoperative pain. The results of this analysis, presented in Table 36, indicate that while there was no significant effect for experimental groups, there was, however, a highly significant difference between the gallbladder and postoperative interview results. Inspection of the mean scores clearly indicates that subjects coped more and catastrophized less postoperatively than they did during gallbladder attacks. The lack of a difference between groups is particularly interesting in that the Control Group had no instruction in cognitive coping and yet received scores similar to those of the groups that received explicit training in these strategies. However, since the coping variable was scored with a 5 point category scale, the absence of a significant difference between the experimental and control groups may be due to the restricted range of this variable (Huskisson, 1974).

Individual differences in cognitive coping were further explored by examining the pattern of correlations between this variable and the demographic, personality, pain history and preoperative measure. Significant correlations are displayed in Table 37. Catastrophizing is associated with higher trait anxiety, initial and preoperative depression and the existence of an ongoing chronic pain problem. Conversely, subjects who had had more intense gallbladder attacks and who rated themselves as physically healthier catastrophized less. It is interesting that the

TABLE 36

Summary of Two-Way ANOVA to Test the Effects of Experimental Groups and Type of Pain Experience (Gallbladder Attack versus Postoperative Pain) on Cognitive Coping Strategies

Source	df	M.S.	F	p value
Groups	3	2.3	1.7	ns
Error (note 1)	28	1.4		
Type of Pain	1	25.6	21.1	.0001
Group X Type	3	1.3	1.1	ns
Error	28	1.2		

Note 1: The total N is reduced due to 8 subjects whose transcripts were rated as irrelevant to the scoring criterion

TABLE 37

Pearson Correlations Between the Results of the Cognitive Coping Strategies Interview and Other Variables (N=39)

VARIABLE	r	p value	VARIABLE	r	p value
Current Illnesses	-.32	.05 (note 1)			
Trait Anxiety	-.44	.01	Chronic Pain Problem	-.32	.05
Depression (Initial Level)	-.40	.01			
Self-Control Shedule	.28	.05	Preoperative: Depression	-.53	.001
			Physical Status	.44	.01
Gallbladder Pain Intensity: PPI	.31	.05 (note 2)			

Note 1: N=36
Note 2: N=37

correlation between cognitive coping and the Self-Control Schedule only approached significance, r = .28, p = .088. Overall, this pattern of correlations parallels that found for the postoperative outcome measures, and suggests that one mechanism by which these antecedent factors influence postoperative outcomes is through the subjects' cognitive responses to the postoperative situation.

Statistically reliable predictors of coping versus catastrophizing cognitions were determined through step-wise multiple discriminant analysis. In this analysis, the scores of all psychological tests completed prior to surgary were included. As can be seen on Table 38, three variables of the original 11, depression measured during the initial interview and during the afternoon prior to surgery and extroversion, were used to create a linear function which correctly classified 72% of the cases into the appropriate cognitive coping group. This result is particularly interesting considering recent theoretical formulations regarding the role of cognition in the etiology and maintenance of depression (Beck, Rush, Shaw and Emery, 1979).

5. Self-Statement Inventory (SSI)

As noted in Section C, subjects whose scores indicated relatively more coping than catastrophizing on this self-report inventory also reported less postoperative anxiety and required fewer narcotics (Table 15). The results of the SSI, however, were not related to pain levels. Inspection of the scale items suggests that this may well be due to the generality of the contents of many items. SSI scores derived solely from the additional items added at subject number 20, all of which relate to coping and catastrophizing specific to pain, correlate significantly with PRIE, PRIM, VASP, VASD as well as postoperative anxiety (see Table 39). These scores also yield a marginally significant correlation with the results of the

TABLE 38

Summary of Step-Wise Discriminant Function Analysis for Coping versus Catastrophizing Cognitive Strategies During the Postoperative Period

Discriminating Variables	Pearson r with the Discriminant Function		Wilk's Lamda	Discriminant F	p value	% of Cases Correctly Classified
Depression (Initial Level)	.80	p<.001	.70	4.9	<.006	72
Extroversion	.72	p<.001				
Depression (Preoperative)	.40	p<.01				

(All p values based on two-tailed probability levels.)

Postoperative Cognitive Coping Strategies Interview; $r = .35$, $df = 18$, $p = .06$.

Dividing the pain-related items on the SSI into coping and catastrophizing subscales revealed similar results (see Table 39) as those found with the Postoperative Cognitive Coping Strategies Interview. That is, the coping items were not significantly correlated with any of the outcome measures, while the catastrophizing items are correlated with six pain measures as well as anxiety and depression. Further, only the catastrophizing items are negatively correlated with the results of the day 4 interview; $r = -.44$, $df = 18$, $p = .02$. Since the SSI items are scored according to frequency of occurrence (i.e. rarely to almost always), these results both confirm the relationship between catastrophizing cognitions and pain levels found with the Postoperative Cognitive Coping Strategies Interview and further suggest that the more frequently this type of cognition occurs, the more intense the experience of pain.

Analysis of the internal consistency of the SSI reveals acceptably high Cronbach's alpha for the original scale: .79. The alpha for the pain items is somewhat lower: .65. Inspection of the scale alpha's, with individual items removed, suggest that a number of items do not contribute to the scale's reliability. Clearly this instrument would benefit from further development with larger sample sizes.

6. Coping Style

Subjects were classified into low-anxious, repressor, high-anxious and defensive high-anxious subgroups according to the scheme reported by Weinberger et al. (1979). This classification accounted for an average of 27% of variance in PRIS, A, M and T scores. As noted in Section C, this effect was due to defensive high-anxious subjects having significantly more pain than other subjects and secondarily to repressors reporting less pain

TABLE 39

Pearson Correlations Between Measures of Cognitive Coping and the Postoperative Outcome Measures

VARIABLE	PPI	PRIS	PRIA	PRIE	PRIM	PRIT	VASP	VASD	STAIS	BDI	Analgesics
Interview (note 1)	-.39*	-.30*	-.32*	-.37*		-.34*	-.40**	-.39**	-.41**	-.25[2]	
Self-Statement Inventory:											
a) Full Form, Ratio (note 3)									-.46***		-.29*
b) Pain Items Only (note 4):											
Coping											
Catastrophizing	.37*		.37*	.32[5]		.32[5]	.39*	.55**	.66***	.44*	
Ratio				-.37*	-.46*		-.41*	-.46*	-.45*		

Note 1: N=39, these results were reported in table 15 and are included here for comparison with the results of the SSI
Note 2: p=.06
Note 3: N=40
Note 4: N=20
Note 5; p=.08
* p<.05 ** p<.01 p<.001; based on one-tailed probability levels

than low anxious subjects (for PRIS and T only) see Tables 40 and 41. An ANOVA calculated on impact of stress scale (ISS) scores yielded a significant groups effect; $F(3,36) = 4.0$, $p = .02$. Results of the Newman-Keuls method of multiple comparisons presented in Table 42 indicate that this effect is due to higher scores for the defensive high-anxious group.

In order to further document this classification scheme, ANOVAs were calculated using the other antecedent (demographic, personal history and personality) variables as dependent variables. No significant effects were noted on the demographic or gallbladder pain history variables. It should be noted, however, that all six subjects in the defensive high-anxious group were female. All of the affective variables demonstrated significant effects reflecting covariance with trait anxiety. Among the non-affective trait measures, only extroversion and the self-control schedule demonstrated a significant group effect. Newman-Keuls analyses on the means for these variables presented in Tables 43 and 44, reveal two significant contrasts which are not consistent with the overall pattern of results. ANOVAs calculated on the fear of surgery data reveal a significant effect two weeks prior to surgery ($F(3,36) = 7.4$, $p = .006$) but no significant effect the afternoon prior to surgery ($F(3,36) = 2.3$, $p = .09$). Newman-Keuls analysis on the means of the initial fear of surgery measure again indicate significantly higher scores for the defensive high-anxious group (see Table 45).

Overall, these results suggest that subjects who are both highly anxious and defensive are most disturbed prior to surgery, have more postoperative pain and experience more distress.

TABLE 40

Means (and Standard Deviations) of the Postoperative Pain Measures for Patients Grouped According to 'Coping Style'

	PPI	PRIS	PRIA	PRIE	PRIM	PRIT	VASP	VASD
Low-Anxious (N=8)	1.8 (.44)	12.6 (2.5)	1.2 (.77)	1.2 (.30)	3.3 (1.1)	18.3 (3.9)	35 (13)	32 (12)
Repressor (N=13)	1.7 (.52)	10.4 (4.1)	1.1 (.82)	1.3 (.79)	3.0 (1.6)	15.8 (6.5)	38 (15)	31 (17)
High-Anxious (N=13)	1.8 (.63)	10.1 (5.1)	1.7 (1.1)	1.4 (.81)	2.8 (1.6)	15.9 (7.9)	37 (17)	37 (16)
Defensive High-Anxious (N=6)	1.9 (.62)	17.6 3.3)	3.7 (1.0)	2.0 (.67)	4.7 (.82)	28.1 (4.5)	50 (14)	48 (12)
p value	ns	.004	.0001	ns	.05	.002	ns	ns

TABLE 41

F Ratios Resulting from Group Contrasts for the Coping Style Variable with the Outcome Variables (note 1)

Contrasts (note 2)	PRIS F	PRIS df	PRIS p value	PRIA F	PRIA df	PRIA p value	PRIM F	PRIM df	PRIM p value	PRIT F	PRIT df	PRIT p value
1. Group: 1 vs 2	8.7	1,33	.01	2.3	1,33	ns	2.8	1,33	ns	5.6	1,30	.05
2. Groups: 1,2 vs 3	0.3	1,33	ns	2.8	1,33	ns	1.6	1,33	ns	0.3	1,30	ns
3. Groups 1,2,3 vs 4	4.2	1,33	.05	17.2	1,33	.01	6.8	1,33	.01	6.7	1,30	.05

Note 1: F ratios taken from hierarchical step-wise multiple regression analyses on the outcome measures where the coping style variable was contrast coded in the manner indicated here. Note that the degrees of freedom reflect the placement of these variables in the hierarchical regression.

Note 2: Groups: 1=low anxious (N=8); 2=repressors (N=13); 3=high anxious (N=13); 4=defensive high-anxious (N=6)

TABLE 42

Summary of Newman-Keuls Method of Multiple Comparisons Applied to 'Coping Style' Group Means of Impact of Stress Scale Scores

Group	Mean		Table of Q 2	1	3	4
2. Repressor	6	2		.84	.84	5.1**
1. Low-Anxious	10	1			.00	4.2*
3. High-Anxious	10	3				4.2**
4. Defensive High-Anxious	30	4				

* $p < .05$, df=36
** $p < .01$, df=36

TABLE 43

Summary of Newman-Keuls Method of Multiple Comparisons Applied to 'Coping Style' Group Means of Extroversion Scores

Group	Mean
4. Defensive High-Anxious	7.8
3. High-Anxious	10.7
2. Repressor	10.9
1. Low-Anxious	13.5

Table of Q

	4	3	2	1
4		2.4	2.0	4.7*
3			.17	2.3
2				2.1
1				

* $p < .05$, df=36

TABLE 44

Summary of Newman-Keuls Method of Multiple Comparisons Applied to 'Coping Style' Group Means of Self-Control Schedule Scores

Group	Mean		Table of Q 3	4	1	2
3. High-Anxious	24	3		1.5	3.1	4.4*
4. Defensive High-Anxious	33	4			1.5	2.9
1. Low-Anxious	42	1				1.4
2. Repressor	50	2				

* $p<.05$, df=36

TABLE 45

Summary of Newman-Keuls Method of Multiple Comparisons Applied to 'Coping Style' Group Means of Initial Fear of Surgery Ratings

Group	Mean
2. Repressor	21.6
1. Low-Anxious	31.1
3. High-Anxious	33.9
4. Defensive High-Anxious	73

Table of Q

	2	1	3	4
2		1.3	1.6	6.9**
1			.37	5.6**
3				5.2**
4				

** $p<.01$, df=36

DISCUSSION

The findings of the present study do not confirm the main hypotheses which were tested. Training in specific psychological pain-control techniques, including self-hypnosis, did not result in decreases in subjective pain, mood or medication requirements as compared to routine preoperative teaching presented alone. There are several possible explanations related to the design of the experiment which may be relevant to the lack of group differences.

Firstly, the sample studies were unrestricted with respect to the subject's level of hypnotizability. As previously noted, Hilgard (1979) has presented evidence from which it can be inferred that significant group differences are more likely to be found with samples of highly susceptible subjects. De Piano and Salzberg (1979), on the other hand, have recommended the use of unrestricted samples so that the mediating effect of hypnotizability can be further investigated. The latter approach was taken in the present experiment. The correlation between subjective pain level and susceptibility scores was, however, not significant for subjects in the self-hypnosis or waking analgesia groups. This was unexpected as the bulk of the literature on hypnotic pain control and susceptibility has yielded significant correlations (see Perry, et al., 1979; Wadden and Anderton, 1982).

The present results may be due in part to the pain measurement strategy employed in this experiment which involved obtaining pain ratings at fixed times during the postoperative course. While this provides an assessment of pain experience across the time frame of the experiment, it is not a measure of pain relief per se. In addition, since the subjects were instructed to use the strategies as often as they liked, rather than

on a fixed time schedule, the pain ratings may not have coincided with periods of diminished discomfort related to using the experimental pain-control techniques. This approach, however, permits patients to use the pain-control strategies in a way that is appropriate for their needs and has allowed this experiment to determine variables which are related to frequency of strategy use. That the techniques were effective in reducing pain can be inferred from the significant correlation between the frequency of technique usage and the affective pain score on the MPQ. The sensory score was also marginally significant. As both pain ratings and frequency of technique usage are correlated with trait anxiety, caution is suggested in asserting a strong direct relationship between pain scores and technique usage.

An additional design factor which may be related to the lack of group differences is related to the subjects' competence in using the techniques themselves. Patients who rated themselves as having learned the techniques best also used them the most postoperatively. This suggests that more extensive preoperative training may have enhanced the effectiveness of the experimental treatments. Indeed, case studies reporting successful use of self-hypnosis to control postoperative pain have employed highly trained subjects (Green, 1972; Daniels, 1976).

While there is no experimental hypnosis literature relevant to this point, examination of the results of relaxation training on postoperative pain is instructive. Contrary to expectation, the studies employing the most extensive preoperative training report negative results (Perri and Perri, 1979), while those using minimal training are most positive (Flaherty and Fitzgibbon, 1978; Voshell, 1980; Wilson, 1981). It is tempting to speculate that the timing of psychological interventions may be critical in determining how well and how often they are used postoperatively. Patients who are approached immediately prior to surgery may be motivationally at an optimal point to benefit from psychological preparation. On the other hand, patients approached several weeks prior to surgery may not be as motivated and, therefore, do not benefit as much from the more extensive instruction. Subjects of hypnotic case studies, however, have clearly persevered through extensive training, often over a period of several months.

A further possible explanation for the outcome of the present study is that it reflects the relative inefficacy of psychological preparations as a whole in influencing postoperative pain. As the literature review presented earlier in this thesis indicated, even the now generally accepted preoperative teaching procedures which have been studied for nearly twenty years have yet to demonstrate an effect on subjective pain reports. Other medical procedures involving acute pain where psychological interventions

have not affected subjective pain reports include cardiac catheterization (Kendall et al., 1978) and knee arthrography (Tan, 1980).

The lack of group differences observed in the results of this experiment may also reflect an influence on subjects' pain coping strategies which was common to all treatment groups--that is, all the interventions including preoperative teaching implicitly define postoperative pain as a benign experience which is controllable by the patient's personal efforts. The data obtained on cognitive coping stratagies illustrates this point. There was a highly significant increase in the number of patients classified as cognitive copers during the postoperative setting compared to the period during gallbladder attacks. Further, this rise in coping was consistent across treatment groups. This explanation is consistent with Reading's (1979) notion that one effect of preoperative teaching is to acquaint patients with opportunities for using their own coping abilities. The experimental pain-control strategies are perhaps an unnecessary adjunctive intervention once the subjects are cognitively prepared to use their own personally developed strategies. The prevalence of cognitive coping strategies in this population is suggested by data from this experiment where ten of ten subjects in the preoperative instructions-only control group indicated the use of coping strategies. What is interesting, however, is that only six reported using them during the gallbladder attacks. It is, of course, not logically necessary to attribute the increased utilization of cognitive coping strategies to the treatments used in this study unless these are compared to a group of patients who receive no intervention other than the measurement package. As already noted, current hospital practice make this comparison difficult to obtain.

One important contribution the present study has made is to clarify

the relationship between cognition and pain intensity. The results of the postoperative cognitive coping strategies interview are consistent with previous findings that subjects who engage in catastrophizing cognitions report more stress or pain than those who use cognitive coping strategies (Chaves and Brown, 1978; Brown and Chaves, 1980; Spanos et al., 1981). On the other hand, the relationship between the pain measures and the pain items on the SSI appear to be anomalous. Contrary to expectations, there were no significant correlates between the amount of time subjects acknowledged engaging in coping strategies and pain intensity. There were, however, strong correlations between the extent of catastrophizing and both pain and mood scores. Taken together the interview and SSI data suggest that while subjects who engage in coping strategies have less pain, the pain reduction may be more a result of avoiding engaging in catastrophizing strategies than anything inherent in the coping strategies themselves or the amount of time they are used. A similar conclusion was reached by Chaves and Brown (1978) regarding stress scores in a dental study. They found that there were no significant differences between subjects classified as copers and those who used no strategy. Both groups reported less stress than catastrophizing subjects. The present study extends this finding to the experience of acute pain. In an experimental pain setting, Spanos et al. (1981) found that subjects who used their own coping strategies did not report less pain after receiving instructions in an experimental coping strategy. Subjects who had catastrophized prior to instruction and who then coped did report less pain and demonstrated greater tolerance.

One of the practical implications of this finding is that it does not matter what subjects do in order to avoid catastrophizing as long as they do it. Stated in another way, one coping strategy is as good as another,

or none at all, as long as it precludes catastrophizing. From this perspective it is no surprise that after more than fifteen years of empirical research comparing subjects and patients prepared to face pain with a variety of strategies, no one strategy has been shown to be consistently superior to others. It is then also not surprising that in the present outcome study, all four subject groups demonstrated an equivalent increase in coping strategy use in the postoperative versus the gallbladder attack situation and that there were no group differences in pain scores. What is surprising is that the subjects in the preoperative teaching only group were consistently able to avoid catastrophizing. It is tempting to speculate that by explicitly defining postoperative pain as a normal experience and by instructing the subjects in non-cognitive control strategies such as medication use and physical exercise, subjects were more inclined to view the pain as benign enough to represent a minimal threat.

A second implication of these results is that the psychological mechanisms which precipitate, mediate and covary with catastrophizing are significant pain modulators which have not as yet been explicitly analysed by pain researchers. The personality and affective predictors of catastrophizing found in the present study were depressed mood, both two weeks and the afternoon prior to the operation, and high scores on social extroversion.

The association between depressed affect and a cognitive style consisting of selective attention to distressing stimuli and distortions of logical analytical thought patterns has been noted for some time (Ellis, 1962; Beck, 1967; Beck, Rush, Shaw and Emery, 1979). Indeed, a recent study of patients with chronic low back pain has found that patients who acknowledge the cognitive style attributed to depression by Beck (1967)

report more pain (Lefebvre, 1981). While recent neurochemical research has uncovered mechanisms which may effect both depression and pain (King, 1981; Ghia, Mueller, Duncan, Scott and Mao, 1981), an examination of depressive cognitive style, and, in particular, what has been defined in the current study as catastrophizing, suggests a psychological mechanism as well. The association between affect, cognition and pain found in the present study does not, however, contribute to the current debate on the primacy of cognition in determining emotional reactions (Zajonc, 1980; Lazarus, 1982). In the discriminant function analysis, depression was found to be a 'predictor' of coping versus catastrophizing cognition. The term 'predictor' implies a statistical relationship rather than a causal mechanism or temporal relationship.

Catastrophizing is characterized by a perceptual focus on pain. Indeed, obsessive attention to pain has been noted as a cardinal feature of patients with chronic pain syndromes (Pos, 1974). In contrast, distraction from the pain or its inciting stimulus has been widely acknowledged as an effective means of cognitive attenuation of pain (Tan, 1982).

A second feature of catastrophizing is the sense of being overwhelmed by pain: that is, being unable to tolerate or control it. The issue of control over aversive stimulation has been widely studied. Reviews of this area have indicated that the subject's sense of control over the pain or the pain-producing situation can be critical in mediating distress and pain (Averill, 1973; Thompson, 1981).

Finally, catastrophizing is often accompanied by an anticipation of pain resulting in undesirable or perhaps catastrophic consequences. This is of course the cognitive schema of anxiety (McReynold, 1968) whose relationship to pain has been discussed at length.

The role of extroversion in predicting catastrophizing cognitions is

less clear. Based on Eysenck's analysis, extroverts would be expected to have less pain with their lower physiological arousal and increased adaptive inhibition as compared to introverts (Eysenck, 1967). On the contrary, previous research has indicated that extroverts are more vocal in their complaints and receive more medication (Bond, 1971; Parbrook, et al., 1973). It is likely that the latter mechanism was responsible for the results reported here.

Taken together, these results indicate that patients' cognitions, particularly those identified as representing 'catastrophizing' which have been associated with depressed affect, are a significant factor in augmenting the perceptual intensity of postoperative pain. These results also provide a tentative explanation for the lack of a differential result for the cognitive coping strategies used in the present study and in the literature as a whole. An important implication of these results is that future research in this area would benefit from interventions specifically designed to help subjects become more aware of the occurrence of these 'catastrophizing' cognitions and provide effective means to avert them. This approach has been used successfully in the treatment of clinical depression (Shaw, 1977; Rush, Beck, Kovacs and Hollon, 1977) and chronic pain (Turner and Chapman, 1982b).

Finally, it is worth noting that while the SSI and the postoperative cognitive coping strategies interview provided consistent results, both measures were developed for this study and could benefit from further development.

An analysis of the internal consistency of the SSI yielded a sufficiently high alpha coefficient. It was also found, however, that several items did not contribute to the internal consistency of this questionnaire. Further, the original questionnaire was too broadly based

to accurately reflect pain related cognition. The results discussed above utilized the additional items added to the instrument while the experiment was in progress and suggests that the future development of a highly specific instrument devoted solely to pain related cognition would be of value.

The postoperative cognitive-coping-stratagies interview data were based on the scores obtained on three open-ended questions designed to assist patients in reporting their thoughts. That this approach yielded reliable results is encouraging. The scoring manual, however, is based on concepts of coping and catastrophizing derived from the literature and the author's experiences. A fruitful area for future research would be the development of a scoring system based on a more thorough knowledge of subject's perceptions of the dimensions on which these strategies differ (Wack and Turk, 1981). The interview itself could be expanded to include questions regarding stimuli precipitating strategy use, perceived effectiveness, level of absorption and extent of time committed to strategies.

The question of which patients will actually utilize pain-control strategies in which they have received instruction is one of great practical importance. The results of the correlational and regression analyses indicate that a patient's typical style for using self-control strategies as measured by the SCS is the best overall predictor of the use of pain-control strategies in the postoperative setting. Further, patients who had the strongest beliefs in the efficacy of the treatment as measured by the credibility-expectancy questionnaire were also more frequent users of the techniques. On the other hand, patients who were more trait anxious, who were more inclined to use medication when in pain and who were more external on the Health Locus of Control Scale, used the techniques

less. These results suggest that for this latter group brief self-control oriented training programs, such as the one used in the present experiment, may not be appropriate. It seems likely that these patients would benefit more from a program that included some external environmental control. In fact, several patients whose test scores placed them in this group, spontaneously commented that they would have used the techniques more often had the nursing staff been aware of the program and told them to listen to their tapes instead of giving them medication. That this conclusion is generalizable to other patient populations and self-control procedures is supported by several studies in the locus of control literature (see Wallston and Wallston, 1978).

The present study examined the interrelations among the MPQ and VAS pain rating methods, in addition to examining the effects of anxiety, depression and narcotic requirements. These results indicate that both the pain and affect measures showed the clinically expected pattern of decreasing scores across the postoperative period. Highly significant intercorrelations among the MPQ indices support the internal consistency of this measure for this population. Significant correlations between the MPQ and VAS measures indicate that they are indeed measuring a common dimension. The correlation between the VAS and the PPI (a simple VRS included in the MPQ) equalled 0.65. This is in the range of correlations reported by Reading (1981) who studied the correspondence between the PPI and VAS with a post-episiotomy pain population (r=.29 (day 1), r=.71 (day 2)). Other studies that compared similar scales with chronic pain populations reported correlations ranging from .64 to .87 (Woodforde and Merskey, 1972; Onhaus and Adler, 1975; Kremer, Atkinson and Ignelzi, 1981).

This is the first study which reports the relationship between the PRI scales of the MPQ and VAS scores. These correlations ranged from .49 to

.65. The highest correlations were between PRI scales which are mostly heavily loaded with sensory descriptors (PRI: S, M AND T). For these scales the range is .59 to .65.

Analysis of the pattern of scores across the postoperative period suggests that measuring pain at two time periods during the postoperative course, the afternoons of days 2 and 3, provides an adequate approximation for the average pain experienced across the post-cholecystectomy recovery period. If this result can be replicated by future research, it suggests that subsequent studies with this population can be less intrusive for the convalescing patient while maintaining methodological rigor. One would expect that this pattern would change for different operative procedures.

While it has become popular to use independent scales to measure pain and distress (Johnson, et al., 1978; Meichenbaum and Turk, 1976), the data presented here suggest that this practice is redundant for the post-cholecystectomy population.

The advantages of the VAS for measuring clinical pain have been reviewed previously (Huskisson, 1974; Kremer, Atkinson and Ignelzi, 1981). These reports have also indicated that the VAS method is inappropriate for some 7 to 11% of patients who were unable to use the scale to rate their pain. This problem was not encountered in the present study. This may be due to the instructions the patients received. The VAS was compared to measuring temperature with a thermometer having the freezing and boiling points of water as verbal anchors.

Taken together, these results indicate that the MPQ and the VAS are valid and appropriate indices for assessing postoperative pain. Both appear to reflect the clinical course of postoperative pain and reflect the patient's affective state. Both have shown adequate test-retest reliability in previous research (Melzack, 1975; Revill, Robinson, Rosen

and Hogg, 1976). The VAS has the advantage of simplicity and brevity. Previously reported difficulties, involving a subset of patients not being able to complete the VAS, appear to have been solved through a modification of the instructions presented. The MPQ on the other hand, while being somewhat more complex and time consuming, has the advantage of measuring three phenomenologically and statistically distinct dimensions of pain experience. Additionally, it has been demonstrated to be sensitive to diagnostically distinct pain syndromes as well as to pain therapies which have a differential effect on the pain dimensions it purports to measure (Melzack, et al., 1981). A choice between the MPQ and VAS can be based on these considerations.

One aim of the present study was to investigate the relationship between postoperative pain and a number of personality affective and demographic factors using a pain measurement strategy which reflected the most recent concepts in pain measurement (Fredrickson, et al., 1978; Melzack, 1983).

The expected relationship between higher levels of trait anxiety and neuroticism and increased pain perception was confirmed by the present results. These two factors together were the most important predictors of pain found in the multiple regression analyses. In contrast, situational anxiety and fear of surgery, assessed the evening prior to the operation, were not significantly correlated with most of the pain measures nor did they contribute to the prediction of pain levels. These variables were, however, highly correlated with postoperative emotional disturbance as measured by situational anxiety and depression. Together these results suggest that while the patient's preoperative emotional state is indeed a factor related to his postoperative emotional state, the patient's pain perception is more highly related to his dispositional, or typical

emotional reactivity. One implication of this result is that a surgeon wishing to identify a patient at risk for experiencing high levels of postoperative pain is best advised to consider the patient's typical emotional reactions rather than his preoperative emotional status. Secondly, while it has become customary to think of acute pain and anxiety as being highly related phenomena, the present results indicate that there is sufficient unique variances that even highly related affective factors measured prior to pain onset are not significantly correlated with either postoperative pain or concurrently measured situational anxiety. This relative disconnection between acute pain and anxiety can be seen in the results of many intervention studies which have found a significant treatment effect on anxiety but none for pain (Egbert, et al., 1964; Johnson, et al., 1978; Kendall, et al., 1979).

Because anxiety is traditionally believed to be especially relevant to acute pain, depressive affect is considered almost exclusively in relation to chronic pain (Sternbach, 1968; Weisenberg, 1977). The results of the present study suggest, however, that depression is a previously undetected factor influencing postoperative pain. Depression measured the evening prior to surgery was significantly correlated with 7 of the 8 postoperative pain measures while preoperative anxiety was significantly related to only 2 pain measures. These results are particularly interesting when one considers that the present sample was drawn from a normal population and that patients with severe emotional disturbance were screened out. The mean score on the Beck Depression Inventory was in the normal range ($\bar{x}$= 5.4), and only one patient's score indicated mild depression. This appears to suggest that variations in depressive affect that are considered to be within our cultural norm are in some way related to the perception of acute pain. The results already discussed relating depression to cognitive

coping style and pain suggest one possible mechanism.

It is also possible, however, that the scores on the Beck Depression Inventory were merely a reflection of disturbances in physical functioning related to having gallbladder disease. If this were the case, one would expect to find significant correlations between the preoperative Wolfer-Davis Recovery Index and postoperative pain. This index, however, was significantly correlated with only two pain measures (WASP, VASD, see Table 15, row labelled "Physical Status").

Another possibility is that the correlations are a reflection of neurobiological disturbances thought to underlie both depression and pain perception (King, 1981; Ghia et al., 1981). Again, this is unlikely since clinically significant depression was essentially absent in the population under study.

It was hypothesized that more extroverted patients would report more pain, affective disturbance and receive more analgesics. The relationship between extroversion and analgesic requirements was confirmed, supporting the results of several previous postoperative studies (Bond, 1971; Parbrook et al., 1973). With the exception of one significant correlation, the expected relationship between extroversion, pain and mood was not supported. This is consistent with a recent report by Tan (1980) who also failed to find a significant relationship between extroversion and acute pain.

An interaction between stress coping style and psychological preparation for patients about to undergo stressful or painful medical procedures has been noted in previous studies (Andrew, 1970; De Long, 1973). There has been, however, some concern over the concurrent validity of the measures used to assess coping style (Cohen and Lazarus, 1973). In the present investigation this factor was assessed using the method

developed by Weinberger et al. (1979) which employs stable personality measures, trait anxiety and social desirability. The Weinberger study demonstrated that this methodology produced a classification of subjects consistent with the physiological reactivity and subjective experience which are the defining parameters of the repressing, low anxious and sensitizing coping styles.

The effects of stress coping style on pain perception were explored through planned contrasts in the multiple regression analyses. Two interesting results emerged. First, repressors reported significantly less sensory, but not affective, pain on the MPQ than truly low anxious subjects. This result is consistent with Schwartz' (1982) conjecture that the repressing coping style results in a relative hemispheric disconnection. His disregulation hypothesis proposes that affectively negative stimuli are less intensely registered in the dominant cerebral hemisphere. Schwartz would also predict that repressing subjects would demonstrate heightened physiological arousal to such stimuli. Confirmation of this aspect of Schwartz' disregulation hypothesis must await future research wherein both physiological responses and subjective pain reports are measured.

The second finding was that, overall, defensive high-anxious patients reported more pain than the other groups based on sensory, affective, miscellaneous and total MPQ measures. Further, these patients were more fearful prior to surgery and rated the experience as significantly more stressful at follow-up. These results suggest that the defensive high-anxious patients represent a subgroup of the high trait anxious population who are at risk for experiencing high levels of postoperative pain as well as typical cognitive symptoms of prolonged stress reactions (Horowitz, et al., 1979).

Of the demographic factors included for analysis in this study, only

patients' educational level was significantly correlated with more than one pain measure. This is consistent with previous reports in the labour and postoperative pain literature which have found that more educated mothers reported less pain (Melzack, et al., 1981; Parbrook and Dalrymple, 1973). The reasons for this association are not clear. One possibility is that more educated subjects may be more inclined to present themselves as being stoical. Another is that they are coping with the pain differently, and consequently, diminishing its intensity. A detailed examination of this phenomenon must, however, be left to future research.

It is also interesting that the patient's sex, age and number of previous operations were unrelated to pain intensity. Higher analgesic requirements for females and lower requirements for older patients is consistent with previously published reports (Pilowsky and Bond, 1969; Wolfer and Davis, 1970; Parkhouse, et al., 1961; Johnson, et al., 1978).

It is significant that multiple regression analysis has been able to demonstrate the extent to which non-medical factors influence pain perception. That is, since the surgical lesions were similar for all patients, variance in pain scores must be attributed to other factors. That the multiple regression analyses were able to predict an average of 45% of this variance based on measures of personality traits, as well as situational, affective and cognitive variables is powerful evidence of the importance of non-physiological determinants of pain perception.

In summary, the present study failed to provide definitive results regarding the effectiveness of the components of self-hypnosis in an acute clinical pain setting. In fact, self-hypnosis as a complete treatment package did not produce evidence of enhanced pain relief beyond routinely administered preoperative teaching instructions. A number of possible explanations for this have been discussed. The limitations of the present

study, however, leave a number of unresolved issues.

Firstly, a post-gallbladder surgery population was chosen for study due to the initial severity and time-limited nature of the pain exerience. It is possible, however, that more definitive results may have been forthcoming in a population experiencing less intense pain and/or not also experiencing the effects of anesthetic agents or narcotic analgesics. The effects of these medications on patients' abilities to concentrate effectively on cognitive tasks has been well demonstrated (Bruce and Black, 1976; Kortilla, Ghoneim, Jacobs, Mewaldt and Peterson, 1981). These effects may have interfered with patients' abilities to effectively utilize the pain control procedures they had learned.

Secondly, the pain control strategies used in the present study may have been too complex and time-consuming for these patients to use efficiently. The self-hypnosis procedure took approximately thirty minutes to complete. Most patients stated that it was helpful in relieving pain and inducing sleep at night; during the day there was too much activity in their hospital rooms to use it effectively. Indeed, the average usage of the self-hypnosis procedure was 2.6 times per day. On the other hand, patients reported using their own self-generated cognitive strategies frequently. It is possible that interventions which encourage patients to use brief strategies of their own or those suggested by the reseacher might have been more successful. For example, the stress inoculation package developed by Meichenbaum and Turk (1976) has been demonstrated to be an effective intervention in a severely burned population (Wernick, Jaremko and Taylor, 1981) and for chronic low back pain (Turner and Chapman, 1982b).

A third limitation which has already been noted is related to screening patients in hypnosis research for susceptibility level. It is

possible that with a population screened for high levels of susceptibility more definitive results would be forthcoming. That is, using a highly susceptible population may be, as Hilgard (1979) has argued, more appropriate for answering theoretical questions related to the components of hypnotic analgesia. A word of caution is, however, appropriate. The issue of spontaneous strategy use may be exacerbated in a highly susceptible population. An example in the present study was a highly susceptible lady who had, on her own, developed an elaborate dissociation technique which she had been using successfully for several years to control gallbladder-attack pain.

Finally, the author personally conducted all of the pain-control interventions, leaving open the possibility of differential therapist effects (Turk, 1977). In order to minimize this possibility, all interventions were conducted using a written script and patients' expectations for success with the treatment were measured after the session. These ratings did not reveal a differential expectancy effect. Further, precautions could have included using a taped or bibliotherapy intervention (Glasgow and Rosen, 1978; Genest, 1979). The evidence available in the hypnosis and relaxation literature, however, suggests that this approach would be likely to be less effective (Paul and Trimble, 1970; Israel and Beiman, 1977; Johnson and Wiessen, 1979).

In conclusion, the results of the present study do not provide support for the enhanced effectiveness of self-hypnosis or relaxation training in producing pain relief in an adult population recovering from gallbladder surgery as compared to patients prepared with routine preoperative teaching. The results do, however, suggest that the patient's cognitions during the recovery period can have a significant impact on the intensity of pain perceived. The use of a comprehensive pain measurement strategy

which was found to adequately reflect the course of postoperative pain and to be internally consistent, has also demonstrated a number of factors, including trait anxiety, depressive mood, educational level, and stress coping style which taken together account for a considerable portion of the variance in pain scores.

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APPENDICES

APPENDIX A 1

Patient #_____

Date:_____

Self Statement Inventory

Listed below are several statements that people make to themselves (their thoughts) following gallbladder surgery. Please read each self-statement and indicate how frequently these self-statements characterized your thoughts since your operation. Please read each item carefully and then circle the appropriate number as it relates to your thoughts.

		hardly ever				very often
1.	I was thinking how nice it will be to eat whatever I like.	1	2	3	4	5
2.	I was worried about all the possible complications that could occur.	1	2	3	4	5
3.	I was thinking about the wonders of medical science and how lucky I was that they could do this for me.	1	2	3	4	5
4.	I was thinking about how long I had planned for this operation and how nice it is to finally get it over with.	1	2	3	4	5
5.	I was thinking what a relief it is to know that it was only my gallbladder and that there was nothing more serious wrong with me.	1	2	3	4	5
6.	I was thinking that the doctors and nurses looked too young and inexperienced.	1	2	3	4	5
7.	I kept thinking how little pain the operation caused and how easy it was to tolerate it.	1	2	3	4	5
8.	I was feeling confident in the skills of the doctors and nurses.	1	2	3	4	5
9.	I was concerned about the amount of medication I needed.	1	2	3	4	5
10.	I kept thinking that the operation might cause complications that would never go away.	1	2	3	4	5
11.	I kept reminding myself to think of pleasant things and take my mind off the pain and discomfort.	1	2	3	4	5
12.	I kept reminding myself about all the times in the past when I have been successful in coping with stress and pain and that this was not any worse than those situations.	1	2	3	4	5
13.	Since I wasn't in discomfort I was thinking of other things.	1	2	3	4	5
14.	I was worried that I might not recover from the operation.	1	2	3	4	5

		hardly ever				very often

	hardly ever				very often
15. I kept thinking about all the things that might go wrong while I was away from home and/or at work.	1	2	3	4	5
16. I kept thinking that I should not have let them do this operation on me.	1	2	3	4	5
17. I was thinking about the stitches breaking.	1	2	3	4	5
18. I was thinking about the things I needed to do to be a good patient.	1	2	3	4	5
19. I was thinking how nice it was to be able to rest and have others take care of me.	1	2	3	4	5
20. I kept thinking how much I dislike being away from home and/or work.	1	2	3	4	5

APPENDIX A 2

Patient #_____

Date:_____

Self Statement Inventory

Listed below are several statements that people make to themselves (their thoughts) following gallbladder surgery. Please read each self-statement and indicate how frequently these self-statements characterized your thoughts since your operation. Please read each item carefully and then circle the appropriate number as it relates to your thoughts.

		hardly ever				very often
1.	I was thinking how nice it will be to eat whatever I like.	1	2	3	4	5
2.	I was worried about all the possible complications that could occur.	1	2	3	4	5
3.	I was thinking about the wonders of medical science and how lucky I was that they could do this for me.	1	2	3	4	5
4.	I was thinking about how long I had planned for this operation and how nice it is to finally get it over with.	1	2	3	4	5
5.	I was thinking what a relief it is to know that it was only my gallbladder and that there was nothing more serious wrong with me.	1	2	3	4	5
6.	I was thinking that the doctors and nurses looked too young and inexperienced.	1	2	3	4	5
7.	I kept thinking how little pain the operation caused and how easy it was to tolerate it.	1	2	3	4	5
8.	I was feeling confident in the skills of the doctors and nurses.	1	2	3	4	5
9.	I was concerned about the amount of medication I needed.	1	2	3	4	5
10.	I kept thinking that the operation might cause complications that would never go away.	1	2	3	4	5
11.	I kept reminding myself to think of pleasant things and take my mind off the pain and discomfort.	1	2	3	4	5
12.	I kept reminding myself about all the times in the past when I have been successful in coping with stress and pain and that this was not any worse than those situations.	1	2	3	4	5
13.	Since I wasn't in discomfort I was thinking of other things.	1	2	3	4	5
14.	I was worried that I might not recover from the operation.	1	2	3	4	5

	hardly ever				very often

	hardly ever				very often
15. I kept thinking about all the things that might go wrong while I was away from home and/or at work.	1	2	3	4	5
16. I kept thinking that I should not have let them do this operation on me.	1	2	3	4	5
17. I was thinking about the stitches breaking.	1	2	3	4	5
18. I was thinking about the things I needed to do to be a good patient.	1	2	3	4	5
19. I was thinking how nice it was to be able to rest and have others take care of me.	1	2	3	4	5
20. I kept thinking how much I dislike being away from home and/or work.	1	2	3	4	5
21. I distracted my self by observing things around me.	1	2	3	4	5
22. I was thinking things like 'this is awful'	1	2	3	4	5
23. I concentrated on relaxing my muscles.	1	2	3	4	5
24. I thought about future plans.	1	2	3	4	5
25. I thought about something awful that once happened to me.	1	2	3	4	5
26. I imagined that the incision wasn't really a part of me, that it was separate from me.	1	2	3	4	5
27. I wished that the pain would hurry up and go away.	1	2	3	4	5
28. I repeated something comfortable and familiar like a poem, a prayer or even a word.	1	2	3	4	5
29. I was thinking something like 'why me, why should I have to suffer so much'.	1	2	3	4	5
30. I thought about music that I like and let myself go with the experience.	1	2	3	4	5
31. I was worried about the future and what might happen to me and my family.	1	2	3	4	5
32. I thought that if the pain continues I might panic or go crazy.	1	2	3	4	5
33. I imagined that the incision was numb or insensitive.	1	2	3	4	5
34. I imagined pleasant feelings coming from the incision.	1	2	3	4	5

APPENDIX B

Patient's Name_____ Date_____ Time_____ Rm. #_____

Unit #_____ Exp#_____ Day (0-3)_____ Test Time (1-3)_____

PPI_____ PRIS_____ PRIA_____ PRIE_____ PRIM_____ PRIT_____

STAI-A_____ Activity Meter_____ VAS_____

1.	FLICKERING ___	6.	TUGGING ___	12.	SICKENING ___	18.	TIGHT ___
	QUIVERING ___		PULLING ___		SUFFOCATING ___		NUMB ___
	PULSING ___		WRENCHING ___	13.	FEARFUL ___		DRAWING ___
	THROBBING ___	7.	HOT ___		FRIGHTFUL ___		SQUEEZING ___
	BEATING ___		BURNING ___		TERRIFYING ___		TEARING ___
	POUNDING ___		SCALDING ___	14.	PUNISHING ___	19.	COOL ___
2.	JUMPING ___		SEARING ___		GRUELLING ___		COLD ___
	FLASHING ___	8.	TINGLING ___		CRUEL ___		FREEZING ___
	SHOOTING ___		ITCHY ___		VICIOUS ___	20.	NAGGING ___
3.	PRICKING ___		SMARTING ___		KILLING ___		NAUSEATING ___
	BORING ___		STINGING ___	15.	WRETCHED ___		AGONIZING ___
	DRILLING ___	9.	DULL ___		BLINDING ___		DREADFUL ___
	STABBING ___		SORE ___	16.	ANNOYING ___		TORTURING ___
	LANCINATING ___		HURTING ___		TROUBLESOME ___		
4.	SHARP ___		ACHING ___		MISERABLE ___		PPI
	CUTTING ___		HEAVY ___		INTENSE ___	0	No pain ___
	LACERATING ___	10.	TENDER ___		UNBEARABLE ___	1	MILD ___
5.	PINCHING ___		TAUT ___	17.	SPREADING ___	2	DISCOMFORTING ___
	PRESSING ___		RASPING ___		RADIATING ___	3	DISTRESSING ___
	GNAWING ___		SPLITTING ___		PENETRATING ___	4	HORRIBLE ___
	CRAMPING ___	11.	TIRING ___		PIERCING ___	5	EXCRUCIATING ___
	CRUSHING ___		EXHAUSTING ___				

How intense is the pain you are feeling now ?

No pain ——————————— Worst pain possible

How distressing is it?

Not at all ——————————— Severely

APPENDIX C 1

POST OP PAIN CONTROL PROJECT - MEDICATIONS ADMINISTERED

Exp# _____ Date _____

A. Surgery

	Drug	Dose	Time
1)			
2)			
3)			
4)			
5)			

B. Day 0 PM

	Drug	Dose	Time
1)			
2)			
3)			
4)			

C. Day 1 AM

	Drug	Dose	Time
1)			
2)			
3)			
4)			

Day 1 PM

	Drug	Dose	Time
1)			
2)			
3)			
4)			

D. Day 2 AM

	Drug	Dose	Time
1)			
2)			
3)			
4)			

Day 2 PM

	Drug	Dose	Time
1)			
2)			
3)			
4)			

E. Day 3 AM

	Drug	Dose	Time
1)			
2)			
3)			
4)			

Day 3 PM

	Drug	Dose	Time
1)			
2)			
3)			
4)			

APPENDIX C-2

MORPHINE AND CHEMICALLY RELATED OPIOIDS

Table 22-2 A COMPARISON OF OPIOID ANALGESICS WITH RESPECT TO DOSAGE, DURATION OF ACTION, WITHDRAWAL SYMPTOMS, AND DISTINGUISHING FEATURES

NONPROPRIETARY NAME	TRADE NAME	DOSE * (*mg*)	DURATION OF ACTION * (*hours*)	WITHDRAWAL SYMPTOMS	DISTINGUISHING FEATURES ▲
Morphine		10	4-5	*see* text	*see* text
Heroin (diacetylmorphine)		3 (2-8)	3-4	like morphine	2
Hydromorphone (dihydromorphinone)	DILAUDID	1.5	4-5	like morphine	
Oxymorphone (dihydrohydroxymorphinone)	NUMORPHAN	1.0-1.5	4-5	like morphine	
Metopon (methyldihydromorphinone)		3.5	4-5	like morphine	
Codeine		120 (10-30)	(4-6)	*see* text	*see* text
Hydrocodone (dihydrocodeinone)	HYCODAN †	(5-10)	(4-8)	between morphine and codeine	4,7
Dihydrocodeine	PARACODIN †	60	4-5	between morphine and codeine	
Oxycodone (dihydrohydroxycodeinone)	PERCODAN †	10-15 (3-5)	4-5 (4-5)	close to morphine	9
Pholcodine (β-morpholinylethylmorphine)	ETHNINE, PHOLDINE	(10-15)	(4-5)	much less than codeine	3,4,5
Levorphanol	LEVO-DROMORAN	2-3	4-5	like morphine	7
Methadone	DOLOPHINE, etc	7.5-10	3-5	*see* text	6,8
Dextromoramide	PALFIUM	5-7.5	4-5	like methadone	3,6,8
Dipipanone	PIPADONE	20-25	4-5	like methadone	3,6,8,9
Phenadoxone	HEPTALGIN etc	10-20	1-3	less than morphine	3,9
Meperidine	DEMEROL etc	80-100	2-4	*see* text	1,7
Alphaprodine	NISENTIL	25-35	1-2	like meperidine	1,7
Anileridine	LERITINE	25-30	2-4	like meperidine	1,7

(See Jaffe, 1980.)

APPENDIX D

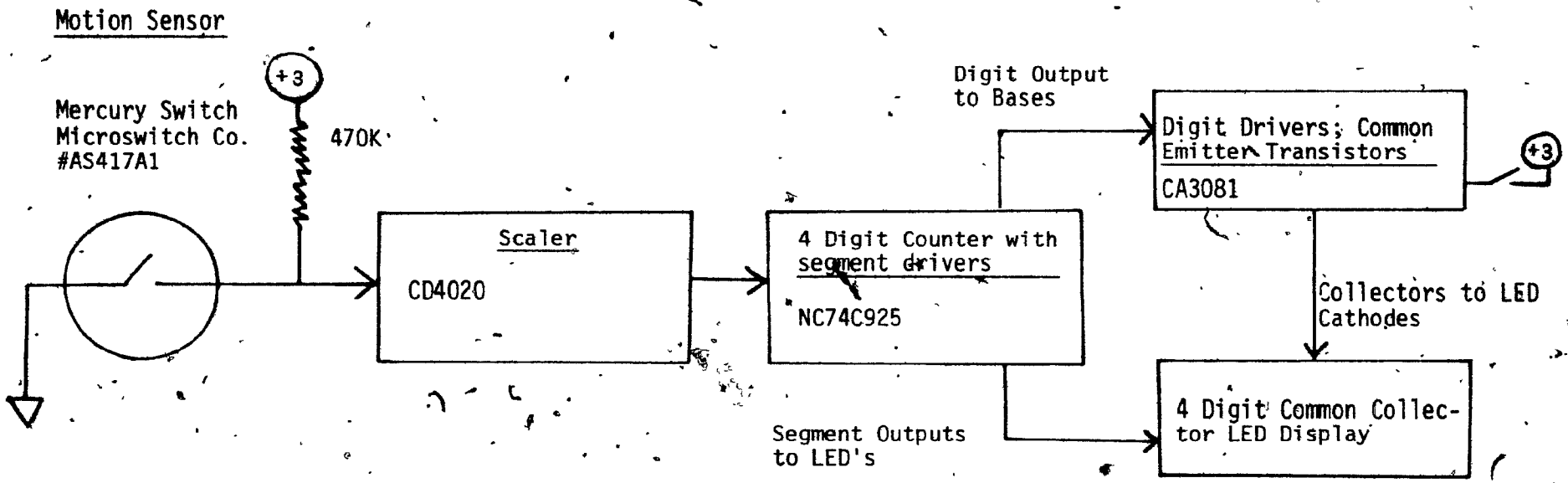
Many behavioural manifestations have been attributed to the experience of pain (Fordyce, 1976). For example, reduction of gross-motor activity level as a result of guarding the effected region, fatigue and depression have been widely cited (Sternbach, 1974). "Up time" (time spent out of bed) has proven a useful indicator of treatment effects in chronic pain patients (Fordyce et al., 1973). The LSI (large scale integrated circuit) sensor developed by McPartland et al. (1976), appears to offer the possibility of providing more accurate data on gross motor activity level than the simpler "up time" measure.

Mechanical testing with the LSI sensor indicated that the units tracked movements accurately and reliably between 0 and 440 movements per minute (McPartland, et al., 1976). Unpublished data reported in the same article indicated that the range for human activity is 0 to 200 movements per minute. Human experimental studies have indicated that the units provide a highly reliable continuous measure of activity that is linearly correlated with the velocity of walking and running on a treadmill as well as running in field trials (Foster, McPartland and Kupfer, 1978a). Both ankle and trunk placements of the device were tested. Both provided accurate and reliable data. The trunk placement was, however, able to discriminate between walking and running. In a further study where students wore the units for two days and kept activity logs, metabolic cost ratios were calculated and correlated with activity counts (Taylor, Jacobs, Schucker, Knudson, Leon and Debacker, 1978). The correlation for the trunk and ankle placements were .69 ($p<.01$) and .43 ($p<.07$) respectively. The marginally significant correlation for the ankle placement was attributed to subjects who engaged in high metabolic rate activities such as weight lifting which did not require ankle movements. In a clinical study, the LSI sensor accurately tracked changes in activity level in outpatients with bipolar manic depressive illness (Forster et al., 1978). Taken together, these data indicate that the LSI sensor is a valid and reliable instrument for monitoring human gross-motor activity.

Due to the relatively high cost of these units, $250.00 from GMM Electronics, Verona, PA, the original published specifications for the LSI sensor (McPartland, et al., 1976) were used to develop a less costly unit. In doing so, the motion sensing componant was preserved in order to make the units functionally identical to the original unit. It was found that by using more advanced integrated circuits the counting mechanism could be simplified at a reduced cost. Specifically the Mosteck MK5005 counter was replaced with a National Semiconductor 74C925 counter-driver. In addition, the reed relay switch to activate the LED display was replaced by a simple subminiature push button switch. These substitutions allowed the units to be built for $35.00 each and eliminated one integrated circuit from the design. The separate segment driver transistors included in the McPartland design are integrated into the 74C925 counter-driver. A flow diagram of the revised design is presented in figure D-1.

FIGURE D-1

CONCEPT SCHEMATIC OF CMOS ACTIVITY MONITOR



APPENDIX E

Name: _____

Pre Operative Pain History Interview

Section I: Gallbladder Disease History

1) Do you have painful gallbladder attacks? _____
If yes, continue; if no, go on the section II.

2) When did you have the first one? _____

3) Roughly speaking, how often do they occur? _____

4) Before your doctor diagnosed gallbladder disease, what were your thoughts about the cause of the pains?

_____

_____

5) Have you noticed that the attacks are begun by anything that you do or that happens to you (food intolerance, emotional stress?)

_____

_____

6) a. Place a mark on this line graph that would indicate the intensity of the pain of a gallbladder attack.

_____

Not painful Worst possible pain

b. Which of the following words would best describe the pain of a gallbladder attack?

__mild

__discomforting

__distressing

__horrible

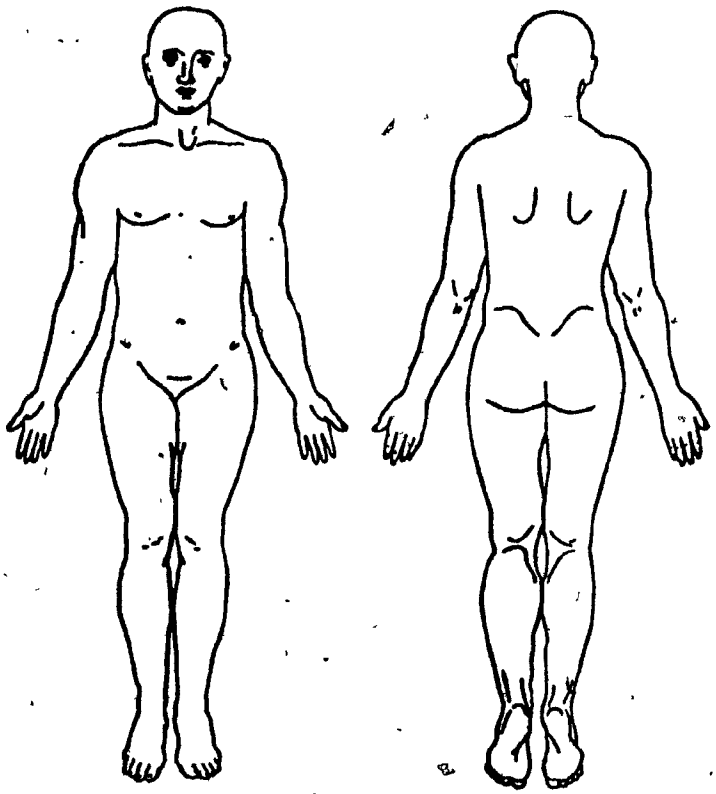
__excruciating

7) How distressing is an attack?

_____

Not at all Severely

8) Where do you feel it? Please mark on the drawings below where you feel pain.



9) How long does an attack last?_____

10) When an attack begins, what do you do?_____

_____

_____

11) What do you find yourself thinking about, imagining, and feeling during an attack?

_____

_____

_____

12) Is there anything that you do, think about or imagine to help you cope with the pain? If no, why not? If yes, what is it? Is it effective?

_____

_____

_____

13) Can you think of any (other) method that you haven't used that you might be able to use to reduce the pain of an attack?_____

_____

14) Do you take any medication?_____ What?_____

How much?_____ Do you take the medication immediately when the attack begins or do you wait? What do you wait for (how strong do you let the pain become before you take the medication)_____

_____

15) If I were there, how would I know that you were having an attack?_____

_____

16) Do you prefer to be alone or with other people when you have an attack?

_____

17) Is there anyone who helps you out when you are having an attack?_____

What do they do?_____

18) How has your life changed as a result of your gallbladder problems?

_____

_____

Section II: Pain History

1) Have you in the past or do you presently have any painful condition?

Condition	When	Treatments, Outcome

2) Has anyone in your family or close to you had a painful condition?

Who	Pt's Age	Condition	Contact c Pt.	Outcome of Condition

3) Have you known anyone with gallbladder problems? _____

Who? _____

4) Did they have surgery? _____ When? _____

In this hospital? _____ How did they describe the experience (e.g. anesthesia, quality of care, pain) _____

_____

_____

_____

Section III:

1) During the past week, how much have you been thinking about coming into hospital and having surgery?

Not at all ——————————— Cannot stop thinking about it

2) Are there things about coming into hospital or having surgery that worry you? _____ What are they?

_____

_____

_____

3) How worried or concerned about your operation are you?

Not at all worried or concerned ——————————— Very worried or upset

APPENDIX F 1

Post-Operative Day 4 Interview

Introduction

(To be tape recorded with patients' consent)

I'd like to spend a few moments with you discussing your experiences while you were initially recovering from your surgery. You've helped us a great deal over the past few days by filling in the forms we've given you to complete. These forms are very helpful to us in that they allow us to follow the changes in how you are feeling from one day to the next.

What our forms can't tell us, however, is very much about how you have coped with the experience during your recovery. That's what I would like to discuss with you now.

1) During the first few days after the operation, you had a certain amount of pain and discomfort. I'd like you to tell me what went through your mind while you were experiencing this. That is, I'd like to know what you were thinking about, feeling and what kind of mental pictures occurred to you while you were in pain. (If the patient says that mothing was going through their minds, say "something is always going through our minds all the time. but these thoughts happen so fast and are so automatic that we're not always aware of them. If you think back to a time when the pain was mounting, it might help you to recall what was going through your mind.")

2) Were there things that you thought about or imagined that helped you to deal with the pain or discomfort? What were they?

3) Were you able to use the things that we taught you about in this program?

4) What specifically, if anything, was helpful

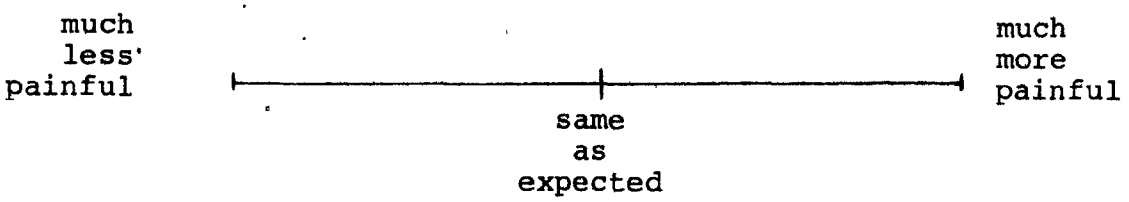
5) Did you find that listening to the tape recording itself was helpful to you?

6) People often have their own ways of coping with stress and pain that they use at times like this. Were there ways of coping with the stress of recovering from surgery that you used since your operation?

7) Were there coping strategies that you thought of and rejected?

8) Why, for each of the above.

9) Compared to what you had expected, how painful has your recovery been?



APPENDIX F 2

Post-Operative Pain Control Project

Scoring Manual for Verbal Reports of Cognitive Activity During Pain

The purpose of this manual is to guide you in scoring the verbal reports of patients who have recently participated in a research project assessing psychological influences on the experience of clinical pain. Each of the patients were interviewed both before and after they had gallbladder surgery. Each question was recorded and transcribed verbatim. (Occasionally a patient gave a long and irrelevant response. These responses were merely summarized. Instances of this sort are clearly indicated in the transcripts.)

The patients were asked the following questions in the Pre-Operative Interview:

Q 10) When an attack begins what do you usually do?

Q 11) What do you find yourself thinking about, imagining, and feeling during an attack?

Q 12) Is there anything that you do, think about, or imagine to help you cope with the pain? If no, why not? If yes, what is it? Is it effective?

The following questions were asked in the Post-Operative Interview:

Q 1) During the first few days after the operation you had a certain amount of pain and discomfort. I'd like you to tell me about what went through your mind while you were experiencing this. That is, I'd like to

know what you were thinking about, feeling, and what kinds of mental pictures occurred to you while you were in pain.

Q 2) Were there things that you thought about or imagined that helped you deal with the pain or discomfort? What were they?

Q 6) People often have their own ways of coping with stress and pain that they use at times like this. Were there ways of coping with the stress of recovering from surgery that you used since the time of your operation?

Your task is to rate subjects' responses to each question on two independant dimensions: 1) cognitive activity related to coping and 2) physical activity related to coping. Each response will then receive two scores, one for each dimension.

For the cognitive dimension you will be asked to classify the transcripts as showing evidence of:

1) Cognitive strategies for the self-control of pain

2) Catastrophizing or non-coping cognitive activity

3) Both of the above

4) Irrelevant cognitive activity or no cognitive activity.

For the physical activity related to coping you will be asked to classify the transcript as either:

1) Physical activity related to the self-control of pain, or

2) Irrelevant or no physical activity.

The following section details guidelines for you to use in making your ratings. In addition to determining the major classifications you will also be determining subclasses when appropriate.

I. Cognitive Activity Related to Coping:

A) Cognitive coping strategies for self-control of pain are defined as any cognitive activity (thoughts, images, fantasies) which the person uses to help him deal with the pain. This includes cognitive activities which may lead to reductions in pain intensity and/or make the pain easier to bear; that is, reduce the emotional reaction to the painful stimulation. Cognitive coping strategies include all of the following subclasses:

1) Distraction includes any strategy to divert attention away from the pain. These include strategies that involve internal focus of attention (thought diversion, imaginal inattention) or external focus of attention (attention diversion, physical distraction).

a) Thought diversion: thinking about things to get one's mind off pain: i.e. reciting prayers, poems, repeating mantras or words such as 'calm' or 'relax' or planning in detail a future project.

b) Imaginal inattention: focusing on a memory or image incompatible with pain: i.e. reliving in imagination a restful holiday or lying on a beach. This category of coping also includes fantasizing about future events: i.e. mentally rehearsing in imagery a planned holiday.

c) Attention diversion: focusing attention on something in the immediate environment and not on the pain. Examples include watching TV, listening to the radio, conversing with others, listening to the tape.

d) Physical distraction: involves any physical activity to help the subject take his/her mind from the pain. For example, taking a walk, beginning a task like house cleaning, or purposefully carrying on with an ongoing task in order to not pay attention to the pain. This is distinguised from physical activities to relieve pain:i.e. rubbing the painful area, lying down, or exercises which focus on the pain.

2) Coping Self-Statements: Talking to oneself in a way to produce

confidence, regain perspective, remind oneself of one's strengths and abilities or giving oneself helpful instructions:i.e. now just stay calm, don't worry it won't last forever, I've coped with worse so I can cope with this.

3) Somatizing: Concentrating on bodily processes in an effort to control them: i.e. imagining alterations in sensations that would reduce pain, as in imagining that the incision is warm and comfortable or inducing sleep. Note that to rate a response as somatizing the coping effort must be cognitive. If it is physical and directed toward the pain: i.e. muscular relaxation, breathing exercises, it is classified as a physical activity to relieve pain.

4) Dissociation: Separating one's self from one's body or the part of the body that is painful: i.e. imagining that the operative incision isn't really a part of them and therefore any pain is not really happening to them.

5) Unspecific Coping: This classification is to be used for transcripts that clearly involve coping responses but where there is not enough information to use a specific category: i.e. I handle it, or you just have to cope with it, that's all. This category implies that the subject was engaging in coping activities of some sort but what specifically these activities were is not clear.

B. Catastrophizing or Non-Coping Strategies

Some people engage in cognitive activities which would seem to be associated with negative emotional reactions to pain and which likely inhibit the use of coping strategies. These include:

1) Negative Self-Statements: i.e. I can't stand this; This pain is going to kill me; I'm no good; I can't stand it any longer.

2) Catastrophizing Thoughts: Thoughts about terrible things that have happened in the past or that might happen in the future: i.e. thinking that they might have cancer and die a slow and horrible death or that they should not have let the doctors do the operation on them because of complications that will set in and won't go away.

3) Catastrophizing Images: An image involving a terrible thing that has happened or might happen: i.e. imaging that the stitches are going to break and the incision open up and their guts spill out or remembering a bloody accident that they have seen and seeing the blood gushing all over.

C. Both Coping and Catastrophizing Strategies Present:

When a transcript contains both coping and catastrophizing use this classification and indicate which subclasses of coping and catastrophizing are present. Assess the relative intensity of each to determine if the transcripts are predominantly coping, predominantly catastrophizing, or equally coping and catastrophizing. The following are guidelines for making this distinction:

a) Disregard neutral and irrelevant statements.

b) Examine the coping and catastrophizing statements with respect to implied intensity and chose the most intense dimension for your rating. For instance, if the person responds "I tried the relaxation exercise but it didn't help too much.....then I really got nervous and wondered if I was going to die from the operation." You would rate this response as predominantly catastrophizing due to the intensity of the catastrophizing thoughts and the weakness of the coping effort.

c) If the coping and catastrophizing aspects of a transcript are in your opinion equal, rate the response as equal.

D. Denies any Cognitive Activity or Irrelevant Cognitive Activity:

Use this classification if the subject claims that they did not think of

anything or if they merely describe the situation in which they were experiencing pain without any specific reference to a cognitive strategy.

Notes:

1) Sometimes it is difficult to classify a statement as coping or catastrophizing. It is sometimes helpful to turn the statement around and see if it is then clearly one or the other. For example "It's worse than I thought" seems like it might be catastrophizing. Turningit into "It's better than I thought" is clearly coping - a positive self-statement. It is appropriate to classify "It's worse than I thought" as a negative self-statement.

2) If after puzzling over a transcript you still can't decide if there is evidence for a cognitive strategy, rate it as indeterminant. It is better to be conservative than to bend the classification rules.

II. Physical Activity Related to Coping

A) Physical Strategies to Cope with Pain

This includes any physical activity that the subject initiates that is directed towards changing the pain. For example, lying down, sitting up, rubbing the painful area, doing relaxation exercises or deep breathing. Note that these are distinguished from physical distractors which are activities to draw attention away from the pain.

B) Medication

Use this classification if the subject actively seeks medication. If the subject says that the nurses gave them the medication it should not be considered as actively seeking medication.

C) No Physical Activity to Deal with the Pain

Use this classification if you do not find evidence of physical coping strategies.

Before you are given the actual research transcripts to rate you will be given 10 practice transcripts. Rate the first 5 with the other rater. Discuss your ratings together and resolve any disagreements. Rate the last 5 practice transcripts independently and resolve any disagreements afterwards.

For each research transcript you will be given an answer sheet with the patient's experimental number and spaces for you to indicate your ratings and for notations and comments. Be sure to read each response carefully before you make your rating. You and the other raters will be asked to resolve any differences in your ratings once the rating of all the transcripts has been completed.

APPENDIX G

Name:_____

Post Operative Pain Control Study

Post Hospitalization Follow up Interview

Date:_____

1) How much did what you learned through this program help you to cope with what you experienced in hospital?

Not at all _____ Very much

2) Specifically, what aspects of the program where helpful to you, and what did they help you with?

_____

_____

_____

_____

3) Were there aspects of this program that were a hindrance, annoying, irritating, etc._____ What were they?

_____

_____

_____

4) Would you recommend this program to a friend?_____

5) If you were free to change it, which aspects of the program would you:

leave out_____

add_____

do differently_____

6) Is there anything you would like to know about or tell us about? Either about the research program or your experiences in hospital? (Record questions)

_____

_____

_____

APPENDIX H 1

Patient No: _____

Date: _____

Treatment and Staff Evaluation Form 1

Please place a mark on the line graphs below to indicate your answers.

1) How sensible does this treatment seem to you?

Not at all |——————————————————————| Very

2) How well have you learned the techniques described in the treatment?

Not at all |——————————————————————| Perfectly

3) How much do you expect these techniques to help you to control pain and feel more comfortable after your operation?

Not at all |——————————————————————| Very Much

4) If you learned that a relative or friend were about to have surgery, how confident would you be in recommending this treatment to them?

Not at all |——————————————————————| Very confident

5) How worried or concerned about your operation are you?

Not at all worried or concerned |——————————————————————| Very worried or concerned

6) Overall, how painful do you expect the post operative recovery period to be?

Not at all painful |——————————————————————| Worst possible pain

There are several researchers at the hospital working on this program. We would like to know your reactions to the researcher who was your instructor.

7) How helpful was your instructor?

Not at all |——————————————————————| Very

8) How likeable was your instructor?

Not at all |——————————————————————| Very

9) How well did your instructor know how to do his (her) job?

Not at all |——————————————————————| Very well

APPENDIX H 2

Patient# _____

Date: _____

Treatment and Staff Evaluation Form 2

Plase place a mark on the line graphs below to indicate your answers.

1) How sensible does this treatment seem to you?

Not at all |——————————————————| Very

2) How much do you expect these techniques to help you to control pain and feel more comfortable after your operation?

Not at all |——————————————————| Very

3) If you learned that a relative or friend were about to have surgery, how confident would you be in recommending this treatment to them?

Not at all |——————————————————| Very Confident

4) In general, how often do you take medication when you experience pain or discomfort.

Not at all |——————————————————| Always

APPENDIX H 3

Patient #_____

Date:_____

Treatment Evaluation Form: 3

1) How sensible does this treatment seem to you.

Not at all ——————————— Very

2) How well were you able to control pain or discomfort with the techniques you learned in this program?

Not at all (no control) ——————————— Perfectly (Complete control)

3) If you learned that a relative or friend were about to have surgery, how confident would you be in recommending this treatment to them.

Not at all ——————————— Very Confident

APPENDIX I

Wolfe - Davis Scale

Please rate your present condition on each of the following:

1) Sleep:

Very Poor Poor Fair Good Very Good Excellent

2) Appetite:

Very Poor Poor Fair Good Very Good Excellent

3) Strength and energy:

Very Poor Poor Fair Good Very Good Excellent

4) Stomach Conditions:

Very Poor Poor Fair Good Very Good Excellent

5) Bowel Condition.

Very Poor Poor Fair Good Very Good Excellent

6) Urination:

Very Poor Poor Fair Good Very Good Excellent

7) Self Assistance:

Very Poor Poor Fair Good Very Good Excellent

8) Movement:

Very Poor Poor Fair Good Very Good Excellent

9) Interest in your surroundings:

Very Poor Poor Fair Good Very Good Excellent

APPENDIX J

Consent Form

Psychological Augmentation of Standard Pain Control following Gallbladder Surgery.

Purpose of the Study:

Psychological procedures are well known to affect the intensity of pain. The aim of this study is to evaluate the relative effectiveness of several procedures for diminishing pain.

Consent.

The purpose of the study as described above has been explained to me by _____ and I understand that my participation will involve meeting with the researchers before my operation. After my operation I will be requested to take simple notes about my experiences. I also permit the researchers to attach a small 'activity meter' to my lower leg for the purpose of monitoring the course of recovery of my physical activity. Finally, I understand that approximately two weeks after I leave hospital I will be requested to return for some additional testing. I understand that anonymity will be preserved and that my answers will at all times be kept in the strictest confidence of the researchers alone. All information will be used solely for research purposes. I understand that I am under no obligation to participate - that the quality of my care will in no way be jeopordized by my refusal or enhanced by my consent and that I am free to withdraw from participating in the study at any time. Knowing these things, I agree to enter the study as a participant.

Date: _____ _____
Participant

_____
Witness

APPENDIX K

Introduction to the Aims and Procedures of the Study

As I mentioned to you on the phone, Dr. _____ and I are evaluating teaching patients how to have more control over their comfort during the immediate post-operative period. A number of techniques have been used at various hospitals, but never carefully evaluated or compared. This is what we are now doing.

I'd like to describe what would be involved for you if you decide to participate.

Perhaps that's the first point I should make, your participation is entirely voluntary; what I'll be teaching you are things for you to do to help yourself be more comfortable. Your care in the hospital with respect to nursing, medications etc. won't be altered in any way whether you participate or not.

Now for what's involved:

1)For the Self-Hypnosis Group: What I'd like to teach you today is how to use a form of self-hypnosis to relax yourself and to relieve pain and discomfort after your operation.

2) For the Waking Analgesia Group: What I'd like to teach you today are several simple mental exercises that will help you to control pain and discomfort after your operation.

3) For the Self-Relaxation Group: What I'd like to teach you today is a special relaxation exercise that you can use to relax yourself and to relieve pain and discomfort after your operation.

4) For the Control Group: The instructions begin with the next paragraph.

I'll go through the procedure with you today and answer any questions

you might have and then give you a cassette tape and tape recorder (if you need it), so that you can practice the technique before you come to the hospital. In addition, I'll be playing a tape recording for you of the routine hospital procedures for patients like yourself, who are having gallbladder surgery. This tape recording also describes important exercises for you to do after your operation, which will help you to recover more comfortably and rapidly. Our head nurse will discuss this information with you and answer any questions you might have.

A nurse will probably review this information and exercises with you when you come into the hospital. Also today I'll be asking you questions about your gallbladder problems and your medical history, as well as giving you some standard paper and pencil psychological tests to fill in about things like how you usually feel, how you respond to situations, your attitudes and beliefs about illness. We are giving these tests to explore some ideas we have about factors relating to post-operative comfort. We will be averaging these tests across many people. I won't be looking at any individual scores, nor will I tell you any results. Actually, none of the tests will have your name on them, just a code number. All the information is strictly for the research and will not go into your medical record, in fact it won't go anywhere but my filing cabinet.

While you're in the hospital, my assistant will come by to see you several times a day for about 5-10 minutes and ask you questions about how you're feeling. Most people find it a welcome break from the boring hospital routine. It also gives us accurate information which is so important for us. For several days after your operation, you'll be asked to wear a small activity monitor on your leg. (Show the patient the units). This unit is light and quite comfortable and gives us an excellent indication of the recovery of your physical activity.

Lastly, after you've been back home for 2-3 weeks, you'll come back to see us for some follow-up evaluations. This will be scheduled on the day you see your doctor for follow-up.

Do you have any questions about what I've said?

Would you like to participate?

I have a consent form for you to sign. It's a standard hospital procedure to protect patients from being talked into things that weren't explained to them.

Read Consent Form.

STAI-State follows consent then interview.

APPENDIX L

Rationale

We have found from our dicussions with other people that they have similar reactions to pain as you do. For instance, anxiety, feelings of uncertainty, their view of the situation and, in general, their thoughts and feelings about the pain and the situation they are in, all contribute to the degree of pain they experience. (Note some specific examples from the patient's descriptions of his experience with gallbladder or other pain). In fact, the most modern conception of pain incorporates these factors to account for the degree and type of pain that people actually experience. The model has two parts: the sensory component, and the reaction component, which act together to form the experience of pain. Now, the sensory component has to do with actual messages coming from the area of the body that is injured or sick and the reaction component includes all of the factors of emotion, past experiences, attention, and the situation that we've been talking about. Let me give you an example which will help make that clearer. Suppose you notice a dull ache in the little finger of your left hand. Would you take it seriously? Probably not, unless you were a pianist or a surgeon. You probably would not take to your bed, make a doctor's appointment, or begin worrying about your future. In fact, most likely, you'd just go on with what you're doing and not even think to notice it again for hours.

Now suppose that dull ache was in the center of your chest. What would happen then? It would probably become the center of your attention, you might begin thinking about your heart, become fearful of the future consequences of that dull ache, stop whatever you were doing and consider

phoning your doctor, or even going immediately to hospital emergency! This is an example of how the meaning we ascribe to an uncomfortable sensation, the attention we pay to it, the future consequences we consider, the concern and anxiety it generates, which are part of the reactaive component, have a powerful effect on the experience of pain. Our thoughts and feelings can magnify as well as reduce the sensations we experience.

Does this model of pain make sense to you? Have you had experiences where the reactive component of pain has made a big difference in your experince to a painful condition? (If no response to this query, ask the patient how they think the reactive component might be involved in how people respond before and during a dental appointment, during childbirth, etc.).

Our experience has shown that the reactive component is very important in people's experiences of pain following an operation. Frequently, people are fearful of the pain they expect to have after the operation and feel that they are helpless, passive sufferers of pain. Actually, that's not the case, people need not be helpless, passive sufferers of pain. We actually can have some control over the sensory and reactive components of pain.

In this program we will show you ways to use this control to make the experience no worse than it has to be.

APPENDIX M 1

Rationale Continued: For the Self-Hypnosis Group

For the rest of today's session I'll be demonstrating for you some simple instructions that will enable you to use self-hynosis whenever would you like to control the pain after your operation. But before I do, I'd like to talk to you for a while about self-hypnosis and why you can use it to control pain. Many people have questions and concerns about hynosis, because of things they have heard, or from their own experiences. Have you had any experiences with hypnosis? Please tell me about them. What have you heard or seen on TV about hypnosis? Are you interested in learning to use hypnosis to control pain? (Question patient about concerns about loss of control, induction implying a weak mind, not waking up, after effects, not remembering, etc.).

Actually hypnosis is a state of mind in which you are very deeply relaxed and your mind is extremely clear, you will be aware of everything going on around you and if you concentrate, even more so than you ordinarily are. Aside from this, you may not notice that anything else is different than usual. It is this relaxed clarity of mind, this increased ability to concentrate the attention, that allows the hypnotized person to experience many interesting things that wouldn't seem possible in our ordinary state of mind. In this program we will teach you how to use self-hypnosis as a way to explore your own body's ability to control your pain after the operation. Most people are surprised by how well they can learn to relax deeply and to control pain with self-hypnosis. In order to be successful, it is important that you practice before the operation and utilize what you have learned while you are recovering. Pracaticing once a

day with the tape that I'll give you should be sufficient for you to be prepared to use self-hypnosis effectively.

Now before I go on to demonstrate the techniques of self-hypnosis to you, I'd like to know if you have any questions about self-hypnosis?

As I mentioned, with self-hypnosis you will be able to do some very interesting things that will help to control pain. One of these involves your ability to concentrate your attention. You see, your attention can be like a spotlight which allows you to focus on only one thing at a time. With self-hynosis you can learn to focus your attention so intently that the pain will just fade into the background. Also I'll show you how you can use your knowledge of different types of sensations in order to filter out the pain from what you are feeling. Now let's begin.

APPENDIX M 2

Rationale Continued and Treatment: For the Waking Analgesia Group

For the rest of today's session I'll be demonstrating to you several ways to control pain that involve using your own mental abilities. As I just mentioned, one way that the reaction component of pain can magnify or diminish pain is through changing the focus of attention. This probably happens when you are in a rush peeling vegetables and nick your finger. (For the men: use examples of cutting yourself shaving or sports injuries). You don't have time to attend to the pain and keep going with the preparations for the meal, and don't notice the cut for hours. If, on the other hand, you were relaxing in your living room reading and got a paper cut, you'd probably find it very painful and annoying. The difference is how your attention is focused.

Your attention can be like a spotlight that allows you to focus on only one thing at a time. You can use this aspect of the mind to help control pain. Simply by concentrating on something else, something interesting, something compelling, you keep your spotlight there and very little, if any, pain or discomfort can get through.

Place attention focusing suggestions here. (See APPENDIX N, Treatment Element 4).

Now there is a whole other way of controlling pain that actually involves focusing on the pain and the area around it. It is a very interesting technique because it uses your past experiences with different types of sensations and your imagination in order to create a filter to actually change the way the pain feels, to take the hurt out.

The technique is simple, in fact, but it takes practice to do it well.

I'm going to give you a tape recording of it so that you can practice at home. What you do is create a mental picture, perhaps with the help of memories of experiences you've actually had, or maybe entirely from your imagination, that include sensations that are imcompatible with pain. In a moment I will show you what I mean. Now it is important that you realize that to be most successful with this strategy, it's important to let yourself go with your imaginings and not be critical of your ability. You might find it easiest to do with your eyes closed sitting comfortably in the chair.

Insert the sensation alteration suggestions here. (See APPENDIX N, Treatment Element 4).

Open your eyes now. How was that? Could you imagine the situations and sensations? (If no, try to find out why not, e.g. anxiety, distracting thoughts, thinks it's silly, usually has poor imagery. If possible, give simple suggestions to overcome these). (For everyone:) Your ability to use these techniques most effectively is dependent on your practicing them before you actually use them to diminish pain after the operation. I'm going to give you a cassette tape that reviews the techniques that you can use to practice at home; and as a reminder, while you are in the hospital. If you practice for a few minutes a day before you enter the hospital, that should be sufficient to master these techniques of controlling pain.

APPENDIX M 3

Rationale Continued: For the Self-Relaxation Group

For the rest of today's session I'll be demonstrating for you some simple exercises that you can use to become very relaxed, both mentally and physically, whenever you like. But before I do, I'd like to explain why these relaxation exercises can help to control pain after your operation.

There are two important reasons: firstly, pain causes tension. That is, we naturally brace ourselves and tense up when something hurts us. This helps us to immobilize the area that's injured, which is good, say if we have a broken leg. But for many pains it isn't good because muscle tension itself causes pain. In fact, it's a vicious cycle of pain causing tension, causing more pain, etc. That is the reason that relaxation is taught in prenatal training classes, labor pains are also made worse by excess muscle tension.

I'll show you what I mean, just make a fist with your right hand, and concentrate on the sensations in your hand, now make that fist as tight as you can, tight, tight, tight. Now how does it feel? OK, let go.....How does that feel?

You see, muscle tension all by itself causes pain. With the exercise I'll show you, you can keep the muscle tension in your body down to a minimum, and not cause any unnecessary extra pain.

The second reason has to do with anxiety. Aside from muscle tension, pain also causes feelings of anxiety, and as we just discussed, anxiety also makes pain worse. Now, it's a fact that you can't be anxious and relaxed at the same time. That's the basis of many psychological treatments for anxiety and stress, which are gaining wide acceptance these

days. So, by knowing how to become very relaxed, you'll be able to counteract the anxiety that usually accompanies pain; and thereby reduce the pain.

Now it's important to realize that the relaxation techniques I'll show you can only be mastered by practicing them until you can achieve deep relaxation quickly and easily. If you practice once a day with the tape I'll give you, that should be sufficient.

APPENDIX N

Specific Treatment Elements

The subjects in the experimental groups received appropriate combinations of the following treatment elements:

1) Relaxation induction adapted from J. Barber (1978) 2) Suggestions to enhance efficacy of anlgesia suggestions, patterned after Hartland (1971) 3) Suggestions to enhance effectiveness of relaxation exercises 4) Analgesia suggestions 5) Wake up instructions from Barber (1978).

The Self-Hypnosis Group received elements 1, 2, 4, and 5. The Waking Analgesia Group received element 4. The Self-Relaxation Group received elements 1, 3, and 5.

Treatment Element 1:

Relaxation Induction After Jo Barber and Cam Perry

The best way to begin to feel more relaxed, (experience self-hypnosis), is to make yourself comfortable, go ahead and adjust yourself to the most comfortable position you like, that's fine. And now I'm going to give you some simple instructions which will help you to become much more relaxed (experience self-hypnosis).....you will find that you will quickly learn to follow these instructions and to experience the things that I describe to you. With practice, you will find that you can eaxperience these things with greater vividness, with greater intensity than you do at first.

Now just let your eyes gently close, and begin to focus your attention on your breathing. Notice the cool air in your nostrils as you breath in and the warm air as you breath out. Let yourself begin to take regular relaxed and comfortable breaths. Not so deep to cause discomfort.....just regular relaxed and easy breaths.....and you may already notice how good that feels.....how when you exhale.....you can feel the tension draining away.....and the relaxation beginning to sink in.

And now as you continue to breath freely and easily, comfortably and regularly, not so deep so as to be uncomfortable, just comfortable, regular and satisfying breaths.....all I'd like you to do is to create a picture in your mind.....just imagine a staircase, any kind that you like.....with 20 steps and you at the top.....now you don't need to see all 20 steps at once, you can see any or all of the staircase, anyway you like is fine..... just notice yourself at the top of the staircase, and the step you're on, and any others you like.....however you see it is fine.....now in a moment, but not just yet, I'm going to begin to count, out loud, from one to twenty

and as you may have already guessed, as I count each number I'd like you to take a step down that staircase.....see yourself stepping down, feel yourself stepping down, one step for each number I count.....all you need to do, is notice, just notice how much more comfortable and relaxed you can feel at each step as you go down the staircase.....one step for each number that I count.....the larger the number, the farather down the staircase.....the farther down the staircase, the more comfortable you feel.....one step for each number.....alright you can begin to get ready.....now I'm going to begin.....

ONE - ONE step down the staircase.....

TWO - TWO steps down the staircase.....

THREE - THREE steps down the staircase..... and you may already notice how much more relaxed you can feel..... I wonder if there are places in your body that feel more relaxed than others.....perhaps your shoulders feel more relaxed than your neck.....perhaps your neck feels more relaxed than your arms.....I don't know and it really doesn't matter.....all that matters is that you feel comfortable that's all.....

FOUR - FOUR steps down the staircase, perhaps feeling already places in your body beginning to relax.....you may notice that the deep relaxing, restful heaviness in your forehead is already beginning to spread and flown down, across your eyes, down across your face, your neck, deep, restful, heavy.....

FIVE - FIVE steps down the staircase.....a quarter of the way down, and already beginning, perhaps, to really enjoy your comfort and relaxation.....

SIX - SIX steps down the staircase.....and noticing perhaps that if there were sounds which were distracting you at the start, they are beginning to become less so.....any sounds you can hear become part of your experience

of comfort and relaxation.....and you might also be noticing an interesting thing happening.....that no matter how deeply relaxed you ever feel, (no matter how deeply in hypnosis you ever feel), your mind is always clear. Your're always aware of my voice and what I'm saying to you, completely aware of everything happening around you.....anything you can notice becomes a part of your experience of comfort and relaxation.....

SEVEN - SEVEN steps down the staircase.....perhaps noticing the heavy restful, comfortable relaxing feeling spreading down into your shoulders, into our arms.....I wonder if you notice one arm feels a bit heavier than the other.....perhaps your right arm feels a bit heavier than the left.....perhaps your left arm feels a bit heavier than your right....I don't know, perhaps they are equally, comfortably heavy.....it really doesn't matter.....just letting yuourself become more and more aware of that comfortable heaviness.....or is it a feeling of lightness?.....it may be either.....whatever you feel is fine.....

EIGHT - EIGHT steps down the staircase.....perhaps noticing a tingling in your fingers.....perhaps wondering about a fluttering feeling of your eyelids.....

NINE - NINE steps down the staircase, breathing confortably, slowly, easily.....restful, noticing that heaviness really beginning to sink in as you continue to notice the pleasant restful, comfortable, relaxation, just spreading through your body.....

TEN - TEN steps down the staircase.....halfway to the bottom of the staircase, wondering perhaps what might be happening, perhaps wondering if anything at all is happening.....and yet, knowing that it really doesn't matter, feeling so pleasantly restful, just continuing to notice the growing, spreading, comfortable relaxation.....

ELEVEN - ELEVEN steps down the staircase.....noticing may be that as you

feel increasingly heavy, more and more comfortable, there's nothing to bother you, nothing to disturb you, as you become deeper, and deeper relaxed.....

TWELVE - TWELVE steps down the staircase.....I wonder if you notice how easily you can hear the sound of my voice.....how easily you can understand the words that I say.....with nothing to bother you, nothing to disturb you.....

THIRTEEN - THIRTEEN steps down the staircase.....feeling more and more the real enjoyment of this relaxation and comfort.....

FOURTEEN - FOURTEEN steps down the staircase.....noticing perhaps the sinking restful pleasantness as your body seems just to sink down, deeper and deeper into relaxation with nothing to bother, nothing to disturb.....

FIFTEEN - FIFTEEN steps down the staircase.....three quarters of the way down the staircase.....deeper and deeper relaxed, absolutely nothing to do.....but just enjoy yourself.....

SIXTEEN - SIXTEEN steps down the staircase.....breathing freely and easily.....more and more comfortable, with nothing to bother, nothing to disturb.....

SEVENTEEN - SEVENTEEN steps down the staircase.....closer and closer to the bottom, perhaps feeling the heaviness in your arms and legs becoming even more clearly comfortable.....knowing that nothing really matters except your enjoyment of your experience of comfortable relaxation, with nothing to bother, nothing to disturb.....

EIGHTEEN - EIGHTEEN steps down the staircase.....almost to the bottom, with nothing to bother, nothing to disturb as you continue to go deeper and deeper

relaxed.....heavy.....comfortable.....restful.....relaxed.....nothing really to do, no one to please but yourself, no one to satisfy but

yourself.....just notice how very comfortable and heavy you can feel as you continue to breath, slowly and comfortably.....

NINETEEN - NINETEEN steps down the staircase.....almost to the bottom of the staircase.....nothing to bother, nothing to disturb you, as you continue to feel more and more comfortable, more and more relaxed.....more and more rested.....more and more comfortable.....just noticing.....and now.....

TWENTY - TWENTY bottom of the staircase.....deeply, deeply, relaxed.....deeper and deeper with every breath you take.....

Treatment Element 2:

Introduction to the suggestions for the Hypnosis Group

You have become so deeply relaxed.....so deeply in hypnosis that your mind has become so sensitive.....so receptive to what I say.....that everything I say to you.....will sink so deeply into the furthermost recesses of your mind.....and will make so deep and lasting an impression there.....and because these things will remain.....firmly embedded in the deepest part of your mind .....they will continue to exercise the same profound impression as when you are actually listening to my voice.....

And now while you remain deeply relaxed, deeply in hypnosis.....I'm going to talk to you for a few moments about some very interesting things that you can do while your body is healing itself after your operation.....I'm sure sure you'll be surprised to discover how much control you can have over your comfort and well-being.

Treatment Element 3:

Continuation of the induction for the Relaxation Group

And because you have become so deeply relaxed, you will find that these comfortable, restful feelings will continue long after you have completed this relaxation exercise.....You will feel more alert.....more wide awake.....more able to concentrate.....to focus your attention on whatever you are doing.....more able to remain clam and comfortable. You will find that with continued practice you will be able to relax much more quickly.....much more deeply .....whenever you wish to feel more comfortable and relaxed.....

Proceed to wake up instructions.

Treatment Element 4:

Analgesia Suggestions

One natural part of the process of healing is the disagreeable or uncomfortable sensations from the incision in your abdomen, it is a sign of the body's natural processes working, it is something that is there, something (natural) that needn't worry you. In fact you don't even have to pay attention, your mind can do whatever you wish it to do, you can go anywhere you like, reliving pleasant relaxing memories so completely it's as though you were there. Or maybe you'd prefer to move ahead in time, enjoying your healthy body or perhaps you'll find whatever you are doing, whatever is happening around you is so interesting, so absorbing, that you hardly thing of yourself at all.

You may find that there are many sensations you can experience .....some much more comfortable and pleasant than you might expect .....perhaps you can notice a gentle warmth.....a sensation of warmth and comfort growing and spreading towards the incision.....you may find that you can do this more easily by imagining yourself lying comfortable on your favorite beach.....just imagine yourself lying there in the sand.....looking up at the sun.....it's a golden blazing yellow ball.....and the sky a brilliant blue.....the sand dazzling and glistening in the sunlight .....may be you can feel the grains of sand between your toes.....just feeling the warmth of the sun against your skin.....it's a comfortable soothing feeling.....a pleasing feeling.....easing out any discomforts.....helping you to rest comfortably.....

Or perhaps you would prefer to create sensations of tingling and numbness. You can do this by imagining that you are floating.....make it a vivid picture of floating on water.....on icy cold water.....make it so icy

that you can feel the cubes of ice floating in the water.....as it gets colder and colder you can even feel an imaginary tingling numbness coming from the cold. This tingling numbness gives you a protective coating around the incision, so that you can filter the hurt out. Eventually you may find that with frequent practice (of self-hypnosis) you can create a a constant state of ~~tingling~~ numbness all of the time protecting you day and night, around the clock, even when you are alert.....as long as you need to keep your filter to help you to remain comfortable. If the uncomfortable feelings return, you can create your protective coating by doing this exercisse once again. You may even find that you become so used to the feelings of tingling numbness that you don't even notice it at all.

You may not be comfortable right away.....sometimes it takes a little time to control your discomfort.....the unpleasant feelings will tend to fade away, become less intense, more bearable.....until you find that you can control it whenever you wish.

Treatment Element 5:

Relaxation Wakeup After Jo Barber

I'd like you now to notice how very nice it feels to be this way.....to reallly enjoy your own experience, to really enjoy the feelings of comfort and relaxation your body can give you.....and in a moment but not just yet.....I'm going to count from TWENTY to ONE.....and as you know I'd like you to feel yourself going back up the staircase.....one step for each number.....feel yourself slowly and comfortably going back up the steps, one step for each number that I count.....more alert as you go back up the steps, one step for each number I count.....when I reach THREE your eyes will be almost open .....when I reach TWO they will have opened.....and when I reach ONE, you'll be wide awake, alert, refreshed .....perhaps as though you've had a little nap.....wide awake, alert, refreshed, comfortable.....even though you'll still be very comfortable and relaxed, you'll feel alert and very well.....and now I'll begin to count.....TWENTY.....NINETEEN .....EIGHTEEN.....feel yourself going back up the steps.....SEVENTEEN.....SIXTEEN.....FIFTEEN.....a quarter of the way back up, more and more alert.....

alert.....FOURTEEN.....THIRTEEN.....TWELVE.....ELEVEN.....TEN..... halfway back up the stairs.....more and more alert.....comfortable but more and more alert..... alert....NINE.....feel yourself becoming more and more alert.....EIGHT.....SEVEN.....SIX.....FIVE.....FOUR.....THREE.....eyes almost open.....TWO.....eyes open and.....ONE wide awake, alert, relaxed, refreshed.....that's fine

APPENDIX O

Home Practice Instructions

Do you have any questions about the:

Self hypnosis exercise
Relaxation exercise
Mental pain control strategies

that we have just been going through? Fine, now I'd like you to take this audio cassette that has the exercises you've just done recorded on it. In order to increase your ability to use these techniques after your operation it is important that you practice them before you come to hospital. Do you have a cassette recorder at home that you could play this tape on? (If yes, fine. If no, offer a loan of a tape recorder.)

The best way to practice is to pick a time each day when you aren't likely to be disturbed for the time required to practice and practice each day at that time. Then make yourself comfortable and listen to your cassette tape.

APPENDIX P

Pain Control Skills Home Record Form

This form is for you to record your daily home practice of the pain control skills that you are learning.

	Date - Time
1)	
2)	
3)	
4)	
5)	
6)	
7)	
8)	
9)	
10)	
11)	
12)	
13)	
14)	
15)	

Appendix F

Name: _____

Relaxation Home Practice Record Form

This form is for you to record your daily home practice of the relaxation exercise that you are learning. Rate your 'level of relaxation' on a 0 to 10 scale where 0 is not at all relaxed and 10 is for completely relaxed.

Date - Time	Level of Relaxation		
	Before	After	Comments
1)			
2)			
3)			
4)			
5)			
6)			
7)			
8)			
9)			
10)			
11)			
12)			
13)			
14)			
15)			

Appendix P

Name: _____

Self Hypnosis Home Practice Record Form

This form is for you to record your daily home practice self hypnosis exercise that you are learning. Rate your 'level of relaxation' on a 0 to 10 scale where 0 is not at all relaxed, and 10 is for completely relaxed.

Date - Time	Level of Relaxation		
	Before	After	Comments
1)			
2)			
3)			
4)			
5)			
6)			
7)			
8)			
9)			
10)			
11)			
12)			
13)			
14)			
15)			

APPENDIX Q

THE MONTREAL GENERAL HOSPITAL

Admission History

The nurse admitting you to the unit will question you about some of your daily living habits and preferences which can help us in providing care for you. By giving us this information, you become an active member in the planning process. This is recorded so that it is readily available to all the staff despite the change in personnel every eight hours.

The surgeon's present treatment is also indicated on this sheet so that certain prescribed activities are automatically carried out at various times of the day. Alterations in care are noted as the situation changes.

If you are taking any prescribed medication, bring it to hospital with you. Proceed with the taking of your medication on the day of admission just as you did at home. Inform the nursing staff about your medication. Check with the admitting doctor as to whether this medication will be given by the nursing staff in the first days after surgery.

Activities Carried Out The Day Before Surgery

1. Physical Examination

As a matter of routine procedure, all patients have a physical check-up by the intern on duty. He will also obtain a history of your past and present illnesses.

2. Consent Form

The legal age of consent is 18 years. Your signature on this form gives permission to your surgeon and to the anaesthetist to carry out their necessary functions in the Operating Room. The intended extent of surgery is indicated on this sheet.

In the case of a hysterectomy, and/or removal of ovaries or tubes, a woman requires her husband's consent. A man having a vasectomy requires his wife's consent.

3. Crossmatch

This is a blood test to determine your blood compatibility in relation to other blood. It is a test that is routinely done for surgery. In some cases, it is not done. Yet, if the need for use of blood arises, this test can easily be done at the time. Other solutions containing many of the properties of blood can be used in the waiting period.

4. Cleansing of the Skin

The skin contains healthy organisms, which, if given access to the body could cause inflammation. Therefore, it is necessary to reduce the number prior to surgery.

This requires:

1) Shave of the involved area of the body.
2) Disinfectant baths which contain Iodine detergent.
   They are taken:
   A. after the shave
   B. during the evening
   C. morning of surgery

5. Bowel Cleansing (enema)

This is done when determined necessary, eg. in bowel surgery. It is also of benefit for those individuals who are prone to constipation.

6. Visit by the Anaesthetist

At this time, he may ask you about your previous experience with medications and anaesthesia. Indicate whether you have allergies to any drugs. Following his contact with you, the anaesthetist may order a premedication. This is the drug, given approximately one hour before surgery for the purpose of relaxation. He may also order a sleeping sedative for those who might need it.

7. Fasting From Midnight

No food or fluids are allowed after this period.

Activities Carried Out The Day Of Surgery

These include:

Detergent Bath

This is taken 2-3 hours before the time of surgery. Information as to the approximate time of operation is made available to the ward staff on the evening prior to surgery.

Removal of the following:

nail polish
dentures
any prosthesis
jewelry
valuables

Jewelry and other valuables can be locked in a special drawer of your locker. Such items are then our responsibility to care for in your absence. Any items, not locked away by the nursing staff, remain your responsibility.

Empty Bladder prior to receiving the premedication.

Premedication

This drug, given by injection, is designed to help you relax. It will not necessarily put you to sleep. It may have the effect of making your mouth dry (to reduce the amount of mucus).

Transportation to the Surgical Operating Room

You are accompanied by a member of the staff. Upon arrival, you will be greeted by one of the operating room nurses who will ask you such information as: your name, name of your surgeon and the intended operation. The wait in the operating room corridor varies (5 - 15 minutes). The temperature is cool in this area. If you find the coolness uncomfortable, please convey this information to a nurse.

Once in the Operating Room, you may recognize the anaesthetist who visited you the previous evening. He gives you the anaesthetic by intravenous injection in a vein of a hand or arm. This is all you will recall until you wake up in the Recovery Room.

Recovery Room

It is used for all patients having a general anaesthetic. You are escorted to this area by your anaesthetist where you have close nursing attention and available medical supervision. Intravenous solution will be running into a hand or arm and will continue for several hours to one or more days, depending on the nature of your surgery and the decision of your surgeon.

In the Recovery Room setting, routine aspects of care include checking your blood pressure every few minutes and looking at your dressing. Such activities as deep breathing, coughing and changing your position are initiated. The staff will encourage you to carry out these functions and will help you as necessary. Medication for the relief of pain may be required at this time.

You are returned to your room when the staff decide that you are fully awake and the nature of your blood pressure and breathing are within the normal range for you. The approximate length of stay is forty-five minutes. Some people require a much longer period in the Recovery Room.

The unit does not return patients to their rooms during the following hours:

11:30 a.m. - 12:30 p.m.
4:45 p.m. - 5:45 p.m.
11:00 p.m. - 8:00 a.m.

The Surgical Intensive Care Unit

It is also available and is being used increasingly for patients having surgery. It is a highly specialized area in terms of personnel and equipment. Your admission to this unit simply means that you are being provided with the almost constant supervision and specialized equipment you need at this time.

Post Operative Exercises

A. Deep Breathing

B. Coughing

C. Turning

D. Leg Exercises

Improve Breathing & Circulation

WHY YOU SHOULD DO THESE EXERCISES

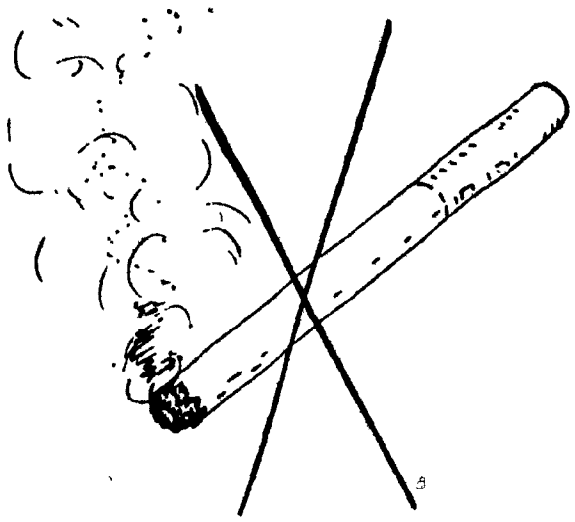
1. General anesthetics have certain predictable effects in your body. They slow down:

   A. Breathing
   B. Circulation
   C. Bowel action

   They also irritate your lung which reacts by producing more mucus. It is essential to reverse these effects in order to return to normal function as soon as possible. This is achieved by exercise. The nurses will help you with the exercise whenever necessary, but you should begin them on your own the day of surgery.

2. Smoking irritates the lung causing an increase in the amount of mucus. This mucus can block the air passages in your lungs.

   If you stop smoking (or cut down by at least 50%) some time (a week or longer) before surgery, you will have less mucus to get rid of after surgery.



3. Pain is a normal response to injury. It is most intense in the first 48 hours. After this period, it gradually subsides. Individual reactions to pain vary. Some people describe it as soreness, others say it is a stinging sensation. The presence of pain after surgery can lead to reduced breathing and a lack of desire to carry out the prescribed exercises.

   Certain activities (eg. coughing) are painful or at least serve to make you aware of the pulling sensation in your incision. This relates to the use of these muscles in carrying out the activity. It does not mean that your sutures have given away.

   Since activity is a necessary part of your convalescence, there is a definite need to reduce the amount of soreness in order to help you carry out the prescribed activities.

   Regular deep breathing helps reduce body tension and therefore helps to ease soreness. A more specific control of pain is the use of medication ordered for you by your doctor.

   If you notice a rising level of discomfort, especially in combination with reduced activity (eg. lying still so it will hurt less) then you require medication. Simply call your nurse who in discussing the nature of the pain with you, will help you determine your need for relief.

PRACTICE GUIDE

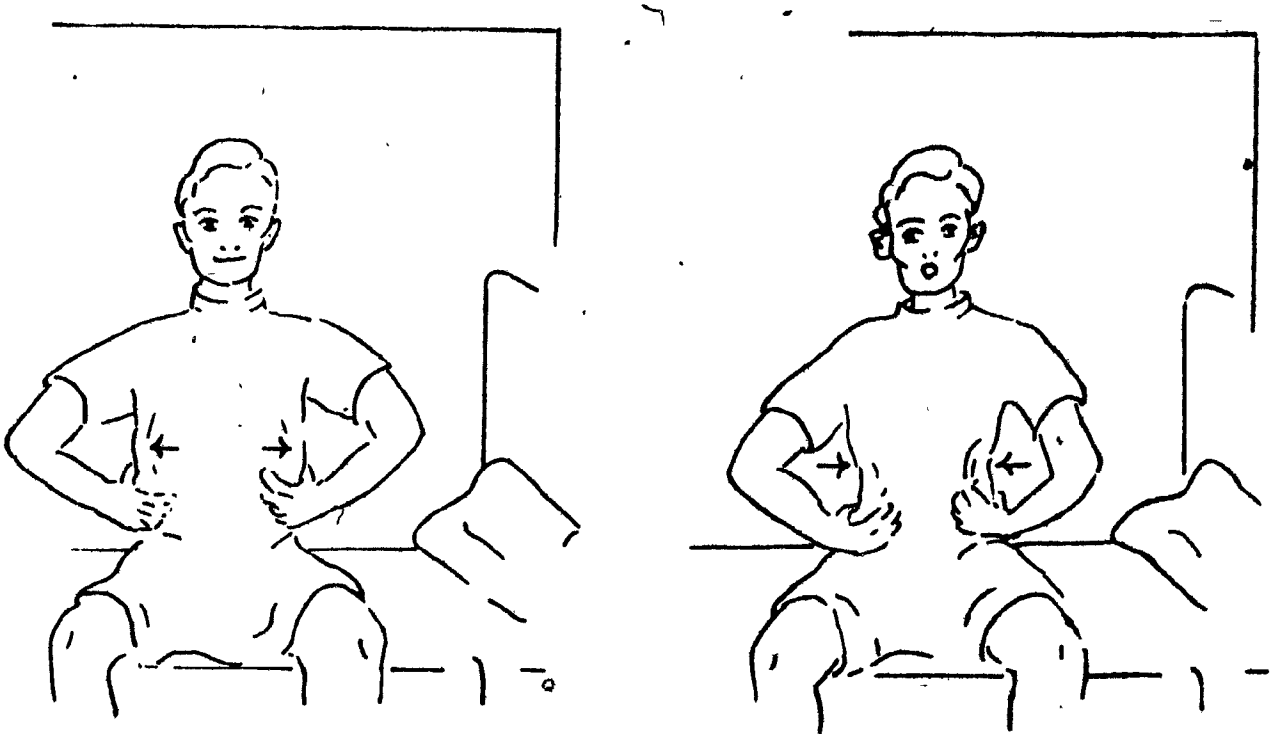
A. Deep breathing

Purpose: to promote full expansion of the lungs

Frequency: every 30 minutes - 1 hour

Technique:

1. In a comfortable position, (preferably sitting up), place hands on either side of lower rib cage.
2. Take a slow deep breath in through the nose and feel the rib cage move up and out as lungs are filled with air.
3. Pause
4. Relax and blow air out slowly through the mouth while applying a gentle pressure on rib cage (with hands).
5. Repeat 2 - 3 times.



B. Coughing

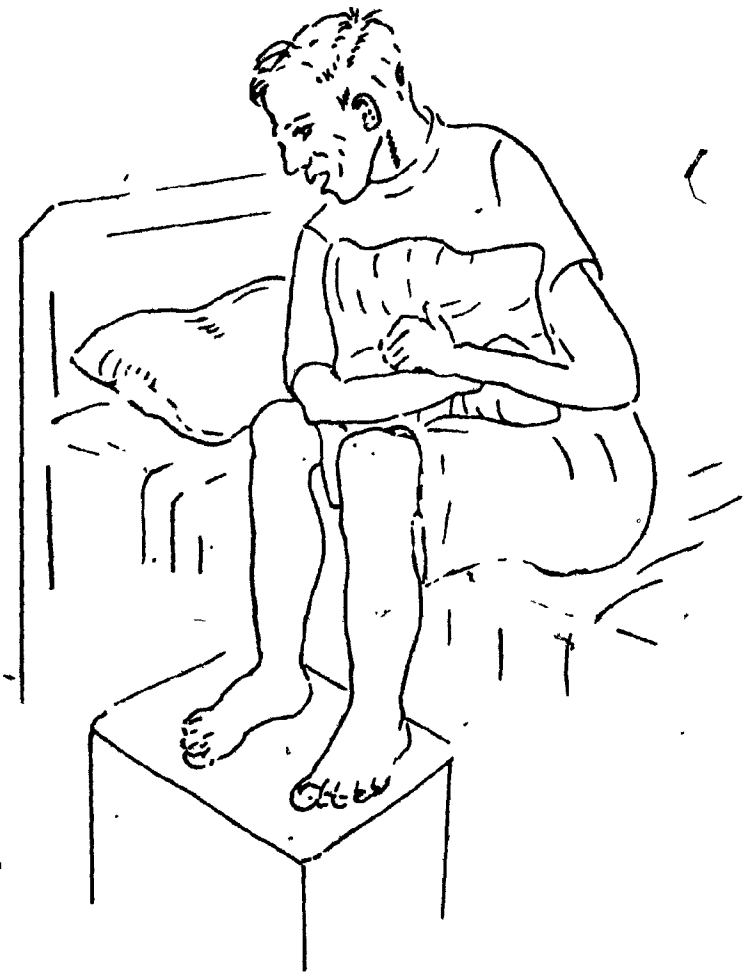
Purpose: to eliminate mucus secretions that could cause respiratory problems.

Frequency: every 1 - 2 hours.

Technique:

1. In a sitting position, with knees bent, do the breathing exercise 2 - 3 times.

2. On the fourth breath, inhale deeply and then cough out your breath as you support your incision with hands or a pillow (to reduce discomfort).



C. Change of position. Lie on each side and on your back.

Purpose: To assist in eliminating mucus from the lungs.
To aid circulation.

Frequency: Every two hours, during the day, when you are in bed for more than this length of time.

Technique: eg. In turning from back to left side

1. Bend right knee, pushing foot into mattress.

2. Roll onto side, using the right foot to push you as you move.

3. Hold on to the side of the bed with right arm.

In turning from left side to back

1. Bend right knee again.

2. Place palm of right hand on the side of the bed to help you push yourself back to your starting point.

Turning by yourself is less uncomfortable than being pulled by someone else as you avoid sudden jerking movement. Your nurse will supervise your first turnings, thus assuring you of your proficiency. Intravenous fluid running into a hand or arm can reduce its permitted movement. Therefore, check with your nurse when you are ready to turn.

D. Leg exercises

Purpose: To increase circulation to distant parts of the body.

Frequency: Every 1 - 2 hours

Technique: All are done slowly 2 - 3 times

1. Ankle exercise - make circular motions several times to the right, then to the left.

2. Feet exercise - extend your feet toward the bottom of the bed. Relax. Draw feet toward the top of the bed. Relax.

3. Leg exercise - bend one knee at a time, then fully straighten it.

Avoid activities such as crossing legs and ankles which slow down circulation.

Ambulation means walking

Purpose: To restore full activity as soon as possible which promotes a more rapid recovery.

In most cases, you will be allowed out of bed the evening of surgery or the first day after surgery.

Initially, you are assisted by the nursing staff. As you feel more confident, you require only their supervision and finally, no supervision at all.

The aim each day is to increase the number of times spent walking and increase the length of each period. In this way you have a balance of activity, eg. a time sitting in the chair, walking in the corridor and a period of rest in bed.

Information as to the method of getting out of bed will be given to you by the nursing staff at the appropriate time.

PRACTICE THEM AT HOME

* If you wish any further information, you may call the hospital and leave a message for the nurse who will later return your call. 937-6011 ext. 770.

August 1974

APPENDIX R

Post Op Utilization of Pain Control Techniques Instructions

Now that you have made the effort to learn these techniques of pain control you are ready to use them after your operation. You may find that it is helpful to play the tape to remind you of exactly what to do. Some people find that they are a bit groggy on the first day, and that it is easier to follow the tape than to use the technique on their own. You may even wish to begin using them the day after your operation. Any way you do it is fine.

Also it's important to remember that you may not have complete control of pain with these techniques and that you should take pain killing medication if you need them. If you need medications that doesn't mean that you've failed with your self control techniques, only that you needed some additional help from the medicines. That's perfectly all right, go ahead and use your techniques after taking the medication; it will help you to keep the pain intensity down for longer periods of time. There is no danger of over using your self control techniques. Use them and any others you may know or think of as frequently as you need them. I'm sure you'll find it interesting to see how much control you can have over your comfort.

APPENDIX S

Intro to Susceptibility Scale

1) Gaining Consent

As part of our research program, we are interested in the extent to which it was the actual techniques, that we showed you that helped your good recovery and how much was due to other factors. One factor that we think may be involved is a person's responsiveness to hypnosis.

For S's in the non hypnotic groups include:

Although hypnosis was not used in your treatment, it has been sometimes found in other medical research of this sort that a person's responsiveness to hypnosis was the crucial factor affecting how well a non hypnotic treatment such as yours will work for the individual.

As you might have guessed, people vary greatly in their responsiveness to hypnosis. Would you mind doing a short test to see how responsive you are? Good, I think you'll find it very interesting.