PREOPERATIVE AND POSTOPERATIVE PSYCHOLOGICAL FACTORS IN RECOVERY FROM SURGERY

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ABSTRACT

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This study investigated the relationships of background factors and preoperative psychological factors to recovery from surgery. Thirty-two males scheduled for elective hernia repair were assessed on the day before surgery and, again, on or about the second postoperative day. Results indicated linear relationships between preoperative and postoperative emotional adjustment; patients high in anxiety and depression prior to surgery remained high in anxiety and depression following surgery. In addition, high preoperative depression was associated with higher ratings of postoperative pain. Significant relationships with recovery variables were also obtained with a measure of coping style rated along an avoidance-vigilance dimension. A more vigilant coping style, characterized by greater information seeking and increased expectations of a difficult recovery, predicted greater postoperative emotional disturbance and higher ratings of postoperative pain. A trend for more vigilant coping to be associated with greater postoperative use of pain and sleep medications was also present. Among background factors, age emerged as an important influence on both preoperative psychological status and the course of recovery. Increasing age was related to less preoperative anxiety, less vigilant coping, lower ratings of postoperative pain and decreased postoperative use of pain and sleep medications.

Measures of physical recovery, such as length of stay, occurrence of complications, and rate of recovery, were not significantly correlated with either

age or preoperative psychological variables. The best predictor of complications was the patient's overall preoperative health status and the best predictor of length of stay was the occurrence of complications. Multiple regression equations were developed using background, preoperative psychological, and recovery variables to predict postoperative depression, pain and sleep medication use, complications, and length of stay. In addition, path analysis techniques were used to test causal models regarding variations in pain and sleep medication use and length of stay.

Findings from the study suggest that psychological factors play a major role in patients' emotional adjustment and experiences with pain following surgery, but have little influence on the course of physical recovery. These findings are based on a sample of patients undergoing a form of elective surgery with an extremely low mortality rate and a relatively short recuperative period. Further research is needed with other forms of surgery to determine the generalizability of these results.

Dedicated to my parents

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INTRODUCTION

The situation of patients undergoing surgery offers a unique opportunity for the naturalistic study of individual differences in stress and coping. While surgery is frequently perceived as possessing some threat or risk, patients may differ greatly in the degree to which they experience stress, the aspects of the situation they find stressful, and the coping strategies they rely upon. In addition to identifying individual differences in stress and coping, the study of surgical patients provides a chance to assess the impact of psychological factors on the postoperative course. The existence of such a relationship is suggested by evidence that links psychological factors to both the development of certain diseases (Rosenman, Friedman, Straus, Worm, Kositchek, Hahn, & Werthessen, 1964) and the course of recovery from some nonsurgical illnesses (Andreasen, Noyes, & Hartford, 1972).

This research project utilizes data from a variety of sources to monitor patients' psychological and physical status during hospitalization for elective surgery. The focus of the study is on individual differences in adapting to the role of surgical patient. Along these lines, the study examines the influences of background factors (e.g., age) on preoperative adjustment and coping style, and the relationships of psychological factors to the course of postoperative recovery. A review of the results from previous psychological studies of recovery from surgery will be followed by a fuller discussion of the plan for the present study.

Overview of Previous Research

Previous psychological studies of recovery from surgery can be divided into two general categories. The first category consists largely of prospective nonintervention studies, where preoperative psychological variables are used to predict the course of postoperative recovery. In the second category are studies where an experimental design is employed to determine the effects of a specific intervention on the postoperative course. For each category of studies, assessment of the course of recovery may include measurement of psychological variables, physiological variables, or both. Assessment of the psychological aspects of recovery usually consists of postoperative measurements of the presence or absence of negative emotional states. Anxiety, depression, fear, worry, and anger appear as the most frequently studied emotions. Physical measures of recovery are more diverse owing to the availability of medical records for coding purposes. Among the physical outcomes which have been studied are: length of hospital stay, number of analgesics and sedatives administered, respiratory functioning, vomiting and/or nausea, blood pressure, urinary retention, bowel difficulties, ambulatory functioning, elevated temperatures and mortality. Certain recovery measures, such as reports of postoperative pain, would appear to have both physical and psychological components.

Nonintervention Studies

Fear and anxiety. Janis (1958) published the first research study on psychological variables and recovery from surgery. He examined the relationships between preoperative and postoperative emotional states, and found that patients with moderate preoperative fear had a better postoperative psychological adjustment than patients either high or low in preoperative fear. Patients with moderate

preoperative fear were observed to accept postoperative discomforts with compliance and cooperation. In contrast, most of the patients with low preoperative fear exhibited anger, resentment, and a general lack of cooperation during convalescence; patients high in preoperative fear were judged to display excessive timidity about their treatments and to express more hypochondriacal concerns. He argued from these findings that a moderate amount of anticipatory fear is necessary for engaging in the "work of worrying." Through the work of worrying the patient rehearsed the upcoming event, sought information to fill in gaps in his/her understanding of the danger, and developed self-delivered reassurances. According to Janis (1958), these efforts constitute an effective strategy for coping with hospitalization for surgery.

Subsequent investigations of the association between preoperative fear and postoperative psychological adjustment have not confirmed Janis' (1958) observation of a curvilinear relationship. Studies using self-report measures of anxiety and worry to measure anticipatory fear generally report a positive linear relationship between preoperative and postoperative emotional states (Wolfer & Davis, 1970; Johnson, Levanthal, & Dabbs, 1971; Cohen & Lazarus, 1973; Vernon & Bigelow, 1974; Sime 1976). In these studies, high anticipatory fear patients displayed the most postoperative emotional disturbances, while low anticipatory fear patients displayed the least. However, Auerbach (1973) found that when preoperative fear was defined in terms of the elevation of preoperative state anxiety level over postoperative (baseline) state anxiety level, a curvilinear relationship between anticipatory fear and postoperative adjustment was obtained.

Negative findings are also reported when preoperative fear and anxiety are related to measures of physical recovery. For example, Cohen and Lazarus (1973) found preoperative anxiety to be unrelated to length of hospital stay, minor

complications, or use of analgesics. Johnson et al. (1971) reported no significant relationships between preoperative fear and speed of recovery or use of analgesics. Wolfer and Davis (1970) also reported that, with very few exceptions, patients' self-ratings of fear and anxiety were unrelated to physical recovery. On the other hand, Sime (1976) found that high levels of preoperative fear were associated with a longer recovery period and greater use of analgesics and sedatives.

In the case of open-heart surgery, Layne and Yudofsky (1971) found that low anticipatory fear patients had the greatest incidence of postoperative delirium, while Morse and Litin (1969) found that low fear patients had the least delirium. Gilberstadt and Sako (1967) and Kornfeld, Heller, Frank, and Moskowitz (1974) failed to observe significant relationships between preoperative anxiety and post-cardiotomy delirium.

Depression. The affective state of depression has received considerable attention in studies of open-heart surgery. Kimball (1968) found that patients rated as depressed preoperatively suffered greater postoperative mortality. This finding was confirmed by Tufo and Ostfeld (1968), who found that patients rated as depressed preoperatively had a higher risk of operative death not accounted for solely on the basis of worsened cardiac status. In contrast, studies utilizing the MMPI D (Depression) Scale (Hathaway & McKinley, 1951) generally report no relation between depression and mortality after open-heart surgery (Gilberstadt and Sako, 1967; Henrichs, Mackenzie and Almond, 1969; Kilpatrick, Miller, Allain, Huggins, & Lee, 1975). Morse and Litin (1969) and Kornfeld et al. (1974) observed that preoperative depression was related to greater incidence of postcardiotomy delirium. A review of the literature uncovered no nonintervention studies, other than those researching

open-heart surgery, which report on the relationship between depression and recovery.

Personality traits. Several studies have employed trait or dispositional measures of personality to predict the course of postoperative recovery. Trait anxiety scales appear to be the most widely used personality measures. Negative findings were reported when preoperative scores on the IPAT Anxiety Scale (Cattell & Scheier, 1963) were correlated with measures of physical recovery (Rothberg, 1966) and use of analgesics (Bruegel, 1971). On the other hand, Parbrook, Dalrymple, and Steel (1973) obtained significant results using the Neuroticism Scale of Eysenck's Personality Inventory (Eysenck & Eysenck, 1968). Increased levels of neuroticism (proneness to anxiety) were related to postoperative impairments in vital capacity and chest complications. In addition, for male patients only, higher neuroticism scores were also related to increased pain and greater use of analgesics. Chapman and Cox (1977) employed the Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970) and observed positive correlations with self-reports of pain on the first postoperative day for general surgical patients and kidney recipients; this relationship was not evident in kidney donors. Martinez-Urrita (1975) also found that Trait Anxiety Inventory scores were related to increased pain following surgery. Among patients undergoing open-heart surgery, Henrichs et al. (1969) found that, for males only, survivorship was related to lower scores on the Pt (Psychasthenia) Scale and Welsh's (1956) first factor scale (Anxiety) of the MMPI, while Kilpatrick et al. (1975) observed no relationships between MMPI anxiety measures and postoperative mortality.

A few studies have related scores on the Internal-External Locus of Control Scale (Rotter, 1966) to the course of postoperative recovery. Johnson et al. (1971) found that patients who scored as internals (i.e., a tendency to believe in personal

control over events) used more analgesics postoperatively than patients who scored as externals (i.e., a tendency to believe in environmental control over events). Otis (1979) replicated this finding and also reported that an external locus of control tended to predict a shorter hospital stay. On the other hand, Wise, Hall and Wong (1978) reported no significant correlations between locus of control and either pain perception or use of analgesics. Wise et al. (1978) also looked at the effects on recovery of the cognitive control dimension of field dependence-independence. A tendency to have perceptions influenced by characteristics of the perceptual field (field dependence) was related, for females only, to self-reports of pain but not to use of analgesics.

The Repression-Sensitization (R-S) Scale (Epstein & Fenz, 1967), a self-report measure of defensive style, assesses general tendencies toward avoidance and denial versus approach and intellectualization. Walseth (1968) and Cohen and Lazarus (1973) found no relation between scores on R-S Scale and measures of recovery. However, Minckley (1974) reported a trend where repressors and sensitizers tended to have better recoveries than person's scoring at an intermediate level. Goldstein's (1959) Sentence Completion Test (SCT) measures a similar trait, the tendency to accept versus to avoid the unpleasant emotional content of situations. Cohen and Lazarus (1973) found that acceptors took more pain medications, and MacCornack (1979) reported that persons scoring at an intermediate level displayed a faster rate of recovery.

In one of the most wide-ranging studies of personality factors, Cohen (1976) compared responses on the California Psychological Inventory (Gough, 1956) and the Adjective Check List (Gough, 1952) to measures of recovery. Summarizing the results of a factor analysis, she reports that patients who stayed longer in the hospital could be characterized as more inhibited, cautious, and methodical. Those patients having more minor postoperative complications tended to be capable,

conscientious and conforming individuals who liked to work toward defined goals and who minimized worries and complaints. Patients who took more pain medications scored higher on factors reflecting agreeableness and sociability. Using another personality inventory, the 16PF (Cattell & Eber, 1957), Kornfeld et al. (1974) found that high scores on a factor labelled dominance were associated with a greater incidence of postoperative delirium in open-heart surgery patients. This result was interpreted as an indication that complete immobilization in the recovery room is more stressful for active, dominant individuals than for individuals who typically make more passive life adaptations.

Information seeking. Janis' (1958) research suggested that by gaining information about what to expect, patients become more aware of the threats involved in surgery, and can then begin to prepare themselves for the postoperative period. Several researchers have explored the relationships between information seeking and postoperative recovery. Cohen and Lazarus (1973) used an interview method to rate patients as being either avoidant or vigilant toward seeking information about their upcoming operations. The results showed that the vigilant group, those who knew the most about their operations, spent more days in the hospital and had more minor complications. Cohen (1976) has subsequently replicated the finding associating more vigilant coping with more minor complications. In their discussion of these results, Cohen and Lazarus (1973) theorize that vigilant copers try to actively master the surgical situation by seeking information; in the postoperative period this strategy proves maladaptive because there is little the patient can do to achieve mastery. Cohen (1976) also speculates that vigilant patients have more difficult recoveries because they may be constantly evaluating their condition, thereby exacerbating certain postoperative complications subject

to psychological influence. Cohen and Lazarus (1973) conclude that, since many threats occur in the surgical context but few harms actually materialize, surgery is a stressful encounter which can be more effectively dealt with by avoidant methods of coping.

Using questionnaires desiged to measure information seeking and the amount of information actually received, Sime (1976) found no relationship between these variables and postoperative negative affect, use of analgesics, or length of stay. However, an interaction was observed between preoperative fear and the amount of information received preoperatively. High fear patients who received much information used fewer analgesics and sedatives and spent less time in the hospital than high fear patients who received little informtion. In addition, moderate fear patients who received much information had longer hospital stays than moderate fear patients who received little information. Sime (1976) concludes that interaction effects need to be better understood in order to interpret correctly the relationship of preoperative information to recovery from surgey.

Background factors. Only a few psychological studies of surgery have examined the impact on recovery of background factors such as age, socioeconomic status, and previous surgery experience. The two studies which reported on the effects of age found that it was positively correlated with length of hospital stay (Cohen, 1976) and unrelated to changes in state anxiety scores during hospitalization for surgery (Auerbach, 1973). Only one study reviewed reported on the effects of education; Cohen (1976) found that education was negatively correlated with length of stay, but was positively correlated with more vigilant coping. Higher socioeconomic status has been reported to be positively related to more vigilant coping (Cohen, 1976) and to increased postoperative use of analgesics (Bruegel,

1971). In the one study which reported on the influence of marital status (Bruegel, 1971), it was found that married patients suffered less postoperative pain than unmarried patients. Studies that have examined the impact of previous surgery experience have found that it is not significantly related to changes in state anxiety during hospitalization (Auerbach, 1973), or physical recovery and postoperative emotional adjustment (Cohen & Lazarus 1973; Cohen 1976). Finally, research regarding the effects of preoperative health status has yielded contradictory findings; Cohen (1976) reported there was no significant association between ASA (American Society of Anesthesiologists) ratings of operative risk and recovery in a sample of hernia and gallbladder patients, while Parbrook et al. (1973) found that pre-existing chest disease was associated with postoperative complications in a sample of patients undergoing upper abdominal surgery.

Intervention Studies

Providing information. As noted before, Janis (1958) theorized that obtaining information on what to expect possessed therapeutic value. Several studies have examined the effects on recovery of providing patients with information about their forthcoming surgery. Wilson (1977) found that information regarding procedures and sensations to be expected during hospitalization reduced overall length of stay. However, Langer, Janis, and Wolfer (1975) observed no relationship between measures of recovery and an intervention where information, along with reassurance, were supplied before surgery. Lindeman and Stetzer (1973) found that information and reassurance provided by operating room nurses had little effect on preoperative or postoperative anxiety. Similarly, Vernon and Bigelow (1974) reported that providing specific, accurate information about surgery had no significant effect on preoperative mood. Although informed patients experienced less anger postoperatively,

there were no differences in postoperative depression and fear. Vernon and Bigelow (1974) conclude that there is little support for the notion that anticipatory fear and worry are essential parts of the process by which patients utilize information to prepare themselves and to reduce the impact of surgery-related stress.

Coughing and deep breathing. Egbert, Battit, Welch, and Bartlett (1964) studied the effects on recovery of visits by medical personnel who provided information about postoperative pain. During these visits patients also received instruction in deep breathing exercises. These exercises were designed to reduce the risk of lung complications related to inactivity during the postsurgical recovery period. Patients who were visited used less pain medication and were sent home earlier than patients who were not visited. Lindeman and Van Aernam (1971) confirmed the beneficial effects of deep breathing exercises. They found that patients given standardized instruction and practice in deep breathing went home sooner than patients who did not receive the standardized program. In contrast, Cohen (1976) found no significant effects on measures of recovery of instruction, but no actual practice, in coughing and deep breathing.

Psychotherapeutic interviews. Solomon (1973) observed trends which indicated that preoperative psychotherapeutic interviews, combined with tours of the intensive care unit, reduced mortality and morbidity in thoracotomy patients. Schmitt and Wooldridge (1973) conducted small group sessions prior to surgery where patients discussed their fears, received information on surgical procedures, and were instructed in techniques to aid recuperation. Patients participating in these groups used less pain medication, returned to oral intake more rapidly, and were discharged sooner than patients who received standard medical care.

Two studies have examined the effects of psychological interventions on delirium following open-heart surgery. Lazarus and Hagens (1968) report that a preoperative psychotherapeutic interview plus efforts by nurses to establish rapport in the intensive care unit lessened the risk of postopertive psychiatric reactions. Surnam, Hackett, Silverberg, and Behrendt (1974) examined the effects of preoperative visits that combined support and information with hypnotic induction for relaxation purposes and instruction in self-hypnosis. The visits had no effect on the incidence of delirium, postoperative negative affect, subjective estimates of pain, or use of pain medication.

Behavioral techniques. The effects on recovery of systematic relaxation, a technique designed to reduce anxiety, have been the focus of several studies. Wilson (1977) found that relaxation training reduced length of stay, subjective estimates of pain, and use of pain medication. Aiken and Henrichs (1971) observed a trend indicating that fewer postoperative psychiatric complications occurred in open-heart surgery patients who had received training in systematic relaxation. Smith (1975) reported that, while patients instructed in relaxation techniques had a significant decrease in preoperative anxiety, there were no differences in postoperative anxiety. Furthermore, there was no relationship between receiving instruction and length of hospital stay.

Influence of personality. A number of studies have examined the influence of personality factors on the effectiveness of preoperative interventions. Andrew (1970) explored how patients' coping dispositions interacted with providing information to affect rates of recovery. Goldstein's SCT was used to classify patients as sensitizers, neutrals or avoiders with respect to their tendency to move toward

or away from negative emotions. Since providing information was seen as more compatible with the sensitizing style, it was hypothesized that this group would improve most as a function of the intervention. Results indicated that the neutral group improved most when informed, recovering in less time and with less pain medication. In contrast, the avoiders were found to require more pain medication when informed. The course of recovery for the sensitizers was not influenced by the intervention.

DeLong (1971) also evaluated the hypothesis that information about surgery would be helpful only if it was compatible with the individual's coping style. A sentence completion test was used to determine whether individuals preferred a vigilant, avoidant or mixed coping style. Prior to surgery, patients listened to an audiotape which provided either specific information about the surgical procedure or general information about the hospital. Regardless of coping style, patients who received surgical information had a less complicated recovery and were discharged sooner than patients who received general information. Examination of the interactions revealed that type of information had little effect on the mixed coping group, which had the best overall rate of recovery. Vigilant copers who heard the surgical information tape recovered better than their counterparts who heard the general information tape. Avoidant copers generally had slow, complicated recoveries and the avoidant copers who heard the surgical information tape more likely to register complaints postoperatively.

Auerbach, Kendall, Cuttler, and Levitt (1976) explored the effects of general and specific information tapes and personality factors on anxiety and adjustment during dental surgery. No significant main effects were obtained for the influence of type of information or locus of control (external vs. internal) on either adjustment during surgery or postsurgical anxiety. However, examination

of the interaction terms indicated that locus of control interacted with type of information to affect adjustment during surgery. When patients with a tendency to believe in personal control over events (internal locus of control) had heard the specific information tape, they displayed a better adjustment during surgery. On the other hand, patients with a tendency to believe in environmental control over events (external locus of control) displayed better adjustment during surgery if they had heard the general information tape.

Ritter (1979) studied the effects on preoperative anxiety of coping style (rated on an avoidance-vigilance continuum), locus of control, and preoperative teaching. No relationships were observed between a patient's locus of control orientation and coping style or anxiety level. Ritter (1979) reports that when patients received the amount of information which was hypothesized to be consistent with their coping style, presurgical anxiety level was reduced. Specifically, when vigilant patients received much information and when avoidant patients received little information, levels of preoperative state anxiety decreased. Patients who obtained an amount of information inconsistent with their coping style did not experience significant increases or decreases in anxiety.

Summary and Conclusions

Over the past twenty-five years, several psychological studies of recovery from surgery have tested and subsequently challenged propositions derived from Janis' (1958) theory on the work of worrying. For example, Janis (1958) reported that a curvilinear relationship existed between level of preoperative fear and postoperative adjustment; instead, most researchers (Wolfer & Davis, 1970; Johnson et al. 1971; Cohen & Lazarus 1973; Vernon & Bigelow 1974; Sime 1976) observed that the relationship is linear, with high preoperative fear associated with poor

postoperative emotional adjustment and low preoperative fear related to better postoperative adjustment. A second proposition derived from Janis' (1958) theory is that obtaining information prior to surgery will aid recovery. This notion has received only limited empirical support, with the results of several studies (DeLong, 1971; Andrew, 1970; Auerbach et al., 1976; Sime, 1976; Ritter, 1979) suggesting that the effects on recovery of receiving information are mediated by personality characteristics of the patient.

Few other conclusions can be drawn after reviewing the literature on recovery from surgery. The available evidence suggests that instruction in coughing and deep breathng and in systematic relaxation promotes recovery. Additional research is needed to determine whether specific target populations for these interventions can be identified. The influence on recovery measures of anxiety, depression, information seeking, and certain personality traits (such as locus of control and coping style) remain unclear because of the abundance of contradictory and unreplicated findings. Cohen and Lazarus (1979) have noted the presence of several important methodological problems that contribute to this state of affairs. The large number of possible recovery measures creates a situation where few studies employ identical measures; this makes it difficult to compare results across studies and it contributes to the dearth of replicated findings. In addition to a lack of uniformity in the selection of recovery measures, the type of operations subjects are undergoing also varies across studies. While most of the research has been conducted on patients undergoing such elective procedures as herniorraphy and cholecystectomy, some studies have included operations that may have specific psychological meaning (e.g., hysterectomy) or are of high risk (e.g., open-heart surgery). There are also studies where patients undergoing a variety of procedures are combined into one surgical sample. In these cases, according to Cohen (1976),

if the severity of operations differs between comparison groups, or if recovery measures are not standardized across operations, biased results are likely to be obtained. The presence of so few consistent findings and so many methodological difficulties suggest that research in this field is still in a formative stage of development.

Outline of the Present Study

The review of the literature illustrates how many questions remain unanswered regarding the relationships between psychological factors and recovery from surgery. The role that background factors may play in shaping preoperative psychological adjustment also remains largely unexplored. To try to answer some of these questions, the present study collected data from a variety of sources to monitor patient's psychological and physical status during hospitalization for surgery. For heuristic purposes, the data can be grouped into three types.

Background data. The first type, background data, includes basic demographic information such as age and marital status. It also includes past medical history (e.g. previous operations), past social history (e.g. drug or alcohol abuse), surgical residents' ratings of overall health status, and baseline information on past experiences with pain. Background data were gathered directly from patients and their surgical residents, and from notes placed in the medical chart by various medical personnel.

Preoperative psychological data. The second type of data involves the preoperative assessment of the patient's psychological status. This information was gathered directly from the patient using both a structured interview and questionnaires. Three areas of psychological functioning were targeted: the

patient's affective status preoperatively, the patient's coping efforts in response to impending surgery, and the patient's general beliefs about personal control over health.

Regarding affective status, depression was studied along with state anxiety and self-reports of worry. Depression was included because it has been ignored in most psychological studies of surgery. This is true despite reports of its significant relationship to delirium and mortality among open-heart surgery patients.

Coping responses were assessed using a modified version of an interview (Cohen, 1976) which focuses on patients' information seeking and expectations about their upcoming surgery. The interview is rated along the coping dimension of avoidance-vigilance. Cohen (1976) characterizes avoidance as the denial of threatening aspects of the upcoming experience as indicated by unwillingness to discuss the operation and by restricted knowledge or awareness about the condition for which surgery was recommended, the nature of the surgery, and the postsurgical outlook. Vigilance, according to Cohen (1976), is characterized by alertness to emotional or threatening aspects of the upcoming experience as indicated by readiness to discuss the operation and by the seeking of information about the medical condition, the surgery, and the postsurgical outlook. In addition a middle group is identified where patients give evidence of both avoidant and vigilant modes of coping. Evidence regarding the reliability and validity of this interview is reported in Cohen and Lazarus (1973) and Cohen (1976). These studies indicate that acceptable rates of interrater agreement and reliability can be achieved by trained raters. In both studies, vigilant coping has been associated with a more complicated recovery from surgery.

Coping was also assessed using a self-report measure of coping preferences designed by the experimenter for use in the present study. This instrument was

constructed by revising the content and the format of the Ways of Coping Checklist (Aldwin, Folkman, Schaefer, Coyne, & Lazarus, 1980) to include specific coping processes that might be used by patients during hospitalization for surgery.[1] Both instruments are based on the theory, offered by Lazarus and Launier (1978), that coping processes can be divided into efforts to alter stressful person-environment relationships (problem-focused coping) versus efforts to alter one's emotional reactions to such relationships (emotion-focused coping). Under the heading of problem-focused coping come efforts to deal with the source of stress by changing one's own behavior and/or by changing the environment. Figuring out things to do to relieve postoperative discomfort would be an example of problem-focused coping during hospitalization for surgery. Emotion-focused coping processes refer to efforts to reduce or withstand emotional distress. The traditional psychoanalytic defense mechanisms come under this heading. For example, denial of any feelings related to undergoing surgery would be an example of emotion-focused coping. The category also includes more conscious, reality-oriented processes such as focusing on the benefits to health associated with the procedure. In addition to measuring preferences for problem-focused and emotion-focused coping, both instruments assess subjects' cognitive appraisals of the situation under study. Folkman and Lazarus (1980) administered the Ways of Coping Checklist to a middle-aged community sample and found that both the context and the appraisal of a situation influenced coping responses. Subjects reported more problem-focused coping at work and in situations appraised as ones they could change. In contrast, subjects reported more emotion-focused coping when the situation involved health issues and when it was appraised as one they must accept.

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[1] Additional information on the development of the Coping Inventory appears in the Methods section.

Patients' beliefs about personal control over health were studied using a scale designed specifically to measure locus of control for health-related issues (Wallston, Wallston, Kaplan, and Maides, 1976). In a validational study, the scale developers reported that health locus of control scores helped predict information seeking about health conditions among college students. An internal health locus of control interacted with a high value placed on health to predict greater information seeking.

Recovery data. The third type of data, measures of recovery, were collected directly from patients and their surgical residents and from notes placed in the medical record. Three aspects of postoperative recovery were assessed: emotional status, medical status and pain. Assessment of postoperative emotional status involved the readministration of self report measures of anxiety and depression. Measures of medical status included length of stay, number of complications and the surgical resident's rating of rate of recovery. Assessment of postoperative pain involved both patients' subjective estimates of pain strength as well as tabulation of the number of analgesics and sedatives administered.

Hypotheses

The present study expands upon earlier psychological research on surgical patients by including instruments not previously administered to this population. One such instrument is the measure of preferences for emotion-focused versus problem-focused coping processes. It was included in order to investigate the report, by Folkman and Lazarus (1980), that the context and appraisal of an event influences the nature of the coping response. This project also marks the extension of research on health locus of control to the study of surgical patients. In the

present study it was used to gauge the impact of beliefs about personal control over health on the preoperative coping response. Beyond including new measures, this study also sought to expand on previous research by adopting a more comprehensive approach to the psychological study of surgical patients. Information on a number of background factors was collected to determine their associations with preoperative psychological status and the course of recovery. Along these lines, the study investigated such previously ignored issues as the influence of prior surgery and pain experiences on preoperative psychological adjustment and the relationship of certain risk factors (e.g. age, overall health status) to aspects of recovery.

In addition to exploring new areas, attempts were made to replicate two previously reported relationships between psychological factors and recovery from surgery. The first is the generally confirmed finding of a positve linear relationship, rather than a curvilinear relationship, between preoperative and postoperative emotional adjustment. The association between preoperative emotional status and other aspects of recovery was also studied. The second finding the present study sought to replicate was the relationship between vigilant coping and a more complicated recovery reported by Cohen and Lazarus (1973) and Cohen (1976).

The following specific hypotheses were offered for study:

1. Previous experience with surgery will be associated with lower levels of preoperative anxiety, worry, and depression.

2. Higher ratings of past pain experiences will be related to greater preoperative anxiety, worry, and depression.

3. Impending surgery will be more often appraised as a situation which must be accepted rather than as one where change is possible.

4. As a health episode, impending surgery will elicit greater levels of emotion-focused coping than problem-focused coping.

5. An internal health locus of control will be related to more vigilant coping and a preference for problem-focused coping processes.

6. Increasing age will be associated with more complications, a slower rate of recovery, and a longer hospital stay.

7. Poorer preoperative health status will also be associated with more complications, a slower rate of recovery, and a longer hospital stay.

8. Higher ratings of past pain experiences will be related to greater postoperative pain and increased use of analgesics and sedatives.

9. Preoperative state anxiety will have a positive linear relationhip with postoperative state anxiety.

10. Preoperative depression will have a positive linear relationship with postoperative depression.

11. Higher levels of preoperative anxiety will be related to greater postoperative pain and increased use of analgesics and sedatives.

12. Higher levels of preoperative depression will also be related to greater postoperative pain and increased use of analgesics and sedatives.

13. More vigilant coping will be associated with a more difficult recovery marked by higher levels of postoperative anxiety, depression, and pain, increased use of analgesics and sedatives, more complications, a slower rate of recovery and a longer hospital stay.

METHOD

Subjects

From December 2, 1981 to June 10, 1982 all male patients scheduled for elective hernia repair at the Veterans Administration Medical Center in Allen Park, Michigan, were asked to participate in the present study. Patients undergoing other forms of surgery simultaneously with hernia repair were excluded from the sample, as were patients undergoing a second hernia repair within one month of a previous hernia repair. Only one person out of the 33 persons approached refused to participate. The 32 males in the study ranged in age from 24 to 85 years with a mean age of 52.5 (SD 16.45) years. Breakdowns of the sample according to age, race, education, marital status, and living arrangements appear in Appendix A. This sample appears to reflect the general demographic characteristics of the population served by the Allen Park Veterans Administration Medical Center.

Ten subjects had previously undergone a hernia repair, 18 subjects had previously undergone surgery other than hernia repair, and 4 subjects had no previous surgery experience. During the present study, these patients underwent a variety of hernia repair procedures (see Appendix B). One subject scheduled for hernia repair was rediagnosed, following surgery, as having a nonmalignant mass. In addition, one subject who agreed to participate in the study later refused to have surgery.

Procedures

The sequence of procedures is depicted in Figure 1. Subjects were recruited on the day before their scheduled surgery by the experimenter. The length of time patients had spent in the hospital prior to being recruited varied because of differences in diagnostic and presurgical work-ups, treatment of pre-existing medical conditions, and completion of other surgical procedures. After explaining the nature of the study and securing informed consent (see Appendix C), the experimenter conducted a 40-minute preoperative assessment with each subject. The session began with the administration of a structured interview concerning patients' knowledge of and concerns about their upcoming surgery. The interview and the accompanying rating criteria were developed by Cohen (1976) to measure the patient's style of coping along an avoidance-vigilance dimension. As part of the interview, subjects were also asked to rate how worried they were about having surgery. All interviews were tape-recorded and were later rated by the experimenter and a second independent rater.[2] Following this, subjects completed the Coping Inventory, a self-report measure of their preference for certain coping processes during hospitalization for surgery. This inventory was developed by the experimenter for use in the present study. Subjects also filled out the State Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970), the Center for Epidemiologic Studies Depression Scale (Sayetta & Johnson, 1980) and the Health Locus of Control Scale (Wallston, Wallston, Kaplan, & Maides 1976).

Between the first and the third day after surgery, subjects underwent a 20-minute postoperative assessment conducted by the experimenter or a trained technician. This session involved the readministration of both the State Anxiety

[2] An advanced graduate student in educational psychology (David Fleisher) carried out these ratings.

Day of Study	Procedures
1	Explanation of Study
	Securing of Informed Consent
	Avoidance-vigilance Interview
	Worry Self-rating
	Coping Inventory
	State Anxiety Inventory
	CES-Depression Scale
	Health Locus of Control Scale
2	Surgery
3-5	State Anxiety Inventory
	CES-Depression Scale
	Historical Pain Ratings
	Operative Pain Ratings
6 (following discharge)	Resident's Ratings
	Chart Review

Figure 1. Sequence of Procedures

Inventory and the Center for Epidemiologic Studies Depression Scale. At this time, subjects were also asked to make several ratings of their surgery-related pain and of their previous experiences with pain.

After each patient's discharge from the hospital, data were collected from two additional sources. The surgery resident assigned to the patient was contacted by telephone and asked to rate the patient's preoperative health status and overall rate of recovery (see Appendix D). The second data source was the patient's medical chart which was reviewed to ascertain basic demographic data, length of stay in the hospital, and use of analgesics and sleep medications following surgery. The chart was also examined for evidence of postoperative complications. The type and number of complications were tabulated into a single numerical score by means of an index previously used by Cohen (1976) (see Appendix E).

Measures

Avoidance-vigilance Interview. Developed by Cohen (1976), this structured interview includes questions regarding the patient's knowledge and feelings about his upcoming surgery (see Appendix F). The content is rated on a 10-point scale ranging from 1 (Extremely Avoidant) to 10 (Extremely Vigilant) (see Appendix G). The ratings can then be collapsed to yield scores classifying respondents as Avoidant (1-3), Mixed (4-7), or Vigilant (8-10) copers. These collapsed ratings were used in all subsequent data analyses.

Worry self-rating. Following the format used by Cohen (1976), subjects were asked to rate how worried they were about their upcoming operations. A 10-point scale was employed with 1 signifying "not nervous at all" and 10 signifying "very nervous or worried."

Coping Inventory. The Ways of Coping Checklist (Aldwin, Folkman, Schaefer, Coyne, & Lazarus, 1980) was modified by the experimenter to measure patients' preferred ways of coping with hospitalization for surgery. Respondents were asked to rate on a 5-point scale the importance of each of 28 coping processes described in brief statements (see Appendix H). Half the items reflect the use of emotion-focused coping processes while the other half reflect the use of problem-focused coping processes. The range of possible scores on the Emotion-focused and Problem-focused Coping Scales extends from 0 (no importance) to 70 (high importance). As part of the same instrument, subjects were asked to choose whether they appraised hospitalization for surgery as a situation they could change or do something about versus a situation that must be accepted or gotten used to. The Coping Inventory, a face-valid measure of coping preferences was pretested with five hospitalized male veterans who were not subjects in the present study. It was determined that these patients comprehended the directions and the content of the items in the intended manner.

State Anxiety Inventory. Spielberger et al. (1970) designed this inventory to measure anxiety at a particular moment in time. Subjects are asked to rate each of 20 items on a 4-point scale for how they feel right now. The State Anxiety Inventory yields scores that range from a minimum of 20 (no state anxiety) to a maximum of 80 (high state anxiety).

Center for Epidemiologic Studies Depression Scale. The 20-item CES-D (Sayetta & Johnson, 1980) was developed for inclusion in the Health and Nutritional Examination Survey conducted by the National Center for Health Statistics. Subjects are asked to rate on a 4-point scale the frequency of depressive cognitions,

feelings, and behaviors during the preceding week (see Appendix I). The CES-D yields scores that range from 0 (no reports of depression) to 60 (daily occurrence of several signs and symptoms of depression).

Health Locus of Control Scale. The HLC (Wallston et al., 1976) was designed to measure expectancies regarding locus of control for health-related issues. This 11-item self-report scale uses a 6-point format where respondents indicate how strongly they agree or disagree with each statement. The range of possible scores extends from 11 (strong internal health locus of control) to 66 (strong external health locus of control).

Pain questionnaire. The section of the McGill Pain Questionnaire (Melzack, 1975) dealng with subjective impressions of pain strength was modified by the experimenter to yield patients' estimates of their postoperative pain and of their earlier experiences with pain. Respondents were asked to rate on a scale of 0 (no pain or discomfort whatsoever) to 100 (the worst pain you can imagine) each of the following: current pain, worst pain since operation, least pain since operation, worst stomachache ever, worst toothache ever, and worst headache ever. Scores on the three postoperative ratings were summed to yield a Sum Operative Pain Score (possible range 0-300). Similarly, scores in the three ratings of past pain experiences were summed by yield a Sum Historical Pain Score (possible range 0-300).

RESULTS

All 32 subjects were used in most analyses of preoperative data. In analyses utilizing recovery data, only 31 subjects were available since one subject, who completed the preoperative assessment, later refused to have surgery.

Preliminary Analyses

Subjects in the study were admitted to one of two separate wards on the basis of bed availability. To determine whether differences between the wards biased the course of recovery, mean scores for each ward on recovery variables were compared.[3] Results revealed that subjects on one ward received significantly better rate of recovery ratings from surgical residents, t (29) = -2.98, p = .006 (see Table 1). However, significant differences were not observed for length of stay, Complication Index scores, or use of pain and sleep medications. These findings suggest that ward assignment had no clear-cut effect on the course of recovery.

Patients in the study received either general or spinal anesthsia during their operations. In some cases, the choice was left up to the patient, while in other cases certain risk factors determined what type of anesthesia would be employed. To determine whether differences in the type of anesthesia biased recovery data, mean scores for each group were compared (see Table 2). The results indicate that no systematic differences can be attributed to type of anesthesia.

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[3] F- tests of sample variances were performed as part of each t-test. In cases of significantly unequal sample variances, a separate variance estimate, rather than the pooled variance estimate, was used to compute the t value, the degrees of freedom and the probability level.

Table 1. Differences on Recovery Measures Based on Ward

	Ward 1[a]		Ward 2[b]		t	p (two-tail)
	M	(SD)	M	(SD)		
Recovery Measures						
Rate of Recovery	1.86	(0.69)	2.57	(0.51)	-2.98	.006
Days	5.57	(2.76)	5.13	(1.60)	.41	ns
Pain Med Total	4.00	(3.79)	8.71	(9.62)	-1.94	ns
Sleep Med Total	1.71	(3.68)	0.13	(0.45)	1.14	ns
Complications	2.14	(1.95)	1.38	(1.50)	1.12	ns

[a] $n = 7$
[b] $n = 24$

Table 2. Differences on Recovery Measures Based on Type of Anesthesia

	General[a]		Spinal[b]		t	p (two-tail)
	M	(SD)	M	(SD)		
Recovery Measures						
Rate of Recovery	2.27	(0.47)	2.41	(0.71)	-.57	ns
Days	5.17	(1.95)	5.12	(1.73)	.09	ns
Pain Med Total	10.33	(11.17)	6.41	(6.96)	1.17	ns
Sleep Med Total	1.08	(2.87)	0.12	(0.33)	1.38	ns
Complications	1.00	(1.35)	1.88	(1.76)	-1.46	ns

Note: Data on type of anesthesia were not available for two subjects.
[a] $n = 12$
[b] $n = 17$

As reported earlier, subjects underwent a variety of hernia repair procedures. To determine whether differences in the type of surgery had unexpected effects on recovery, comparisons were made between subjects receiving left or right inguinal hernia versus all other types of operations. No significant differences are observed on any of the recovery measures (see Table 3).

During the course of the study, hospital admission notes were reviewed for reports of recent alcohol or substance abuse and for reports of prior treatment for such conditions. This review yielded 19 subjects with a positive history of alcohol abuse and 5 subjects with a positive history of drug abuse. Comparisons were made to determine whether a positive history for either condition influenced postoperative use of pain and sleep medications. No significant differences were observed between alcoholics and nonalcoholics (see Table 4). Comparisons based on drug history indicated that drug abusers used significantly greater amounts of pain medication postoperatively, t (29) = -2.38, p = .02 (see Table 5). This result was due, in large part, to differences in the use of Tylenol #3, an analgesic containing codeine. Consequently, in later analyses of postoperative use of pain medications, the biasing effects of a drug abuse history were taken into account.

Distribution of Variables

Length of stay. Length of stay was calculated on the basis of the number of days inclusive from surgery to discharge. Patient's length of stay ranged from 2 to 11 days, and the average length of stay was 5.23 (SD 1.88) days.

Pain and sleep medications. Use of pain and sleep medications was measured by counting each tablet or injection as one unit. Including drug abusers, each patient used postoperatively an average of 6.45 (SD 7.51) tablets of Tylenol #3,

Table 3. Differences on Recovery Measures Based on Type of Operation

Recovery Measures	Left or Right Inguinal Hernias[a] M	(SD)	All Other Operations[b] M	(SD)	t	p (two-tail)
Rate of Recovery	2.38	(0.65)	2.50	(0.55)	-.43	ns
Days	5.04	(1.52)	5.86	(2.85)	-.73	ns
Pain Med Total	8.67	(9.58)	4.14	(4.34)	1.20	ns
Sleep Med Total	0.21	(0.51)	1.43	(3.78)	-.85	ns
Complications	1.63	(1.53)	1.29	(1.98)	.48	ns

[a] $n = 24$
[b] $n = 7$

Table 4. Differences on Medication Measures Based on Alcoholism History

Medication Measures	No Alcoholism History[a] M	(SD)	Alcoholism History[b] M	(SD)	t	p (two-tail)
Pain Med Total	6.00	(8.62)	8.83	(9.01)	-.88	ns
Sleep Med Total	0.08	(0.28)	0.78	(2.37)	-1.25	ns
Tylenol #3 Total	4.69	(6.29)	7.72	(8.22)	-1.11	ns
Demerol/Vistaril Total	1.31	(3.28)	1.11	(2.47)	.19	ns

[a] $n = 13$
[b] $n = 18$

Table 5. Differences on Medication Measures Based on Drug History

Medication Measures	No Drug History[a] M	(SD)	Drug History[b] M	(SD)	t	p (two-tail)
Pain Med Total	6.30	(7.88)	16.75	(10.63)	-2.38	.02
Sleep Med Total	0.15	(0.46)	2.75	(4.86)	-1.07	ns
Tylenol #3 Total	5.37	(7.06)	13.75	(7.14)	-2.21	.04
Demerol/Vistaril Total	0.93	(2.06)	3.00	(6.00)	-0.69	ns

[a] $n = 27$

[b] $n = 4$

1.19 (SD 2.79) injections of Demerol and/or Vistaril, and .48 (SD 1.82) tablets of sleep medication (Dalmane, Librium, or Seconal). Pain and sleep medications were used for an average of 2.48 (SD 1.93) days following surgery. The average daily use of pain and sleep medications was 2.18 (SD 1.98) units.

Pain ratings. Subjects appear to have made postoperative pain ratings in accordance with instructions. The mean value for "lowest pain rating" ($M = 18.71$) was lower than the value for "current pain rating" ($M = 34.71$) which, in turn, was lower than the value for "worst pain rating" ($M = 65.29$).

Rate of recovery ratings. Residents judged 46.7% of subjects ($n = 14$) to have recovered at a rate faster than average for hernia repair. Another 46.7% ($n = 14$) were given an average rating for rate of recovery, while 6.3% ($n = 2$) were judged to have recovered slower than average.

Complications. The most common postoperative complication was constipation which occurred in 61% of subjects. Other surgery-related complications noted in charts included: decreased urinary output, fever, nausea, incisional swelling, bronchial spasms, and headache attributed to anesthesia. The mean score on the Complication Index was 1.55 (SD 1.61).

State anxiety. The average scores for state anxiety were 35.81 (SD 12.17) preoperatively and 34.67 (SD 10.48) postoperatively. Although the level of state anxiety decreased over time, the difference between preoperative and posoperative means was not significant. The average preoperative score for the present study was lower than average preoperative scores reported for other samples of surgical patients (see Table 6). However, comparisons of this mean with other preoperative state anxiety means did not reveal any significant differences. The average postoperative state anxiety score for the present study was within the range reported in previous studies.

Depression The mean CES-D scores were 12.19 (SD 9.71) preoperatively and 12.35 (SD 8.25) postoperatively. The difference between the preoperative and postoperative means was not significant. The average score for this sample was substantially higher than the norm of 8.7 (SD 8.4) obtained in a large-scale survey of the adult U.S. population (Sayetta & Johnson, 1980).

Health locus of control. The mean HLC score was 38.84 (SD 8.44). This average score is approximately equidistant from the highest and lowest possible scores on the HLC Scale. It indicates that the sample, as a whole, displayed a mixed rather than an internal or external locus of control for health-related

Table 6. Results of Studies on State Anxiety and Surgery

Study	Sample	N	Age	Preoperative			Postoperative I			Postoperative II		
			M	Pre Day	M	(SD)	Post Day	M	(SD)	Post Day	M	(SD)
Spielberger et al., 1973	General Surgical	26	48.5 (Mdn)	1	41.15	(9.12)	3-9	31.12	(8.65)			
Auerbach, 1973	General Surgical	56	45.5 (Mdn)	1	41.10	(11.95)	2	38.67	(11.17)	6	34.17	(10.34)
Chapman et al., 1977	General Surgical	44	40.05	1	39.93	(10.03)	1	41.02	(9.71)	3	40.61	(10.32)
Current Study	Hernia Repair	32	52.50	1	35.81	(12.17)	1-3	34.67	(10.48)			

issues. The mean for the present study was similar to means obtained by Wallston et al. (1976) for community residents and hypertensive outpatients (see Table 7).

Coping style. The reliability of ratings for the Avoidance-vigilance Interview was determined by having the experimenter and an independent rater rate all interviews. The correlation between independent raters was highly significant, r (32) = .88, $p < .001$. Furthermore, the rate of agreement for classification into coping categories (avoidant, mixed, or vigilant) was 81% (n = 26). This rate far exceeds that expected on the basis of chance alone, χ^2 (31) = 167.53, $p < 001$. In the six cases where disagreement occurred, the independent ratings were off by only one category in all but one case. The raters reviewed the interview material together in the event of disagreement and were able to arrive at a compromise rating in all cases. Coping style ratings ranged from 0 to 9 and the mean rating was 5.13 (SD 2.20). This mean was similar to the means of 5.51 (SD 2.22) and 6.04 (SD 2.07) reported by Cohen and Lazarus (1973) and Cohen (1976), respectively, in their studies of surgical patients. Twenty-five percent (n = 8) of the present sample were rated as avoidant copers, 56% (n = 18) as mixed copers, and 19%

Table 7. Results of Studies on Health Locus of Control

Study	Sample	N	Age	HLC	
			M	M	(SD)
Wallston et al., 1976	Community Residents	101	35 (Mdn)	35.93	(7.11)
Wallston et al., 1976	Hypertensive Outpatients	38	51 (Mdn)	40.05	(6.22)
Current Study	Hernia Repair Patients	32	52.5	38.84	(8.44)

(n = 6) as vigilant copers. These frequency breakdowns corresponded with those observed by Cohen and Lazarus (1973) and Cohen (1976) (see Table 8).

Table 8. Breakdown of Surgical Samples of Coping Style

	Cohen & Lazarus 1973	Cohen, 1976	Current Study
Coping Style	n	n	n
Avoidant	14 (23%)	26 (17%)	8 (25%)
Mixed	37 (61%)	87 (57%)	18 (56%)
Vigilant	10 (16%)	40 (26%)	6 (19%)

Coping Inventory. The reliability of each coping scale was estimated using the internal consistency method. Acceptable alpha coefficients were obtained for both the Emotion-focused Scale (α = .79) and the Problem-focused Scale (α = .85). The mean scores were 46.97 (SD 12.03) on the Emotion-focused Scale and 52.91 (SD 11.84) on the Problem-focused Scale. It had been predicted (Hypothesis 4) that patients would express a preference for emotion-focused coping processes over problem-focused coping processes. However, results indicated that the mean for the Problem-focused Scale was actually significantly higher than the mean for the Emotion-focused scale, t (31) = 5.11, $p < .01$. Responses to the appraisal question revealed that 91% (n = 29) of subjects viewed surgery as a situation one must accept or get used to, while only 9% (n =3) viewed it as one they could change or do something about. This result is consistent with the prediction (Hypothesis 3) that surgery, as a health episode, is more likely to be appraised as a situation requiring acceptance rather than action.

Relationships Within Each Type of Data

Background variables. Correlations among certain background variables are presented in Table 9. Results indicate a significant negative relationship between increasing age and lower ratings of preoperative health status, r (24) = -.39, $p < .05$. While tobacco use was also associated with lower health ratings, the correlation failed to reach significance. The significant negative relationship between age and a positive drug history, r (24) = -.60, $p < .01$, reflects the fact that the five substance abusers were all under age 35. The correlation matrix displays two interesting relationships between ratings of previous pain experiences and other background variables. On the one hand, a history of drug abuse was significantly related to higher ratings of past pain experiences, r (24) = .55, $p < .01$. On the other hand, increasing age was significantly related to lower ratings of past pain experiences, r (24) = -.57, $p < .01$; the relationship between age and historical pain ratings remained significant even when drug abusers were eliminated from the sample, r (22) = -.61, $p < .01$.

Preoperative psychological variables. The intercorrelation matrix for all preoperative psychological variables is presented in Table 10. It had been predicted (Hypothesis 5) that an internal locus of control for health-related issues would be related to more vigilant coping and a preference for problem-focused coping processes. Neither expected relationship was observed and, in fact, health locus of control scores were not highly correlated with any preoperative psychological variables. In contrast, the correlations among anxiety, depression, worry and more vigilant coping were all significant in the positive direction. Emotion-focused coping tended to be more highly related than problem-focused coping to anxiety depression, and worry, but only the correlation between emotion-focused coping

Table 9. Correlations Among Background Variables

	Preop Health	Previous Surgery	Tobacco Use	Alcoholism History	Drug History	Sum Historical Pain
Age	-.39*	.20	.01	-.10	-.60**	-.57*
Preop Health		-.19	-.30	-.12	.20	.19
Previous Surgery			.06	.14	.01	-.23
Tobacco Use				.40*	.05	-.16
Alcoholism History					.18	.04
Drug History						.55**

Note: df (minimun N-2) = 24.
* p < .05
** p < .01

Table 10. Correlations Among Preoperative Psychological Variables

	Preop Depression	Worry	HLC	Coping Style	Emotion Coping	Problem Coping
Preop Anxiety	.54**	.62**	.02	.49*	.30	.19
Preop Depression		.59**	.17	.49*	.42*	.37
Worry			.00	.49*	.36	.18
HLC				.14	.21	.15
Coping Style					.07	.16
Emotion Coping						.76**

Note: df (minimum N-2) = 24
* p < .05
** p < .01

and depression reached significance, r (24) = .42, $p < .05$. Finally, emotion-focused coping was highly correlated with problem-focused coping, r (24) = .76, $p < .01$, suggesting that these two scales were measuring much the same thing.

Recovery variables. The intercorrelation matrix for all recovery variables appears in Table 11. Although only 3 of 21 correlations reached significance, only one significant correlation would be expected at the .05 level on the basis of chance alone. A partial confirmation of the validity of the Complication Index is provided by the significant correlation between high scores on the index and length of stay, r (24) = .54, $p < .01$ The only other significant relationships were between postoperative depression and other recovery variables. Depression was significantly correlated with both postoperative anxiety, r (24) = .51, $p < .01$, and the sum of postoperative pain ratings, r (24) = .46, $p < .05$.

Table 11. Correlations Among Recovery Variables

	Postop Anxiety	Postop Depression	Rate of Recovery	Compli-cations	Days	Pain/Sleep Med Use
Sum Operative Pain	.34	.46*	-.05	.10	.31	.33
Postop Anxiety		.51**	-.33	.22	.32	.18
Postop Depression			-.01	.22	.14	.25
Rate of Recovery				-.19	-.36	-.06
Complications					.54**	.01
Days						.13

Note: df (minimum N-2) = 24
* $p < .05$
** $p < .01$

Background Variables and Preoperative Psychological Variables

Relationships between background variables and preoperative psychological variables are displayed in Table 12. Six of 49 correlations were significant, a number which exceeds the 2 to 3 significant correlations expected at the .05 level on the basis of chance alone. It had been predicted (Hypothesis 1) that previous experience with surgery would be associated with lower levels of preoperative anxiety, depression, and worry. While all three correlations were in the expected direction, only the relationship with self-ratings of worry reached significance, $r(24) = -.42$, $p < .05$.

Table 12. Correlations Between Background Variables and Preoperative Psychological Variables

	Age	Preop Health	Previous Surgery	Tobacco Use	Alcoholism History	Drug History	Sum Historical Pain
Preop Anxiety	-.46*	.36	-.30	-.01	.23	.45*	.37
Preop Depression	-.32	.19	-.04	-.07	.06	.30	.39*
Worry	-.26	.20	-.42*	-.33	-.04	.19	.29
HLC	-.05	.00	-.31	.16	-.07	.05	.03
Coping Style	-.53**	.21	-.12	-.16	-.08	.30	.58**
Emotion Coping	.01	.09	-.04	.17	.22	-.06	-.11
Problem Coping	-.13	.04	.13	.24	.03	.14	.16

Note: df (minimum $N-2$) = 24
* $p < .05$
** $p < .01$

It has also been predicted (Hypothesis 2) that higher ratings of past pain experiences would be associated with higher levels of preoperative anxiety, depression, and worry. Once again, all three correlations were in the expected direction but only one, that with depression, reached significance, r (24) = .39, $p < .05$. In addition to this relationship, higher ratings of past pain experiences yielded an unexpected significant correlation with more vigilant coping, r (24) = .58, $p < .01$. Two other unexpected significant findings involved the background variable of age. Increasing age was significantly negatively related to both anxiety, r (24) = -.46, $p < .05$, and more vigilant coping, r (24) = -.53, $p < .05$.

Background Variables and Recovery Variables

Relationships between background variables and recovery variables are displayed in Table 13. Although only 5 of 49 correlations reached significance, only 2 to 3 significant correlations are expected at the .05 level on the basis of chance alone. It had been predicted (Hypothesis 7) that poorer preoperative health status would be associated with more complications, a slower rate of recovery, and a longer hospital stay. While all three correlations were in the expected direction, only the correlation between preoperative health status and Complication Index scores reached significance, r (24) = .40, $p < .05$. It had also been predicted (Hypothesis 8) that higher ratings of past pain experiences would be related to higher ratings of postoperative pain and increased postoperative use of pain and sleep medications. Both correlations were in the expected direction, and the relationship between historical pain ratings and average daily use of pain and sleep medications reached signifcance, r (24) = .49, $p < .05$.

A third prediction was offered (Hypothesis 6), stating that increasing age would be associated with more complications, a slower rate of recovery and

Table 13. Correlations Between Background Variables and Recovery Variables

	Sum Operative Pain	Postop Anxiety	Postop Depression	Rate of Recovery	Complications	Days	Pain/ Sleep Med Use
Age	-.74**	-.24	-.23	-.03	.00	.24	-.57*
Preop Health	.24	.13	.25	.02	.40*	.06	.28
Previous Surgery	.09	-.04	.18	.00	-.01	.21	-.08
Tobacco Use	.37	.14	-.08	.10	-.11	.19	.18
Alcoholism History	.28	.06	.04	.24	.01	.00	.21
Drug History	.26	.14	.09	.06	-.25	-.10	.49*
Sum Historical Pain	.28	.28	.33	.08	-.03	-.35	.49*

Note: df (minimum N-2) = 24
* $p < .05$
** $p < .01$

a longer hospital stay. Only the correlation with length of stay was in the expected directon and it failed to reach significance. However, age did yield unexpected significant correlations with two other recovery measures. Increasing age was significantly negatively related to both postoperative pain ratings, $r(24) = -.74$, $p < .01$, and average daily use of pain and sleep medications, $r(24) = -.57$, $p < .01$. The latter relationship remained significant even when drug abusers are eliminated from the sample, $r(24) = -.42$ $p < .05$.

Preoperative Psychological Variables and Recovery Variables

The major focus of the present study was on the associations between preoperative psychological functioning and the course of postoperative recovery. Relationships between preoperative psychological variables and recovery variables are displayed in Table 14. Nine of 49 correlations were significant, a rate which exceeds the 2 to 3 correlations expected to be significant at the .05 level on the basis of chance alone.

It had been predicted (Hypotheses 9) that preoperative state anxiety would have a positive linear relationship with postoperative state anxiety. This prediction was confirmed by the significant positive correlation between the two anxiety variables, r (24) = .62, $p < .01$. It had also been predicted (Hypothesis 11) that preoperative state anxiety would be associated with greater postoperative pain and increased use of pain and sleep medications. Although both correlations were in the expected direction, they failed to reach significance.

As with state anxiety, it was predicted (Hypothesis 10) that preoperative depression would have a positive linear relationship with postoperative depression. The finding of a significant positive correlation between the two depression variables, r (24) = .72, $p < .01$, strongly supported this prediction. In addition, it had been predicted (Hypothesis 12) that preoperative depression would be related to both increased postoperative pain and use of pain and sleep medications. Although both correlations were in the expected direction, only the relationship between depression and the sum of operative pain ratings reached significance, r (24) = .39, $p < .05$.

One unexpected finding was the significant relationship between self-ratings of worry and average daily postoperative use of pain and sleep medications,

Table 14. Correlations Between Preoperative Psychological Variables and Recovery Variables

	Sum Operative Pain	Postop Anxiety	Postop Depression	Rate of Recovery	Complications	Days	Pain/ Sleep Med Use
Preop Anxiety	.31	.62**	.53**	-.08	.19	.10	.15
Preop Depression	.39*	.25	.72**	.07	.03	-.17	.04
Worry	.13	.24	.42*	.15	-.18	-.34	.41*
HLC	.08	.09	.10	-.29	.04	.14	-.08
Coping Style	.58**	.39*	.65**	.02	-.14	-.25	.38
Emotion Coping	.11	-.14	.23	.24	.23	.20	.03
Problem Coping	.14	-.05	.22	.14	.13	.20	.19

Note: df (minimum N-2) = 24
* $p < .05$
** $p < .01$

r (24) = .41, $p < .05$. In fact, worry was the only preoperative psychological variable which was significantly related to this measure of recovery.

The final prediction involves the relationships between coping style and measures of recovery. It had been predicted (Hypothesis 13) that more vigilant coping would be related to a more difficult recovery marked by higher scores on all recovery measures. Inspection of Table 14 indicates that only 2 of 7 correlations, those for length of stay and complications, were not in the expected direction. Three of the 5 correlations in the expected direction were signifcant; more vigilant coping was signifcantly related to increased postoperative anxiety, r (24) = .39, $p < .05$, increased postoperative depression, r (24) = .65, $p < .01$, and higher

postoperative ratings of pain, r (24) = .58, $p < .01$. In addition, the correlation between more vigilant coping and increased average daily use of pain and sleep medications barely missed reaching significance, r (24) = .38, $p = .06$. To investigate further the relationships between increasing vigilance and recovery, one-way analyses of variance were conducted on each of the seven recovery variables (see Table 15). A significant main effect was observed only for postoperative

Table 15. Differences on Recovery Measures Between Avoidant, Mixed, and Vigilant Copers

Recovery Measures	Avoidant M (SD)	Mixed M (SD)	Vigilant M (SD)	F value	p
Postop Anxiety	29.14 (10.79)	35.25 (9.96)	42.00 (8.87)	2.15	.14
Postop Depression[a]	5.14 (4.67)	13.50 (7.23)	23.00 (5.57)	8.54	.002
Rate of Recovery	2.29 (0.76)	2.50 (0.62)	2.20 (0.45)	0.59	.56
Complications	2.00 (1.85)	1.39 (1.42)	1.40 (2.07)	0.41	.67
Days	6.25 (2.71)	4.83 (1.50)	5.00 (1.00)	1.70	.20
Pain/Sleep Med Use	1.21 (1.19)	2.23 (2.04)	3.56 (2.22)	2.39	.11
Sum Operative Pain	68.57 (57.35)	127.24 (65.94)	147.75 (43.21)	2.89	.07

Note: Avoidant n = 8, Mixed n = 17, Vigilant n = 6.

[a]Significant ($p < .05$) group differences were obtained for all individual comparisons on this variable (Newman-Keuls).

depression, F (2,23) = 8.54, p = .002. Post-hoc individual comparisons (Newman-Keuls) revealed that avoidant copers were significantly ($p < .05$) less depressed than mixed copers who, in turn, were significantly ($p < .05$) less depressed than vigilant copers. While the remaining F-tests failed to yield significant main effects, inspection of Table 15 reveals that the pattern of means for three other recovery variables were in the expected direction. Mean scores increased with more vigilant coping for postoperative anxiety, average daily use of pain and sleep medications, and the sum of postoperative pain ratings. In summary, the results of these analyses provide partial support for the hypothesis that more vigilant coping would be related to a more difficult recovery. While preoperative coping style was associated with both postoperative pain and affective status, it appeared to bear no relationship to physical measures of recovery such as length of stay and complications.

Prediction of Recovery

A remaining issue involves the comparative utility of background variables and preoperative psychological variables for predicting different aspects of recovery. To help answer this question, multiple regression equations were constructed for the prediction of postoperative depression, use of pain and sleep medications, complications, and length of stay. A total of 21 variables constituted the pool of all possible independent variables (see Table 16). Other recovery variables as well as background and preoperative psychological variables were included in the pool in order to gauge the relative predictive value of preoperative versus postoperative factors. In constructing equations, independent variables were selected for inclusion in a stepwise fashion beginning with the variable that explained the greatest amount of variance in the dependent variable. During successive

Table 16. Independent Variables Used to Construct Multiple Regression Equations

Background Variables	Preop Psychological Variables	Recovery Variables
Age	Preop Anxiety	Postop Anxiety
Preop Health Status	Preop Depression	Postop Depression
Sum Historical Pain	Worry	Sum Operative Pain
Alcoholism History	HLC	Pain & Sleep Med Total
Drug Abuse History	Coping Style	Rate of Recovery
Tobacco Use	Emotion Coping	Complication Index
Previous Surgery	Problem Coping	Length of Stay

steps, variables were selected in order of the amount of remaining variance they explained. Only those variables exceeding a significance level of $p<.1$ for the F-test of the regression coefficient were included in equations. The maximum number of independent variables to be entered into any equation was set at five.

Postoperative depression. Four variables made significant ($p<.1$) contributions toward explaining the variance of postoperative depression (see Table 17). Preoperative depression, the first independent variable selected, explained 52% of the variance of the dependent variable. In predictive power it was followed by coping style, length of stay, and drug history. Examination of the direction of the beta weights indicates that greater preoperative depression, more avoidant coping, a longer hospital stay, and a negative drug history were the best predictors of increased

postoperative depression. Together, these four variables accounted for 79% of the variance of postoperative depression. An F-test of the overall regression equation indicated that it was highly significant, $F(4,19) = 17.73$, $p < .001$.

Table 17. Multiple Regression of Variables on Postoperative Depression

Predictor	Multiple R	R^2	R^2 Change	Simple R	Beta	F	p
Preop Depression	.72	.52	.52	.72	.21	22.69	.001
Coping Style	.80	.63	.11	.65	-.56	17.04	.002
Days	.87	.75	.12	.14	.43	10.22	.005
Drug History	.89	.79	.04	.09	-.38	3.45	.08

Note: Overall $F(4,19) = 17.73$, $p < .001$

Pain and sleep medication total. Data from subjects with positive drug histories were not utilized in constructing this equation because of the previously reported significant correlation between drug history and use of pain medication. To correct for the number of days patients were in the hospital, length of stay was forced into the regression equation on the first step. Results demonstrate that length of stay did not explain a significant amount (only 3%) of the variance of the dependent variable (see Table 18). On the other hand, three variables yielded significant ($p < .1$) regression coefficients: age, followed by health locus of control, and preoperative depression. Examination of the direction of the

Table 18. Multiple Regression of Variables on Pain and Sleep Medication Total

Predictor	Multiple R	R^2	R^2 Change	Simple R	Beta	F	p
Days	.16	.03	.03	.16	.21	1.29	.27
Age	.51	.26	.23	-.43	-.56	8.90	.009
HLC	.62	.39	.13	.39	.43	5.58	.03
Preop Depression	.72	.52	.13	-.19	-.38	4.10	.06

Note: Overall F (4,15) = 4.06, p = .02.

beta weights indicates that lower age, a more external health locus of control, and greater preoperative depression were the best predictors of increased postoperative use of pain and sleep medications in non-drug abusers. Together, these three variables explained 49% of the variance of the dependent variable. An F-test of the overall regression equation revealed that it was significant, F (4,15) = 4.06, p = .02.

Complication Index scores. Preoperative health status and drug history were the only variables to make significant ($p<.1$) contributions toward explaining the variance of Complication Index scores (see Table 19). Examination of the direction of the beta weights indicates that poorer preoperative health status and a negative history of drug abuse were the best predictors of higher scores on the Complication Index. Together, these two variables accounted for only 27% of the variance of the dependent variable; however an F-test of the overall regression revealed that it was significant, F (2,21) = 3.93, p = .04.

Table 19. Multiple Regression of Variables on Complication Index Scores

Predictor	Multiple R	R^2	R^2 Change	Simple R	Beta	F	p
Preop Health	.40	.16	.16	.40	.46	5.99	.02
Drug History	.52	.27	.11	-.25	-.35	3.32	.08

Note: Overall $F(2,21) = 3.93$, $p = .04$

Length of stay. Four variables yielded significant ($p < .1$) regression coefficients in the equation predicting length of stay (see Table 20). Complication Index scores explained 30% of the variance of the dependent variable followed, in order of predictive power, by the sum of historical pain ratings, the sum of operative pain ratings, and use of pain and sleep medications. Examination of the direction of the beta weights indicates that higher Complication Index scores, lower ratings of past pain experiences, higher ratings of postoperative pain, and increased use of pain and sleep medications were the best predictors of a longer hospital stay. Together, these four variables accounted for 62% of the variance of length of stay. A F-test of the overall regression equation reveals that it is highly significant, $F(4,19) = 7.84$, $p = .001$.

Causal Models Explaining the Postoperative Course

Path analysis is a statistical technique for testing the goodness-of-fit of a hypothetical causal model to correlational data. In order to construct a causal model, two assumptions must be met (Kim & Kohout, 1975). First, one must be able to assume, on the basis of logic, the existence of at least a weak

Table 20. Multiple Regression of Variables on Length of Stay

Predictor	Multiple R	R^2	R^2 Change	Simple R	Beta	F	p
Compli-cations	.54	.30	.30	.54	.51	12.88	.002
Sum Historical Pain	.64	.40	.10	-.35	-.56	12.50	.002
Sum Operative Pain	.74	.54	.14	.31	.34	5.19	.03
Pain & Sleep Med Total	.79	.62	.08	.14	.32	4.13	.06

Note: Overall F (4,19) = 7.84, p = .001

causal order between variables. By definition, causal order specifies that, while X may cause Y, Y cannot cause X. Data from the present study are suitable for the inference of causality for two reasons: 1) background and preoperative psychological factors existed prior in time to postoperative recovery; and 2) theories have been advanced proposing causal mechanisms by which background and preoperative psychological factors may influence recovery. The second assumption of causal modelling is that the relationship between any two variables is closed to outside influence. In other words, there should be no common causes or third variables responsible for the covariation of two variables under study. Such noncausal associations between two variables in a path model are referred to a spurious relationships. The assumption of causal closure is met by arranging the proposed causal relationships between variables in such a way that no common causes of covariation are specified.

As stated previously, path analysis is a statistical technique for evaluating how well correlational data conform to a proposed causal model. The approach to path analysis used in the present study has been described by Kim and Kohout (1975) and Kenny (1979). It involves selecting and ordering a set of multiple regression equations so that they conform to the two assumptions of causal modelling. When these conditions have been met, the beta coefficients of the regression equations can be used as estimates of the path (causal) coefficients. The magnitude of the resulting beta coefficients provides an index of the goodness-of-fit of the data to the proposed model. In addition to testing the significance of the beta coefficients, the adequacy of the causal model is also tested by decomposing the total covariation between pairs of variables to uncover the presence of unintended, spurious (noncausal) relationships.

Causal model 1. In the first causal model (see Figure 2) it is proposed that age, coping style, and postoperative pain will all have direct causal effects on postoperative use of pain and sleep medications.[4] In addition, it is theorized that age will have indirect effects on medication use mediated by its direct causal influence on coping style and postoperative pain. Finally, it is predicted that coping style will also have an indirect effect on medication use through its direct effect on postoperative pain. Results in Figure 3 indicate that only two path coefficients reached significance: the paths from age to coping style, F (1,30) = 11.73, $p < .01$, and from age to pain and sleep medication use, F (1,24) = 6.79, $p < .05$. Decomposition of the covariance between variables reveals some interesting causal relationships (see Table 21). Much of covariation between age and postoperative

[4]Persons with a history of drug abuse were not employed in this analysis.

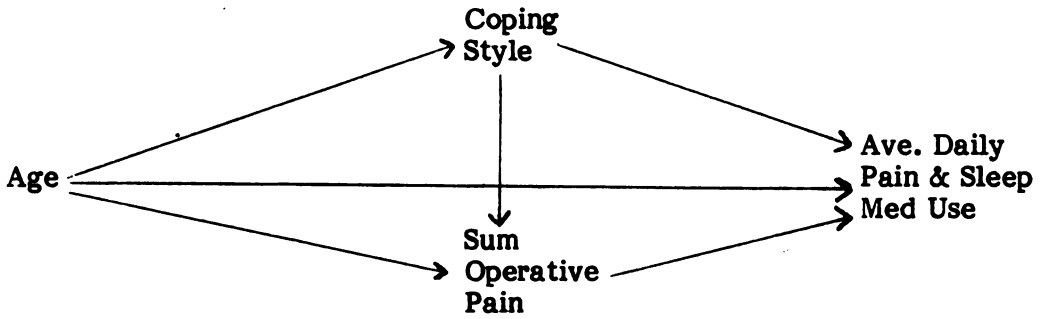

Figure 2. A Causal Model of Pain and Sleep Medication Use

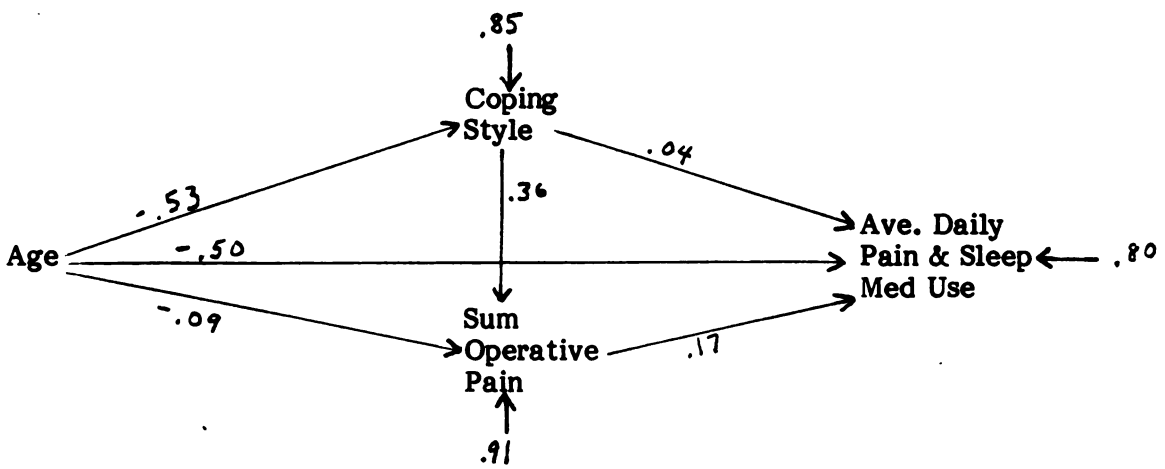

Figure 3. Results of Path Analysis for Causal Model 1

pain attributed to causality is not direct, but is due to the effects of age on coping style which, in turn, influences pain. Examination of Table 21 also reveals the presence of two spurious relationships. A sizable proportion of the covariance between coping style and medication use is due to the noncausal influence of age on both variables. Similarly, almost half the covariance of postoperative

Table 21. Decomposition of Covariance for Causel Model 1

Bivariate Relationship	Total Covariance	Causal			Noncausal
		Direct	Indirect	Total	
Coping Style - Age	-.53	-.53	—	-.53	—
Operative Pain - Age	-.28	-.09	-.19	-.28	—
Pain & Sleep Meds - Age	-.57	-.50	-.07	-.57	—
Operative Pain - Coping Style	.41	.36	—	.36	.05
Pain & Sleep Meds - Coping Style	.38	.04	.07	.11	.27
Pain & Sleep - Operative Pain	.33	.17	—	.17	.16

pain with medication use is due to spurious relationships with either coping style or age. In summary, the proposed causal model receives only limited empirical support. Results suggest that age may be an important causal factor in both the subjective strength of postoperative pain and the postoperative use of pain and sleep medications.

Causal model 2. Figure 4 depicts a proposed causal model that links background, preoperative psychological and postoperative variables to length

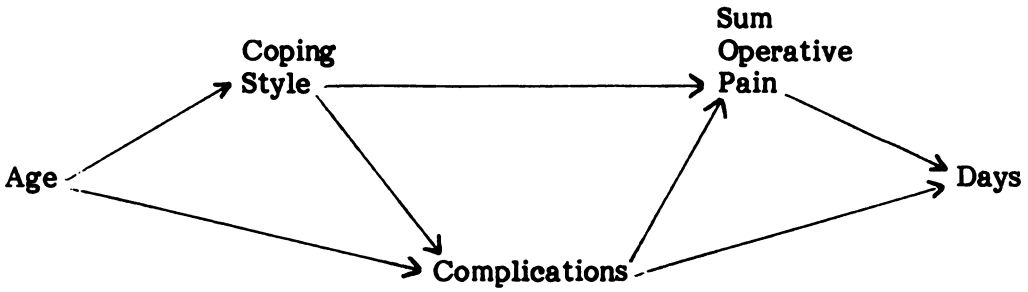

Figure 4. A Causal Model of Length of Stay

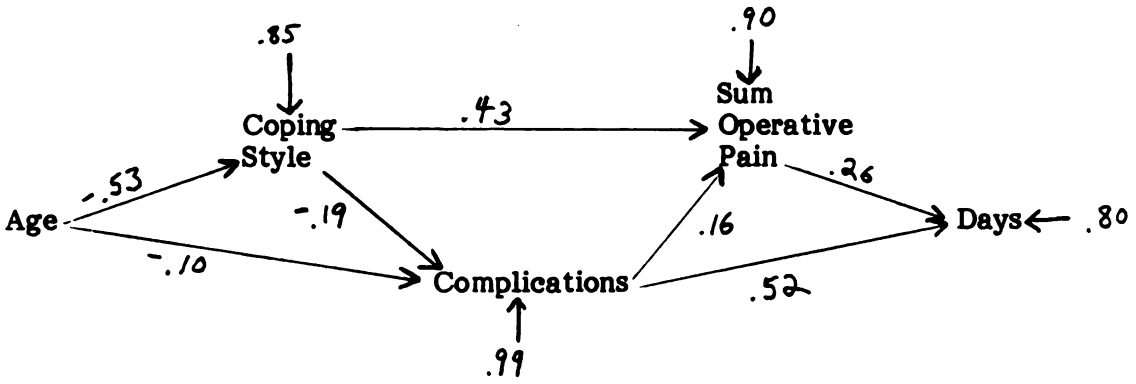

Figure 5. Results of Path Analysis for Causal Model 2

of stay. Several variables were hypothesized to have direct causal effects on other variables: complications and postoperative pain on length of stay, coping style and complications on postoperative pain, age and coping style on complications, and age on coping style. Numerous indirect effects were also predicted and these can be identified by tracing the paths in Figure 4. Results in Figure 5 indicate that 3 of 7 path coefficients were significant: the paths from age to coping style, $\underline{F}$ (1,30) = 11.73, $\underline{p}<.01$, from coping style to postoperative pain, F (1.25) = 5.64, $\underline{p}<.05$, and from complications to length of stay, F (1,25) = 10.44, $\underline{p}<.01$. Decomposition of the covariance (see Table 22) yields additional information. Almost all the covariation between coping style and preoperative pain is attributable to direct causal effects. The indirect and spurious components of this relationship

are minimal. Similarly, results suggest that complications operate on length of stay through direct rather than indirect causal effects. Once again, the spurious component of the relationship is relatively small. In summary, path analysis offers limited support for this causal model explaining length of stay. The occurrence of complications appears to have a strong and direct causal effect on how long patients stay in the hospital postoperatively. In addition, results sugggest that preoperative coping style plays a major role, possibly even greater than the occurrence of complications, in determining patients' subjective estimates of postoperative pain.

Table 22. Decomposition of Covariance for Model 2

Bivariate Relationship	Total Covariance	Causal			Noncausal
		Direct	Indirect	Total	
Coping Style - Age	-.53	-.53	—	-.53	—
Complications - Age	.00	-.10	.10	.00	—
Operative Pain - Age	-.23	—	-.23	-.23	—
Days - Age	-.06	—	-.06	-.06	—
Complications - Coping Style	-.14	-.19	—	-.19	.05
Operative Pain - Coping Style	.41	.43	-.03	.40	.01
Days - Coping Style	.04	—	.01	.01	.03
Operative Pain - Complications	.10	.16	—	.16	-.06
Days - Complications	.54	.53	.04	.56	-.02
Days - Operative Pain	.31	.26	—	.26	.05

DISCUSSION

Summary of Hypothesis Testing

Thirteen hypotheses were initially offered for study. Results provide strong support for three hypotheses and partial support for seven others. Two hypotheses received no support from the findings, while one hypothesis was actually contradicted by the findings.

Strong support. The hypothesis stating there would be a linear relationship between preoperative and postoperative anxiety (Hypothesis 9) was strongly supported by the presence of a significant positive correlation between anxiety measures. Likewise, the prediction (Hypothesis 10) that preoperative and postoperative depression would be linearly related was confirmed by a significant positive correlation between depression measures. The only other hypothesis receiving strong support was the prediction (Hypothesis 3) that impending surgery would be more often appraised as a situation requiring acceptance rather than as one presenting possibilities for change.

Partial support. Among the hypotheses receiving partial support from the data was the prediction (Hypothesis 1) that previous experiences with surgery would be associated with less preoperative emotional disturbance; results indicated that previous surgery experiences correlated significantly with less worry and tended to predict less anxiety. A prediction (Hypothesis 2) that higher ratings of past pain experiences would be related to more preoperatve emotional disturbance also received partial support; higher historical pain ratings were observed to correlate significantly with more depression and they tended to predict greater worry and greater anxiety.

The hypothesis stating that poorer preoperative health status would be related to poorer scores on measures of physical recovery (Hypothesis 7) was partially confirmed by the presence of a significant correlation between health status and complications. Higher ratings of past pain experiences had been expected to predict greater postoperative pain and increased use of pain and sleep medications (Hypothesis 8). The significant correlation between historical pain ratings and medication use, and the positive association between historical and postoperative pain ratings, partially supports this hypothesis.

Two hypotheses relating preoperative emotional disturbance to postoperative pain also received partial support. As predicted (Hypothesis 12), preoperative depression correlated significantly with postoperative pain ratings; however, it failed to yield an expected association with postoperative use of pain and sleep medications. Preoperative anxiety had also been expected to correlate significantly with postoperative pain ratings and medication use (Hypothesis 11). Although both associations were in the expected direction, they failed to reach significance.

The remaining hypothesis which received partial support was the prediction (Hypothesis 13) that more vigilant coping would be associated with poorer scores on all recovery measures. Results indicated that the expected relationships were observed on four measures of recovery; more vigilant coping correlated significantly with increased postoperative levels of pain, anxiety and depression, while the correlation between more vigilant coping and increased use of pain and sleep medications barely missed reaching significance. Expected associations were not observed on three measures of recovery (rate of recovery, days, complications).

No support. Two hypotheses received no support from the data. It had been predicted (Hypothesis 5) that an internal health locus of control would be

related to more vigilant coping and a preference for problem-focused coping processes. The correlation with problem-focused coping was low and the correlation with coping style was not in the expected direction. A prediction had also been made (Hypothesis 6) that increasing age would be associated with more complications, a slower rate of recovery, and a longer hospital stay. While there was a trend associating age with longer stays, there were no relationships observed between age and complications or rate of recovery.

Contradictory findings. A test of one hypothesis yielded contradictory results. It had been predicted (Hypothesis 4) that impending surgery would elicit more emotion-focused coping than problem-focused coping. To the contrary, the data showed that patients attached significantly greater importance to problem-focused coping processes.

Summary of Additional Findings

Prior to data collection, the only hypothesis regarding age involved its potential influence on measures of physical recovery (i.e., days, complications, rate of recovery). Although results did not demonstrate predicted relationships with physical recovery, they did reveal that age had a major influence on a number of other variables. Among background variables, increasing age was found to be significantly related to lower ratings of past experiences with pain. Surprisingly, increasing age was also related to better ratings of preoperative health status. Two significant associations were observed between age and psychological variables; increasing age predicted both less preoperative anxiety and less vigilant coping. With regard to recovery, increasing age was signifcantly correlated with both lower ratings of postoperative pain and decreased use of pain and sleep medications.

Measures of pain also yielded a number of unexpected relationships. As previously noted, age was significantly related to lower ratings of past pain experiences, lower ratings of postoperative pain, and decreased postoperative use of pain and sleep medications. In addition to age, a history of drug abuse was observed to have a major influence on measures of pain. Past or present drug abuse predicted higher ratings of past experiences with pain and increased postoperative use of pain medications. Finally, three psychological variables also appeared to influence pain scores. More vigilant coping was associated with higher ratings of past pain experiences; higher preoperative ratings of worry predicted increased postoperative use of pain and sleep medications; and greater postoperative depression was related to higher ratings of postoperative pain.

Elaboration on Findings for Psychological Variables

Anxiety, depression, and worry. Like most earlier studies of affect in surgical populations (Wolfer & Davis, 1970; Johnson et al. 1971; Cohen & Lazarus, 1973; Vernon & Bigelow, 1974; Sime, 1976), the present study reported linear relationships between preoperative and postoperative measures of emotional adjustment. Patients who were anxious prior to surgey tended to remain anxious after surgery. Furthermore, no significant changes were noted over time in the overall level of anxiety. This result corroborates a report by Auerbach (1973) of nonsignificant differences between preoperative state anxiety and postoperative state anxiety measured on or about the second day after surgery. Spielberger, Auerbach, Wadsworth, Dunn, and Taulbee (1973) had reported a significant decline in state anxiety between preoperative and postoperative measurements. However, in that study postoperative state anxiety was not measured until three to nine days after surgery. Although the sample in the present study registered lower

preoperative state anxiety scores than other surgical samples, these differences were not significant. This trend toward lower state anxiety may reflect the fact that patients in the present study were all undergoing hernia repair. In the other samples patients were undergoing a variety of operations, some of which may have posed greater risk to life. The trend toward lower scores may also be attributable to the older age of the current sample since, at least in the present study, age and preoperative state anxiety were negatively correlated.

Results for the CES-Depression Scale were substantially higher than the norm reported by Sayetta and Johnson (1980). Whether the present sample was more chronically depressed than the general adult population, or just more depressed in response to impending surgery, is not clear. In any case, patients who were depressed prior to surgery tended to remain depressed after surgery. The relationships of the different measures of preoperative emotional adjustment to the course of recovery indicate the usefulness and importance of including a scale to measure depression. While anxiety, worry, and depression all produced significant correlations with postoperative measures of emotional adjustment, only depression was significantly associated with postoperative pain ratings. This result is consistent with recent theories concerning common neurophysiological pathways involved in pain and depression (Sternbach, 1974) as well as research evidence on the increased incidence of pain in persons with depression (Lesse, 1968).

Among preoperative measures of emotional adjustment, self-ratings of worry yielded a significant positive correlation with postoperative use of pain and sleep medications. However, in the multiple regression equation for this recovery variable, preoperative depression was negatively related to pain and sleep medication use. While these results are contradictory, it should be noted

that previous studies investigating the relationship of preoperative emotional adjustment to postoperative use of analgesics and sedatives have also reported inconsistent findings. As in most earlier psychological studies of surgical patients, the present study found that preoperative emotional adjustment was not significantly related to such aspects of physical recovery as length of stay, occurrence of complications, or rate of recovery.

Coping style. The present study provides additonal evidence regarding the reliability and validity of the method for rating coping style along the avoidance-vigilance dimension. Results demonstrated that trained raters were able to rate brief interviews with a high degree of reliability and at a high rate of agreement. With regard to validity, the findings indicate that the coping style rating was the single best psychological predictor of recovery. More vigilant coping was significantly related to greater postoperative emotional disturbance and higher ratings of postoperative pain. In addition, more vigilant coping tended to predict increased postoperative use of pain and sleep medications. Results did not confirm a previous report (Cohen & Lazarus, 1973) that more vigilant coping was related to more postoperative complications and a longer hospital stay.

Cohen and Lazarus (1973, 1979) have stated that vigilant coping contributes to a more difficult recovery because it is a maladaptive strategy in a situation where threats are great but few harms actually materialize. They are unclear about the actual means by which coping style affects recovery; Cohen (1976) has speculated that, by constantly evaluating their conditions, vigilant patients may exacerbate certain postoperative complications subject to psychological influence. In the present study, significant associations were noted between more vigilant coping and preoperative emotional disturbance. These results suggest

that vigilant coping is but one facet of a general reaction to impending surgery where higher levels of anxiety, depression and worry are related to increased information seeking and greater expectations of postoperative difficulties. The affective disturbance associated with more vigilant coping appears to persist after surgery. The presence of a strong relationship between vigilant coping and postoperative depression may explain why more vigilant coping predicts higher ratings of postoperative pain. As previously noted, results from the present study and evidence from the literature on pain perception both point to a connection between depression and proneness to pain. The trend relating more vigilant coping to increased use of pain and sleep medications is also consistent with this explanation. Because of their expectations of a difficult recovery and their greater proneness to pain, vigilant copers may be less likely to experience significant analgesic or sedative effects from prescribed medications. Consequently, they might be moved to request pain and sleep medication more often or in larger amounts.

Health locus of control. In the present study, patients' locus of control orientations toward health-related issues beared little relationship to their coping responses or their preoperative and postoperative emotional adjustment. Health locus of control scores were also not significantly related to any measures of recovery, although results for the multiple regression equation predicting total use of pain and sleep medications did suggest that an external health locus of control helped to predict increased medication use. The overall failure of health locus of control to relate to other psychological variables or to aspects of recovery may be due to the special characteristics of surgery as a health episode. Reviews of the literature (Strickland, 1978; Wallston & Wallston, 1978) indicate that locus of control and health locus of control have demonstrable effects on preventative

and precautionary health behaviors. By its very nature, hospitalization for hernia repair does not involve issues of preventative health behavior. Furthermore, there are few behaviors of a precautionary nature to engage in during the immediate postoperative period that would have a significant impact on measures of recovery. The multiple regression results for pain and sleep medications suggest that one of the only ways persons with an internal health locus of control can exercise personal control over events is to modulate their use of prescribed medications.

Coping processes. Results for the Coping Inventory both confirmed and disconfirmed earlier predictions. As expected, patients appraised hospitalization for surgery as a situation that must be accepted rather than as one where change is possible. However, contrary to expectations, patients attached greater importance to emotion-focused coping processes over problem-focused coping processes. This result runs counter to the theory offered by Lazarus and Launier (1978) that a situation appraised as offering few possibilities for change will be more likely to result in the use of emotion-focused coping processes. This finding also contradicts research by Folkman and Lazarus (1980) using the Ways of Coping Checklist; they found that increased emotion-focused coping was reported for health episodes and for situations appraised as requiring acceptance. Folkman and Lazarus (1980) do not specify the nature of these health episodes but, since their sample was living in the community, it seems unlikely that many inpatient experiences were included. One possible explanation for the results in the present study is that hospitalization for elective surgery elicits a different coping response than other types of health episodes. A second, more likely possibility involves the fact that subjects in this study were asked to decide how important each coping process had been or would be for dealing with hospitalization; in the Folkman and Lazarus

(1980) study subjects rated health episodes after they had occurred. Employing the test, in part, as a measure of anticipatory coping may have biased results toward problem-focused coping since it may have elicited patients' desires to do something in a situation which they had already appraised as one requiring acceptance. How results would have differed if subjects had completed the Coping Inventory after surgery, rather than before, could serve as the subject for another study. Thus, it is not clear what results from the present study demonstrate about the validity of the conceptual distinction between emotion-focused and problem-focused coping or the methodology for measuring coping processes.

Elaboration on Findings for Age

Among the more unexpected findings in the present study were a number of significant relationships between age and measures of preoperative psychological status and postoperative recovery. Older subjects were much more likely to report less anxiety preoperatively and to engage in more avoidant coping. These results cannot be attributed to differences across age groups in previous surgery experience. Instead, the findings suggest that older patients differed, as a group, in their approach to surgery; compared to younger patients they reported less emotional disturbance, they engaged in less information seeking, and they reported fewer negative expectations about the postoperative recovery period. In interviews, older patients frequently expressed confidence in their doctors and in the hospital. Many cited this as a reason why they had asked few questions about the procedure. Some older patients adopted a fatalistic approach toward the situation and viewed events and the outcome of surgery as totally beyond their control. Attitudes such as these were rare among younger subjects.

During the recovery period, older subjects were more likely to make lower ratings of postoperative pain. Age was also signficiantly related to decreased post-operative use of pain and sleep medications; in the multiple regression equation predicting total use of pain and sleep medications, age emerged as the most significant independent variable and accounted for 23% of the variance of the dependent variable. The relationships between increasing age and lower scores on pain measures may reflect the preference for avoidant coping among older subjects. Older patients generally did no better or worse than younger patients on such measures of physical recovery as length of stay, complications, and rate of recovery. Part of the reason for this may be found in the significant correlation between increasing age and better ratings of preoperative health status. This result suggests that surgeons may have selectively screened out of the population available for recruitment older individuals with serious medical illnesses. Since all hernia repairs in the present study were elective operations, surgeons may have decided for medical reasons to perform the operation only on older subjects who were in good physical health. Such precautions may not have been taken with younger subjects, who may have been viewed as better able to withstand the effects of surgery despite poorer overall health status. The possible exclusion of older persons in poorer health from the population under study would serve to confound results regarding age. For example, the previously noted relationships between psychological and pain variables and age may only hold for healthy aged persons.

Case Examples

Two case histories have been included which illustrate some of the statistical relationships observed in this study. Transcripts of the Avoidance-vigilance Interview with each subject appear in Appendix J.

Case 1. Mr. B., a 32 year-old separated black male with a history of alcohol and drug abuse, was hospitalized for repair of a right inguinal hernia. His previous medical history included surgery for a collapsed lung and for treatment of gunshot wounds. During the Avoidance-vigilance Interview he indicated that the first sign of his hernia occurred four to five years previously. At that time he noticed that one of his testicles was enlarged. His doctor had recently provided him with the diagnosis of hernia and had recommended surgery. Mr. B. stated that he initially accepted this recommendation but had subsequently spoken with another doctor who felt that surgery was not indicated. At the time of the interview, Mr. B. was in doubt as to whether he needed the operation. When asked what he knew about the procedure, Mr. B. responded, "It [the hernia] is quite old and probably has to be cut off." He still wished to know from his doctor whether the operation would affect his sexual drive or his fertility, and how soon he could engage again in sexual relations. Without providing specifics, he expressed concerns that, "If something was to go wrong...it would affect me mentally." Mr. B. predicted that he would be back in his room within 24 hours after surgery and that he would have to remain in bed for three to four days before he could ambulate. At the end of the interview he repeated his concerns about how the operation would affect his sexual life and whether or not it was truly indicated.

Mr. B. received a coping style rating of "8" placing him in the vigilant category. he rated himself as "10" (very nervous or worried) on the 10-point rating scale of worry concerning the upcoming operation. Mr. B.'s score of 41 on the HLC Scale is within one standard deviation of the mean and indicates a mixed locus of control for health-related issues. He earned scores of 66 on both the Emotion-focused and Problem-focused Scales of the Coping Inventory. These scores are one to two standard deviations above sample means. Mr. B.

was one of only three subjects who appraised hospitalization for surgery as a situation you could change or do something about. Mr. B.'s preoperative depression score of 26 was one to two standard deviations above the sample mean. His preoperative state anxiety score of 69 was the highest score earned by any subject and is over two standard deviations above the sample mean.

On the morning of his scheduled hernia repair, Mr. B. refused to undergo the procedure and was discharged at his own request. His stated reason for refusing surgery was that he was not convinced it was absolutely necessary.

Case 2. Mr. S. an 85 year-old widowed white male was hospitalized for repair of a left inguinal hernia. He had undergone a hernia repair once before at age 17. His previous medical history also included three previous operations for implantations of pacemakers. Mr. S.'s overall preoperative health status was rated as excellent by his surgical resident. During the Avoidance-vigilance Interview, Mr. S. stated that he had first experienced some pain on his left side one year previously. Soon thereafter, he noticed a slight bulge in the same area and concluded that he had a hernia. Mr. S. wished to have it operated on at once, but was told by his doctor to wait until another medical condition was fully treated. When asked about his reaction to the news that he would need surgery, the patient observed he felt, "Oh fine, let's get it over with. I'm not afraid. I can only die once." When he came to the hospital to be admitted, Mr. S. had been told he would have to wait a few days before a bed became available. Mr. S. reports he told his doctor, "I wish you would avoid that because I want to go to my grandson's high school graduation." He was admitted one day later. Mr. S. stated that his doctor had not gone into specific details about the procedure. He reported that, given an opportunity to ask questions, he would not seek any additional information.

When asked what he knew about the procedure, Mr. S. expressed that he had the highest confidence in his doctor and, furthermore, that he believed hernia repair was not a particularly dangerous or difficult operation. Mr. S. made light of how he would feel afterwards, stating, "Oh...as Groucho Marx said 'I'll probably take a turn for the nurse.'" The patient reported he had been told he would remain in the hospital for five days but Mr. S. was hoping to be discharged sooner.

Mr. S. received a coping style of "3" which places him in the avoidant category. On the self-report scale of worry, Mr. S. rated himself as "1" (not nervous at all). Mr. S.'s score of 39 on the HLC scale indicates a mixed locus of control for health-related issues. His scores for preoperative state anxiety (23) and depression (2) were approximately one standard deviation below each sample mean. Mr. S. attached relatively greater importance to items on the Problem-focused Coping Scale (46) than to items on the Emotion-focused Coping Scale (38). Like most subjects, he viewed surgery as a situation one must accept and get used to.

Mr. S. was discharged five days after his operation. His rate of recovery was judged to be average. He suffered no surgery-related complications and he used no pain or sleep medications. His total rating of postoperative pain (25) was more than one standard deviation below the sample mean. His scores on measures of anxiety (25) and depression (6) remained well below average for the sample.

Implications for Future Research

Three general conclusions can be drawn from this study regarding the role of psychological factors in recovery from surgery. First, reliance on a more avoidant coping style is associated with less preoperative and postoperative emotional

disturbance, lower ratings of postoperative pain, and decreased use of pain and sleep medications. Secondly, results suggest that age has direct effects on certain aspects of recovery, as well as indirect effects on recovery mediated by its influence on coping style. Thirdly, age, coping style and preoperative adjustment appear to have little influence on such physical aspects of recovery as length of stay, occurrence of complications, and rate of recovery. It must be added, however, that the aged persons in this study were a relatively healthy group of individuals with few pre-existing medical conditions.

These conclusions have several implications for clinical practice. They clearly indicate that for many patients, avoiding information about surgery and ignoring the possibilities of postoperative complications is an effective coping strategy. Providing such patients with detailed, accurate information about what to expect would not appear to promote the "work of worrying." To the contrary, it might serve to impede or disrupt a coping strategy centered around minimizing both the threatening aspects of the situation and any experiences of emotional distress. A parallel consideration involves the question of what approach to take with vigilant patients. This question possesses great practical significance since results from this study associate more vigilant coping with greater preoperative emotional disturbance and a more difficult recovery marked by greater postoperative emotional disturbance, higher ratings of postoperative pain, and increased postoperative use of pain and sleep medications.

Previous studies (DeLong, 1970; Andrew, 1973; Ritter, 1979) have attempted to assist vigilant patients by providing them with additional information. This strategy has not demonstrated clear-cut beneficial effects on recovery. A more effective strategy with vigilant patients might be to enhance tendencies toward avoidant coping using such techniques as systematic relaxation and hypnosis.

It is usually assumed, when those techniques are found to improve score on recovery measures, that they have done so by alleviating the patient's level of stress and anxiety. An alternative explanation is that, by disrupting ongoing cognitions and redirecting attention, these interventions reduce both vigilant coping and emotional disturbance. A study in which patients identified as vigilant copers were randomly assigned to either an avoidance-enhancing approach or an information-providing approach would yield much valuable information. In designing this study it would be necessary to include a check on the manipulations. Experimental effects would not be expected to occur if patients did not actually comply with instructions to practice the recommended avoidance-enhancing technique.

A remaining question involves the generalizability of results from this study of hernia repair to other types of surgery and other illnesses. Herniorraphy has an extremely low mortality rate, and most patients can expect to resume daily activities within a short period of time. While avoidant coping may be a successful strategy for this form of surgery, the properties of other operations may favor alternate styles of coping. For example, survivors of surgery for cancer face much different prospects; many must live for years under the threat of relapse and must undergo continuing preventative treatments. Other surgical procedures, such as amputation, involve dealing with loss of function and require active participation in rehabilitative efforts. Each of these procedures presents patients with widely different postoperative psychological tasks. It would be simplistic to believe that one style of coping would be the most effective for all forms of surgery. A series of prospective studies of patients undergoing different types of operations is needed to identify the particular psychological demands and the effectiveness of various coping strategies in each of these situations.

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APPENDICES

APPENDIX A

Demographic Data

Table 23. Breakdown of Sample by Age

Years	n	
24-29	3	(9%)
30-39	7	(22%)
40-49	0	(0%)
51-59	8	(25%)
60-69	10	(32%)
70-79	3	(9%)
81-85	1	(3%)
Total	32	(100%)

Table 24. Breakdown of Sample by Race

Race	n
White	19 (59.4%)
Black	13 (40.6%)
Total	32 (100.0%)

Table 25. Breakdown of Sample by Education

Years	n
6-11	13 (40.6%)
12	12 (37.5%)
13-14	3 (9.4%)
Not Available	4 (12.5%)
Total	32 (100.0%)

Note: Range = 6-14; M = 11.04, SD = 1.88

Table 26. Breakdown of Sample by Marital Status

Marital Status	n	
Single	12	(37.5%)
Married	12	(37.5%)
Divorced	5	(15.6%)
Separated	1	(3.1%)
Widowed	1	(3.1%)
Not Available	1	(3.1%)
Total	32	(100.0%)

Table 27. Breakdown of Sample by Living Arrangement

Living Arrangement	n	
Alone	11	(34.4%)
Not Alone	20	(62.5%)
Not Available	1	(3.1%)
Total	32	(100.0%)

APPENDIX B

Types of Operations

Table 28. Breakdown of Sample by Type of Operation

Type of Operation	n	
Right Inguinal Hernia	14	(43.8%)
Left Inguinal Hernia	10	(31.3%)
Umbilical Hernia	3	(9.4%)
Ventral Hernia	2	(6.3%)
Right Inguinal and Ventral Hernia	1	(3.1%)
Left Mass	1	(3.1%)
Refused Surgery	1	(3.1%)
Total	32	(100.0%)

APPENDIX C

Information Sheet and Consent Form

Individual Differences in Adaptation to Elective Surgery
Information for Participants

Investigators: Paul Jacobsen, M.A. Samuel Brinkman, Ph.D.
Lloyd Jacobs, M.D. Ronald Fudge, Ph.D.

You and other patients scheduled for hernia operations are being asked to participate in a research project investigating people's attitudes toward their surgery and the course of their recovery. If you agree to participate, you will be interviewed today and asked some questions about your medical history and the operation you are scheduled for. To help record this information, the interview will be tape-recorded. You will also be asked to fill out four questionnaires asking about your beliefs and current thoughts and feelings. One of the investigators will visit you on the day after your operation to have you answer some additional questions and redo two of the questionnaires mentioned earlier. Following your discharge, your medical records will be reviewed by members of the research team. In addition, your doctor will be asked several questions about your hospital stay. In all, you are being asked to volunteer 40 minutes on the day before your operation and 20 minutes on the day after.

Although there are no immediate benefits to you from participating, it is hoped that the results of this research will, in the future, assist medical personnel in their care of surgical patients. This study should not present any undue risks to you, unless you believe talking about your upcoming operation and filling out a few forms would not be in your best interest. You may refuse to participate if you do not wish to, and you may terminate your paritipation

at any time without this affecting the quality of medical care you will receive during your stay. The confidentiality of what you say will be protected by not using your name or leaving other identifying information on the questionnaires or in the tape-recording. Only the research team will listen to the tape recordings.

If you have any questions, please ask the investigator who is with you.

Individual Differences in Adaptation to Elective Surgery
Informed Consent of Participant

I have read the attached "Information for Participants".

A detailed explanation of the procedures and their purposes has been given to me and I understand it.

I have been given a description of discomfort and risks which can be reasonably expected from the project.

I understand there will be no direct benefit to me as a result of the project, but that new knowledge may be gained and this knowledge of value to others in the future.

I was given the opportunity to ask any questions about the procedures and all were answered to my satisfaction.

I know I am free to withdraw this consent and to stop participation in the procedures at any time without affecting the quality of my medical care and without generating any prejudice to myself.

I have been assured that my personal identity will not be revealed and will remain confidential in reports and releases of the results of the project.

Of my own free will, I concent to participate in the procedures.

_____
Date

_____
Participant

_____
Witness (Interviewer)

APPENDIX D

Surgical Resident's Ratings

1. Overall Preoperative Health Status (check one):

   _____ Excellent (1)

   _____ Good (2)

   _____ Fair (3)

   _____ Poor (4)

   _____ Extremely Poor (5)

2. Overall Rate of Physical Recovery (check one):

   _____ Excellent (faster than usual for this procedure) (1)

   _____ Satisfactory (about average for this procedure) (2)

   _____ Poor (slower than usual for this procedure) (3)

APPENDIX E

Complication Index

Points		
2	1.	inability to void, requires catheterization (score each time catheter is inserted)
2	2.	inability to move bowels, enema given
1	3.	nausea
2	4.	nausea requiring medication
2	5.	nausea plus vomiting (plus medication)
1	6.	slight headache
2	7.	severe headache, persistent
1	8.	discomfort requiring hot water bottle
1	9.	discomfort requiring ice pack
1	10.	rectal tube for gas
1	11.	wound hematoma aspirated
1	12.	necessity to pack wound (for wound infection)
	13.	special medications given (score only medications given for purposes listed below; do not include medications given for pre-existing medical conditions)
1		a) antibiotics, routine postoperative
3		b) antibiotics given to combat fever and infection
1		c) medication to prevent constipation or for urine stimulation
1		d) bowel softeners
1		e) antacids
1		f) medication for diarrhea and/or gut irritability
2		g) medication for bronchial spasms (e.g., Aminophylline)
1		h) cough medication (no fever)
1		i) medication for gas pains
1		j) antispasmotics
1		k) antipyretics

APPENDIX F

Avoidance-vigilance Interview

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

2. What was the first sign or symptom of the hernia/medical problem you noticed? When was that? (approximate date)

3. How long after that did you go see a doctor? (approximate date)

4. What did the doctor tell you about it? What else?

5. Who told you you would need surgery for this problem?
When was that? (approximate date)
What were you told about how the operation would be performed?
What went into your decision to have it done at the present time?

6. What have other people told you to expect about your operation?
Have you talked with others about it? Who?

7. Do you feel you have as much information about the operation as you'd like to have? If not, what other kinds of information would you like to know?

8. What do you expect this operation to accomplish for you, in your particular case? Do you expect any benefits from this operation, and if so, what?

9. When your doctor first told you that you needed surgery, what was your first reaction? Since then, what other thoughts or ideas have you had about it? How do you deal with these feelings — talk it over or try not to think about it?

10. How does your wife/family feel about it?

11. I'd like you to tell me what you think will happen tomorrow, starting from the time you wake up in the morning, until you're back in your room after the operation, as far as the procedures and things like that. Inquire as to knowledge about anesthesia, incision, procedure, length of time. Do you think you'll feel any discomfort while you're in the operating room?
How do you think you'll feel when you wake up after your operation?

12. How long do you expect to be in the hospital after your surgery?

13. Have you ever stayed or been an outpatient here before?

14. Any feelings regarding your doctor, the medical staff, the hospital?

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

APPENDIX G

Rating Criteria for Avoidance-vigilance Dimension

I. Note the following:

knowledge of his medical condition
how he talks about operation
his thoughts about operation
possible consequences of operation
does he admit threatening aspects of operation situation?
does he deny them?
has he talked with others about it?—what kind of information have they given?
does he want more information about it—what kind?

That is,
a. does he understand his medical problem?
b. does he know what will be done, or what the hospital experience will be like?
c. what does he know about the threatening aspects of the operation?

II. Avoidance-vigilance dimension, characterized as follows:

Avoider end

The patient shows avoidance or denial of emotional or threatening aspects of the upcoming medical experience, as indicated by restriction of knowledge or awareness about the medical condition for which surgery was recommended, the nature of the surgery, and the postsurgical outlook, and by unwillingness to discuss thoughts about the operation.

Vigilant end

The patient is overly alert to emotional or threatening aspects of the upcoming medical experience, as indicated by the seeking out of knowledge about the medical condition, the nature of surgery, and the postsurgical outlook, and by the readiness to discuss thoughts about the operation.

Middle group

The patient shows no rigid preference for either avoidance or vigilant behavior, but rather evidence of both modes. Characteristic—find both modes without predominance of one or the other.

III. Knowledge of any of the following kinds of information puts a person closer to the vigilant end of the dimension:

a description of the medical problem (including etiology)
the risks if surgery were not performed
the nature of the hospital experience
the operation's procedure
medical problems which could occur during the operation
the expected general course of postoperative recovery
possible postoperative complications
the possibility of recurrence of the medical condition
statements that he sought information beyond what his doctor had told him

Lack of knowledge about his medical condition puts the person closer to the avoidance end, as do statements that he had no thoughts at all about his operation and had not discussed it with anyone, that he did not want to know anything about it, denial that an operation was anything to be concerned about, and unusually positive statements ("having an operation is like having a vacation").

IV. Threatening characteristics of operations

Several things to be concerned about:

death
pain
mutilation
possibility of complications after surgery
fear they will find cancer
possibility surgery won't cure condition

V. Discussion of threatening characteristics referring to avoidance-vigilance dimension:

Death - usually puts one in vigilant category. Admits possibility of death, worried if will pull through, tells of fatality rate, etc. They can say they feel they'll pull through, since fatality rate is very low and healthy people have excellent chance of surviving operation. Only if overweight is fatality rate higher; in this case, there is more reason to be worried.

Cancer - in essence, the thought of cancer may be almost equivalent to the thought of death, since cancer in many cases leads to slow death or slow suffering. So if he mentions fears about his, usually in vigilant category, or toward that end. If he mentions possibility of cancer, but doesn't admit he could have it, not as vigilant a response. Is very rare to find in gall bladder.

Complications - pneumonia, infection, would not healing, etc., are a distinct possibility after surgery, especially after gall bladder operation. For older people, overweight people, or those with respiratory troubles in the past, these are realistic possibilities. Never sure there will not be complications after any surgery—always a possibility of infection, etc.

Fears of being cut open - if mention "being under the knife," some unexpressed fears of death, is admitting it to some extent. In this can also be concern about what else they might find (cancer or other diseases). There are also some neurotic fears being expressed sometimes—concerned about someone looking into him, feeling of loss of control, not knowing what surgeon will do to him (sadomasochistic thoughts), etc.

Pain - a major fear for some. Especially a concern of gall bladder patients although others too. Consider it a major fear if they talk about it as "pain," rather than "being uncomfortable" or "feeling discomfort."

Mutilation - not of much concern in these operations, except in a neurotic sense among some; manifested by discussion of scar or what knife might do.

Possibility surgery won't cure condition - likely in all operations, although especially so in hernia and gall bladder. Hernia may recur; gall bladder attacks may still occur and person may still have to restrict his diet.

VI. Breakdown of Avoidance-vigilance dimension

Avoider: 1, 2, 3

Categorized by denial of worry, of anything to worry about. Focus on positive aspects—good doctor, excellent medical facilities, advanced technology. Does not mention pain, but may mention that will be uncomfortable for a few days. Focuses on how simple and minor operation is. States that doesn't want to think about the operation, wants to keep a positive attitude, does not want to know what will happen. If admits being nervous, says as nervous as anyone else would be.

1 = almost total avoidance. Knows very little about forthcoming operation, does not want to know more, and tries to avoid talking about it. May try to cut conversation short or may answer questions very, very tersely. Avoided talking to others about it or has only very positive things to say about the operation.

2 = denies worry or anything to worry about. Knows little about operation and is content, does not want to know more. But will discuss feelings to some small extent. Avoided talking to others about it, or talked only to relatives.

3 = denial of worry or anything to worry about. But focuses on how minor it is, how insignificant, thus giving the impression that underlying what he is saying is the thought that there might be something one could worry about ("I always came through everything before"). Knows a little bit about operation. May have talked to others but denies that their bad stories apply to him, or quotes only good things they said.

Middle group: 4, 5, 6, 7

Categorized by presence of both avoiding and vigilant responses; for example, will mention fear and then deny it. ("I thought of cancer, but I"m sure that's not it.") Usually states vague fears, without specifying exactly what the fear is about. May mention being scared of the unknown, possibility of things happening without suggesting what they might be, just saying surgery scares them, fear of operating room, of knife, etc.

4 = mostly denial, but not as firmly stated as above. Suggestion underlying speech that there may be something to worry about, but this person does not want to know. May mention minor complications such as nausea, discomfort. May focus on question of how long before can get back to normal activities. Knows a little about operation. May have talked to others but denies what they say or talks about good aspects of what they said.

5 = a lot of denial, but not so firmly stated. Suggestion underlying speech that there may be something to worry about, but this person does not want to worry. Discusses minor complications and how long before back to normal. Knows a little about operation. May have talked to others. May give fleeting reference or slip of tongue that others may be concerned about possible complications that could occur.

6 = mentions a few negative possibilities that could happen—pain, etc. —but quickly denies them. Implies there is something one could worry about, but person does not think it helps to worry. Discusses minor complications. Knows something about operation. Talked to others.

7 = mentions some negative possibilities that could happen, denies them, often without certainty. Implies things do happen to other people, but feels they won't to him. May tell of trying not to think about negative aspects, but alludes to what those negative aspects are. Knows something about the operation, can describe in some small detail. Has talked to others.

Vigilant: 8, 9, 10

8 = mentions negative things that could happen, although probably states that he thinks few of them will happen to him. Describes negative things that may have happened to others. Mentions minor complications. Knows a lot about operation and medical problem and willing to explain. Only a fleeting reference to denial.

9 = list of negative things that could happen to him, including possibility of death, although realistically may state that he thinks he will pull through the operation. Knows a lot about the operation, has sought out information, can explain in much detail, discussing threatening aspects. Mentions complications that occur. May state fatality rate, % of times they find cancer, etc. obsesses a little in discussing operation and medical details.

10 = epitomized by the physician undergoing an operation. Knows every bad thing that could happen to him and obsesses at length about these things, the operation, what will happen to him afterward, etc. Has found out all the information he possibly can.

APPENDIX H

Coping Inventory

DIRECTIONS: While thinking about your upcoming operation and the recovery period immediately following it, please read the statements below. Decide how important each of these strategies is to you in dealing with your hospitalization for surgery. A rating of "1" means this strategy is not important to you, and not at all a part of how you've handled or will handle this experience. A rating of "5" means this strategy is very important to you, and very much a part of how you've handled or will handle this experience. Circle only one number for each statement.

			Not Important				Very Important
P	1.	Attempt to learn as much as possible about the details of the operation	1	2	3	4	5
E	2.	Turn to other activities or thoughts to take your mind off matters	1	2	3	4	5
P	3.	Go over the information you have again and again, to make sure you understand everything	1	2	3	4	5
E	4.	Concentrate on something good that will come of the whole thing	1	2	3	4	5
P	5.	Get information from other people who know about or have undergone this type of operation	1	2	3	4	5
E	6.	Ignore information about the possible risks or complications associated with the operation	1	2	3	4	5
E	7.	Make light of the situation, refuse to get too serious about it	1	2	3	4	5
P	8.	Figure out what you can do to relieve any discomfort	1	2	3	4	5
E	9.	Share with someone your feelings about being hospitalized	1	2	3	4	5

			Not Important				Very Important
P	10.	Seek out the advice of someone you respect	1	2	3	4	5
E	11.	Go on as if nothing happened	1	2	3	4	5
P	12.	Plan to monitor closely your use of pain medications and sleeping aids	1	2	3	4	5
E	13.	Feel bad that you couldn't avoid this situation	1	2	3	4	5
P	14.	Seek out the advice of medical personnel on what to do after surgery	1	2	3	4	5
E	15.	Do not let it get to you, refuse to think about it too much	1	2	3	4	5
P	16.	Draw on any past experiences which could be useful in this situation	1	2	3	4	5
E	17.	Accept sympathy and reassurance from others	1	2	3	4	5
P	18.	Think about what you can do to affect the length of your hospital stay	1	2	3	4	5
E	19.	Accept the situation, since nothing can be done about it	1	2	3	4	5
E	20.	Tell yourself things that will help you feel better	1	2	3	4	5
P	21.	Develop a plan of action regarding your recovery	1	2	3	4	5
E	22.	Look for the "silver lining," so to speak, try to look on the bright side	1	2	3	4	5
P	23.	Engage in activities (deep breathing, walking) thought to aid recovery	1	2	3	4	5
E	24.	Try to forget the whole thing	1	2	3	4	5
P	25.	Talk to doctors/nurses to get information on sensations and side effects to be expected	1	2	3	4	5
P	26.	Wait until after surgery to think about how you can help your recovery	1	2	3	4	5

		Not Important				Very Important
E 27.	See comfort in prayer or private meditation	1	2	3	4	5
P 28.	Think about how to solve any problems which may come up during the recovery period	1	2	3	4	5

In general, is this situation

a. one that you could change or do something about? YES____ NO____

b. one that must be accepted or gotten used to? YES____ NO____

If you checked "YES" more than once, underline the statement which best describes the situation.

Note: P = problem-focused process; E = emotion-focused process.

APPENDIX I

CES-D Scale

DIRECTIONS: Circle the number for each statement which best described how often you felt or behaved this way—DURING THE PAST WEEK

	Rarely or None of the Time (Less than 1 Day)	Some or a Little of the Time (1-2 Days)	Occasionally or a Moderate Amount of Time (3-4 Days)	Most or All of the Time (5-7 Days)
1. I was bothered by things that usually don't bother me	0	1	2	3
2. I did not feel like eating; my appetite was poor	0	1	2	3
3. I felt that I could not shake off the blues even with help from my family or friends	0	1	2	3
4. I felt that I was just as good as other people	0	1	2	3
5. I had trouble keeping my mind on what I was doing	0	1	2	3
6. I felt depressed	0	1	2	3
7. I felt that everything I did was an effort	0	1	2	3
8. I felt hopeful about the future	0	1	2	3
9. I thought my life had been a failure	0	1	2	3
10. I felt fearful	0	1	2	3
11. My sleep was restless	0	1	2	3
12. I was happy	0	1	2	3

	Rarely or None of the Time (Less than 1 Day)	Some or a Little of the Time (1-2 Days)	Occasionally or a Moderate Amount of Time (3-4 Days)	Most or All of the Time (5-7 Days)
13. I talked less than usual	0	1	2	3
14. I felt lonely	0	1	2	3
15. People were unfriendly	0	1	2	3
16. I enjoyed life	0	1	2	3
17. I had crying spells	0	1	2	3
18. I felt sad	0	1	2	3
19. I felt that people disliked me	0	1	2	3
20. I could not get "going"	0	1	2	3

APPENDIX J

Transcripts of Avoidance-vigilance Interviews

Case 1

PJ: Have you ever had an operation before?
Mr. B: Yes
PJ: What kind?
Mr. B: Operation from a collapsed lung and from gunshot to my stomach.
PJ: Have you had a hernia repair before?
Mr. B: Yes
PJ: An operation?
Mr. B: No, but the doctor thinks it's a hernia now.
PJ: How long do you think you've had that hernia?
Mr. B: It's been about, at least 4, 5 years.
PJ: What was the first symptom you noticed?
Mr. B: Pain, swelling, and one of my testicles swelled up much larger than the other.
PJ: When did you first mention it to a doctor?
Mr. B: When I first came here.
PJ: What did he tell you?
Mr. B: That's what is was [a hernia].
PJ: How did he explain it to you?
Mr. B: He explained that surgery would be needed. It's quite old and probably has to be cut off.
PJ: Did he tell you anything about how the operation would be done?
Mr. B: No, he didn't explain that other than the fact that surely it would have to be cut.
PJ: If you saw your doctor now, are there some questions you would want to ask him?
Mr. B: Yes
PJ: What?
Mr. B: What effect would it have on me after the operation? Would it have anything on my sex and producing children? Again, things of that nature.
PJ: Anything else?
Mr. B: Will it affect me mentally if something was to go wrong? Quite naturally, it would affect me mentally. It would hurt me seriously.
PJ: You mention something going wrong. What are you thinking about?
Mr. B: What I mean by that, if the operation is not completed or done right. Or if wasn't exactly really needed or wasn't as necessary as they seem to think.
PJ: How will you feel after the operation?
Mr. B: I know there's a period of time in which I have to rest. Quite naturally. But I was mainly concerned in finding out how long would I have to wait before having sex relationships with a woman again. Another one of my concerns.

PJ: When the doctor first told you that you needed surgery, what was your reaction?

Mr. B: I didn't think too much about it because I thought I needed it. At times it does rather ache me, bothers me and I always wonder why one [testicle] always swelled much larger than the other.

PJ: So when he mentioned surgery, what did you think?

Mr. B: When he mentioned surgery, the man being a doctor, I thought that's what I need. Then again, from another doctor, he said that he didn't think I needed it. So, I am in doubt whether I do really need it.

PJ: As best you can, walk me through it as they will do the operation, from the time you wake up tomorrow morning.

Mr. B: If they do the operation...It's kind of hard to answer because they say...

PJ: Explain the procedures they would do.

Mr. B: I will get a shot before I leave the ward, that would a relaxing shot. Before they put me on the anesthesia.

PJ: Do you know what kind of anesthesia they would use?

Mr. B: Exactly the name of it? I don't know. But something to put me to sleep.

PJ: How long before you're back in your room?

Mr. B: Behind this particular operation? By 24 hours I should be back in my room. Still in bed for three to four days. Then on my feet.

PJ: Do you expect any discomfort?

Mr. B: Well sure, there would be some pain. But I don't know exactly how the operation would go. What I was mainly concerned with is how would it affect my sexual life. Whether or not it will or not. The doctors don't think it would affect me at all.

Case 2

PJ: Have you ever had surgery before?

Mr. S: When I was 17.

PJ: What kind?

Mr. S: I had surgery on the right side. I had a hernia. I did some heavy work, and I noticed it, and I wanted to go the next morning. But my mother said, "No." It was Saturday. So I waited and I went Monday and they operated and that was that. Two days.

PJ: What was the first sign of this hernia you noticed?

Mr. S: Well, about a year ago. I had a pain on the upper side. I didn't notice it, but when I bathed I saw it. It was slight, but it's three times its former size now...

PJ: When the doctor examined you what did he say?

Mr. S: He said that they couldn't operate right away and that it would go till next week. So I said 'Oh, I wish you'd avoid that because I want to go to my grandson's high school graduation..."

PJ: So he told you about the hernia and about surgery?

Mr. S: Yeah, sure. But I knew that.

PJ: When he mentioned surgery, what was your reaction?

Mr. S: Oh, fine. Let's get it over with. I'm not afraid. I can only die once.

PJ: What did he tell you about the operation?

Mr. S: Nothing

PJ: Are there still questions you want to ask him?

Mr. S: Not at all. I've got the highest confidence in him.
PJ: Do you feel you have as much information as you need?
Mr. S: Not only that, I'm a lucky guy to last this long. Pure luck. I was no angel...
PJ: Walk me through it. What are they going to do tomorrow?
Mr. S: I got the highest confidence they know what they're doing. And I don't think this is anything extremely dangerous or requires exceptional research or innovation.
PJ: You see this as a routine operation?
Mr. S: Naturally, I think it's a cakewalk.
PJ: How do you think you'll feel afterwards?
Mr. S: Oh, I'll probably, as Groucho Mark said, "I'll probably take a turn for the nurse."
PJ: How long do you think you'll be in the hospital?
Mr. S: Well I asked Dr. ——, and he said they're going to operate on Friday. And he said I ought to be out in five days, but perhaps sooner.