# IMAGERY, STRESS AND NONCOMPLIANT BEHAVIOUR
# IN IMMOBILIZED HOSPITAL PATIENTS

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## ABSTRACT

The purpose of this project was to investigate the effects of immobility and environmental stimulation on imagery, stress and noncompliant behaviour in two studies of hospitalized patients. In one study, objectives also included: (1) to test an intervention designed to reduce stress, and (2) to examine life stress and personal control as possible predictors of dependent variables. Moos and Tsu's (1977) model of physical illness as crisis provided a framework for the variables of interest.

In Study 1, the 2 x 2 analysis of variance design had the following factors: (1) external immobility (traction, bedrest) versus mobility, and (2) cognitive reappraisal intervention versus no intervention. The intervention was tape recorded information which provided an expectation for imagery and vivid dreams, a positive set, and an environmental explanation for these effects. The sample of 48 male and female patients, aged 15-65, with no psychiatric history, was obtained as emergencies were admitted to the orthopedic and surgery units at a Saskatchewan hospital.

Study 2, which examined the effects of both external and internal (paralysis) immobility, had a 2 x 2 x 2 analysis of variance and covariance design with repeated measures. The factors were: (1) level of injury (quadriplegia vs. paraplegia), (2) degree of neurological deficit (complete vs. incomplete), and (3) environment (intensive care vs. ward), the repeated measures variable. The covariate was injectable

analgesics. In both studies, stepwise regression analysis was conducted to examine other predictors of dependent variables. Multivariate analysis of variance was used to compare imagery data across studies. The sample of 50 patients in Study 2, with criteria similar to Study 1, was randomly selected from charts over a five year period on a spinal cord injury unit in a British Columbia hospital.

Hypotheses were developed in relation to the five categories of independent variables. Measures of dependent variables included questionnaires, an interview and the chart record. In one study, observational data were obtained on dimensions of social and nonsocial environmental stimulation in patient rooms. Consistent with the Moos and Tsu framework, some support was provided within each category of hypothesis. As predicted, immobility led to increased imagery. This hypothesis was supported for both external and internal immobility. The type of immobilizing apparatus (e.g., cervical tongs) was predictive of imagery, but traction per se and duration of immobility were not predictors of imagery. Contrary to hypothesis, immobility did not lead to increased general stress or noncompliance. However, immobile patients did report greater environmental stress related to personal control and response restriction.

The intervention led to reduced stress, as predicted, without increasing the incidence of imagery. Stress related to imagery was unaffected by the intervention. Environmental variables were significant predictors of imagery in both studies. Medications and surgery did not contribute to this effect. Patients had greater imagery

in the intensive care unit than on the ward. Sleep deprivation correlated with all three dependent variables. Contrary to the hypothesis that restricted stimulation would lead to imagery effects, high levels of social stimulation dimensions and nonsocial stimulation which had low option for control predicted imagery. High noise levels predicted both stress and noncompliance. Further predictors of stress were high levels of dimensions of social and nonsocial stimulation, whereas noncompliance was predicted by low variety of nonsocial stimulation. In general, these data support an overload explanation of psychological effects, consistent with Zuckerman's (1969) theory of an optimal level of stimulation. Suggestions are made for the development of a theory of optimal level of personal control. As hypothesized, personal control measures were inversely related to stress. With regard to life stress, patients who had a high incidence of life events with a negative impact during the year prior to hospitalization had greater imagery during the hospital stay and lower adjustment (i.e., high stress) on follow-up. Clinical implications of these data are discussed.

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# INTRODUCTION

Restriction of movement has long been seen to cause problems for patients in hospital. Systematic studies of physical and psychological effects of immobility date back to the 1940's (Steinberg, 1980), with most research focusing on negative physical effects. As a consequence, early mobilization is now standard practice in hospitals. Where immobilization cannot be avoided, however, relatively few studies have examined psychological effects or interventions to reduce these effects.

Hammer and Kenan (1980, p. 126) categorize immobility in terms of external and internal restriction of movement. External restriction includes devices applied to the body (e.g., traction) as well as confinement to a restricted space (e.g., bedrest). Internal restriction, on the other hand, refers to situations where physical movement is permitted but not possible due to factors within the individual (e.g., paralysis).

In a previous study of patients with external immobility, Stewart (1977) found an interaction effect in which patients, aged 15 - 65, who were both immobile and isolated in a private room had the greatest incidence of hallucination-like effects and noncompliant behaviour. Twenty-one per cent of 39 orthopedic patients reported unusual visual, auditory, kinesthetic or tactual experiences. Affective responses to these experiences ranged from mild amusement to terror (related to thoughts of "going crazy"). The noncompliant behaviour usually consisted of trying to remove traction or get out of bed. This behaviour tended to occur during hypnagogic periods as the patient was falling asleep and was associated with unusual dreams or vivid images. The images included memory images and bizarre images which Richardson (1965) refers to as imagination imagery.

The choice of the term "hallucination-like experiences" reflected the fact that, unlike psychotic hallucinations, the patients rarely believed that the experiences were real. Sensations of this type have been called pseudohallucinations (Fish, 1967, p. 19), reported visual sensations (Zuckerman, 1969[a]) or, mental imagery. The latter term is preferable here because it does not connote pathology and it is not modality specific. The data from the above study (Stewart, 1977) included transient, quasi-perceptual experiences which occurred during the early hospitalization period and could better be explained as a normal, adaptive process rather than as mental illness.

When immobilized patients have psychological reactions which cause a problem for themselves or the staff, the definition of the problem determines the therapeutic approach. For example, if the problem is defined as a psychosis, the patient will likely be referred to a psychiatrist and treated with antipsychotic medication (Putnam & Yager, 1978). By contrast, the definition of the same behaviour as a normal, adaptive process leads to a search for alternative interventions such as manipulation of the social or nonsocial environment.

The present project extended my earlier research (Stewart, 1977) by examining the psychological effects of both external and internal immobility in two studies of hospitalized patients. The dependent variables (i.e., psychological effects) for both studies were imagery, stress and noncompliant behaviour. In one study, an informational intervention was tested for stress-reducing effect. This intervention was based on the premise that the psychological effects in question represented normal adaptation rather than psychopathology. Given the multivariate nature of clinical situations, this project also examined other possible explanations for effects such as environmental, personal, demographic and experiential factors.

Moos and Tsu (1977) provide a conceptual model of physical illness as life crisis. They suggest that individual difference in response to illness is determined by a number of factors which influence the person's cognitive appraisal of the meaning of the illness. These factors are shown in Figure 1. The model proposed by Moos and Tsu form the framework for the independent variables of interest in the present project (see Figure 2). "Background and personal" factors included previous life stress and personal control. Immobilization was an "illness-related" variable and dimensions of social and nonsocial stimulation were "environment" factors. The intervention tested in this research was at the level of "cognitive appraisal" or perceived meaning, according to the Moos and Tsu model. The outcome or dependent variables studied were imagery, stress and noncompliant behaviour.

The literature review will be organized according to the major variables for study in this project: immobility, the hospital environment, personal control, imagery and stress. The section on personal control includes data related to noncompliance and to the intervention tested here.

A conceptual model: The crisis of physical illness

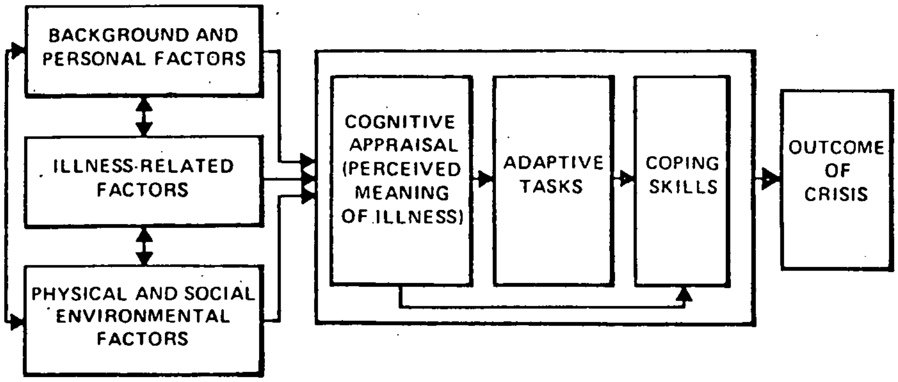


Figure 1. (Reprinted with permission from Moos & Tsu, 1977, p. 16).

Variables included in the present project:

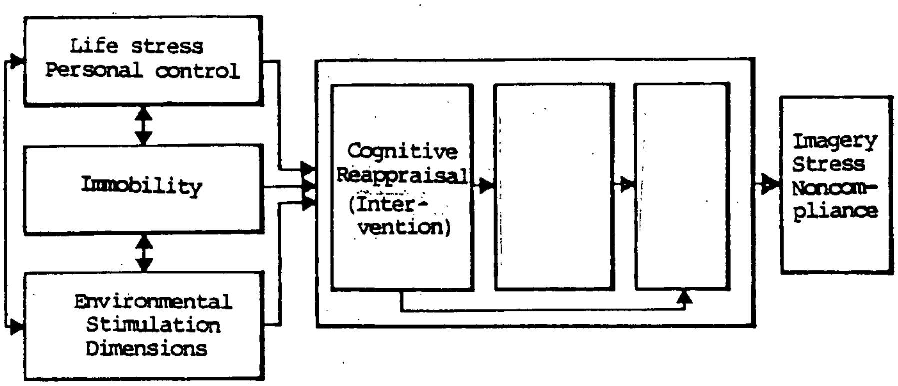


Figure 2.

Note. All of the sample were emergency admissions to hospital.

# Immobility

## External Immobility

### Orthopedic and Medical-Surgical Patients

Bolin (1974) found that immobilized orthopedic patients reported deviations from their normal patterns of sleep and dreams, particularly during the first week of hospitalization. Several of the 13 patients studied reported nightmares in which they saw animals or relived the trauma which brought them to hospital. While apparently dreaming, two patients exhibited noncompliant behaviour, in which they attempted to remove their traction or get out of bed.

Putnam and Yager (1978) used the label "traction intolerance syndrome" to refer to behavioural and emotional reactions in patients with a fractured femur. The syndrome included removal of traction, angry threats to staff, depressed mood and noncompliance with instructions by staff. Of nine patients (aged 16 - 45) admitted to an orthopedic unit in one year, five had the syndrome and required psychiatric consultation and/or the use of major psychotropic medication. All five had no previous psychiatric history; were 16 - 26 years old and were in traction for three weeks or more. The absence of previous psychiatric history is consistent with Stewart's (1977) data and raises the question of whether psychiatric medication should be the intervention of choice when traction (i.e., external immobility) has been identified as the problem.

The foregoing studies should be viewed with caution because of the small sample sizes. However, very few studies with larger samples have examined the psychological effects of external immobility. Two notable exceptions follow.

In a study of 77 medical-surgical patients (aged 21 - 86), Wood (1977) found that patients in private rooms had more sensory/cognitive disturbances (e.g., unusual sensations, confusion) than patients in two-bed rooms. Immobility by bedrest and one or more restraining devices increased the incidence of sensory disturbance for both groups. Wood interpreted the findings in terms of restricted environmental stimulation. On the other hand, Williams, Holloway, Winn, Wolanin, Lawler, Westwich and Chin (1979) found, in a sample of 91 fractured hip patients (aged 60 - 94), that there was less cognitive disturbance (i.e., confusion) in a private room. However, consistent with Wood's study, immobility increased the disturbance.

The conflicting findings cited above on private versus nonprivate rooms may stem from confounding variables which could not be controlled in the hospital setting. On the other hand, these studies differed in the average age of subjects and in the dependent measures. As mentioned previously, Stewart (1977) found greater sensory disturbances in patients who were both immobile and in a private room. However, the latter results were confounded by the fact that more emergency admissions fell into the immobile - private room (isolation) group, whereas elective admissions more frequently were assigned to nonprivate rooms. Further research needs to control this variable by other means, such as restricting the sample to emergency admissions.

Insofar as psychological effects can be attributed to external immobility, the explanation of a mechanism for the effects remains open to question. One explanation has been that these effects result from "sensory deprivation" (Jackson, 1969; Johnson, 1976). A comment about language bears mention here. The term "sensory deprivation" will not be used because, as Suedfeld (1980) has pointed out, it is imprecise and carries negative connotations. The adjective "sensory" is imprecise because it suggests that the environment lowers the absolute level of sensory input, even though this level may be unchanged or even increased. Furthermore, "deprivation" lacks precision because it implies an absence of stimulation, whereas a reduction of external stimulation leads to increased internal (i.e., subject-produced) stimulation. The early laboratory research in this field, with its use of "panic" buttons for escape, coupled with a cultural bias against isolation (Suedfeld, 1974), have contributed to a negative association with the label. For these reasons, neutral terms such as "restricted environmental stimulation", as proposed by Suedfeld, will be used here. The section to follow examines restricted environmental stimulation studies related to external immobility.

Laboratory Research

The main contribution of laboratory research on the psychological effects of external immobility came from the work of Zubek and colleagues in the 1960's. Zubek, Aftanas, Kovach, Wilgosh and Winocur (1963) found that subjects strapped in the prone position in a box with otherwise normal stimulation showed greater cognitive, perceptual, emotional and somatic (i.e., unusual body sensation) changes than recumbent controls who were prevented only from sitting or standing up. They concluded that "severe restriction of kinesthetic activity alone for periods up to 24 hours can produce many of the classical sensory and perceptual deprivation phenomena" (p. 128).

The extreme type of immobilization from the Zubek et al. study resembles that produced by certain devices used in hospital (e.g., cervical tongs, Stryker frame). Cervical traction is used to hyperextend the head and neck of patients with fractured cervical vertebrae. Tongs are inserted into two small burr holes drilled in the parietal region of the skull and this apparatus is attached to a rope and pulley system with weights hanging over the head of the bed. Head movement is severely restricted although the patient can be turned from side to side over approximately a $90^{o}$ angle. The Stryker frame is a canvas bed which allows the patient to remain immobile while being turned. The patient is strapped between two canvas sections on a rotation frame and turned to the prone or supine position. Then the upper canvas is removed until the next turn. These methods of immobilization restrict the visual field as well as restrict movement.

In a summary of Zubek's laboratory research on immobilization, Zuckerman (1969, p. 56) concluded that "confinement and relative immobilization emerge ... as crucial variables" in the studies of restricted environmental stimulation. Zubek and MacNeill (1967) found that confined-recumbent control subjects did not differ from perceptually restricted subjects on subjective stress or on vivid and complex dreams. Both of these groups had a higher incidence of stress and dreams than did ambulatory controls. One could explain the confinement effect in terms of a decrease in stimulus frequency and variability as compared to the ambulatory situation. However, Suedfeld (1979) suggests that decreased response options are the critical aspect of immobility, and that stimulus restriction is of lesser importance. In a later section of this review, data will be examined on personal control, which relates to the question of response options.

## Internal Immobility

### Spinal Cord Injury Patients

Johnson (1976) obtained a dramatic reduction of nightmares, hallucinations ("seeing things") and confusion in cervical spinal cord injury patients using an intervention derived from the restricted environmental stimulation literature. This intervention included an increase in social stimulation with other patients, volunteers and staff; the provision of information on spinal cord injury in general and the patient's particular physical condition, treatment and prognosis; patient group meetings to discuss their injuries; access to clocks, watches, eyeglasses, hearing aids and mirrors; the addressing of patients by name; and the asking of permission to perform treatment or services. The duration of symptoms in the experimental group was reduced to less than seven percent of the duration of symptoms in a comparison group who were not exposed to the intervention. All nine patients in the comparison group had nightmares, hallucinations and/or confusion for periods ranging from 29 to 90 days. Of ten experimental patients, six had symptoms for two to 11 days while the other four were symptom-free. Since nursing records were used, no introspective criteria (i.e., apparent reality) were applied to these data concerning "hallucinations".

Conomy (1973) examined the body image distortions of 18 spinal cord injury patients, aged 10 - 68 years, who had sustained trauma to the cord at levels ranging from the third thoracic vertebra to the fifth cervical vertebra. No high cervical injuries nor lumbar injuries were included in the sample. Patients were selected for the study based on order of admission to a neurology unit. The group which emerged had experienced their initial injury seven days to 25 years prior. A comparison sample included ten patients with congenital or degenerative problems of three weeks' to 24 years' duration. This group was apparently similar in degree of neurological impairment to the trauma group although the level of cord lesion was not reported for the comparison sample.

The definition of body image distortion used by Conomy included perceptual disorders of (1) proprioception (limbs in space), (2) posture and movement, and (3) body size and continuity. With the exception of one patient, all of the trauma cases had at least one category of disorder and one-third of this group had all three disorders. The percentage of trauma patients who had experiences in each of the three categories were 83%, 72%, and 38% respectively. By contrast, the non-traumatic group exhibited no distortions of limb position or body size and continuity. Only one patient (10% in the comparison group) experienced movement illusions. This study demonstrates that trauma is more important than neurological deficit in the etiology of imagery.

Conomy noted that spontaneous reports of these effects were rarely made by patients even though some experienced terror surrounding these experiences. This lack of report probably related to the fear that they were becoming mentally ill. Unlike psychosis, however, most patients realized that their unusual sensations were at variance with reality. When questioned directly, the majority of patients were very interested in discussing their experiences.

Other unusual sensations, which come from paralyzed parts of the body, may be reported as pain. Hohmann (1975) described reports of burning, tingling, hypersensitivity and shooting pains. Melzack and Loeser (1978) have drawn the comparison between phantom limb pain in amputees and "phantom body pain" in paraplegics. However, as Conomy pointed out, the term "phantom" does not accurately represent the spinal cord injury situation in which the limbs are still present. In spinal cord injured patients there may still be afferent pathways which are preserved, contrary to postamputation cases.

Hohmann (1975) also described "phantom sensations" whereby patients experienced sensation and movement in paralyzed limbs which had no sensation or movement on neurological examination. These reports, similar to Conomy's "body image distortions", were sometimes associated with burning and tingling sensations. Although no specific treatment exists for these effects, Hohmann stressed the normality of the experiences and found that it was "useful to encourage some patients to amuse themselves with such sensations rather than being distressed by them."

Pollock, Boshes, Arieff, Finkelman, Brown, Dobin, Kesert, Pyzik, Finkle, Tigay and Zivin (1957), in a study of 213 injuries of the spinal cord and cauda equina (the lower end of the spinal cord), also suggested that the term "phantom" be reserved for cases where a limb has been amputated. They found that sensations of changes in posture and movement were reported from 10.4% of this sample. This study, like Conomy's, had a neurological perspective and only examined unusual body sensations. No mention was made of unusual visual or auditory sensations.

In summary, the research on immobility demonstrates that external immobilizing devices and internal factors such as paralysis can both lead to imagery effects in various modalities. Some of these imagery experiences have been reported as very stressful. Studies of hospitalized orthopedic patients (Bolin, 1974; Stewart, 1977; Putnam & Yager, 1978) also suggest that noncompliant behaviour is a variable which merits further study. Explanations for these effects have included restricted environmental stimulation and decreased response options. The unusual sensations reported by paralyzed patients may represent a physiological adaptation to trauma.

# The Hospital Environment

## Environmental Stimulation Levels

In addition to the effects of immobility, the hospital environment itself has been suggested as a contributor to sensory changes in patients. Jackson (1969), in a review of clinical "sensory deprivation" research, raised the issue of the heterogeneity and complexity of clinical variables. Patients in hospital may experience overstimulation at some times (e.g., admission and surgery) and understimulation at other times. Pain may simultaneously contribute to restriction of kinesthetic stimulation due to inhibition of the desire to move (Carnevali & Brueckner, 1970) and to sensory bombardment on an experiential level (Schultz, 1965). Cohen (1978) proposed that prolonged attentional demands will decrease the capacity to process information. An environmental stressor, in these circumstances, will be more likely to create informational overload because it demands attention capacity. For trauma patients, the unpredictable experience of trauma (see Glass & Singer, 1972) plus factors such as post-admission sleep deprivation increase demands on attention. This, in turn, may render aspects of the physical and social environment of the hospital as stressors contributing to information overload. In this context even pleasant inputs, such as the presence of cherished visitors, may lead to overload due to a "surfeit of attractive information inputs" (Lipowski, 1974).

## Intensive Care Syndrome

Research concerning the hospital environment has mostly been directed at examining the intensive care unit (ICU) environment. Numerous articles have been written about "intensive care syndrome" (e.g., Taylor, 1971) which has been described as a psychiatric complication (Kiely, 1973) of the ICU environment. The syndrome, which has been referred to as a psychosis or delirium, includes disorientation, hallucinations, loss of memory, poor judgment and labile affect.

Ellis (1972), in a study of 43 post-operative cardiac patients in ICU settings, found that 67% of the sample had one or more "indeterminate stimulus experiences" (called imagery in the present analysis). Of the group who experienced imagery, 41% found these experiences to be moderately to highly stressful. Ellis concluded that terms like "psychosis" and "delirium" were not appropriate because patients knew that the experiences were not real and could talk rationally during them. Analysis of the data suggested that sensory disturbances were multi-determined and could not be attributed to any single factor such as age, sex, type of surgery, drugs, perceptual deprivation, overstimulation, sleep deprivation or physiological imbalance.

Other studies have found that particular environmental factors do increase the risk of psychological complications. For example, Wilson (1972) compared 50 patients in a windowless ICU with 50 patients in an ICU with windows. The incidence of "delirium" in the windowless unit was more than twice the incidence in the unit with windows. For patients with certain physiological changes (low hemoglobin, high blood urea nitrogen) the risk of "delirium" was three times as great in the windowless unit as compared to the ICU with windows, which again suggests an interaction of variables.

In cases of intensive care syndrome, a major problem for environmental intervention has resulted from the conflicting explanations of restricted environmental stimulation (e.g., Worrell, 1977) versus excessive stimulation (e.g., Lindenmuth, Breu & Malooley, 1980), which suggest opposite intervention approaches. Based on concerns about overload in an open-ward plan, some hospitals have designed individual cubicles for patients in the ICU setting. Bradburn and Hewitt (1980) did not find differences in the subjective impressions concerning ICU stay of patients in individual rooms as compared to the open-ward design. In both cases, the most common patient concern was difficulty sleeping. Sleep deprivation has been identified as a problem in other ICU settings (Fabijan & Gosselin, 1982), but the connection between sleep deprivation and overload is not usually made. Deprivation of sleep means that the quantity of information-processing required by the individual increases over 24 hours according to the number of waking hours. Attentional demands increase and overload can result (Cohen, 1978).

MacKinnon-Kesler (1973) suggests that the ICU patient may be at risk for underload, overload and sleep deprivation. The question remains as to which factor, on balance, is most important. It is difficult to make recommendations for intervention because of the dilemma that increasing stimulation to reduce apparent underload can increase existing overload in the event that the initial situation was incorrectly assessed. In addition to the quantity of stimulation, the meaningfulness of stimulation has importance (Worrell, 1977). For example, stimulation which has relevance to a person's interests or needs has more meaning than background noise. Yarrow, Rubenstein, Pedersen & Jankowski (1972) found that global definitions of environments as restrictive or excessive in stimulation had limited usefulness. In their observational study of the effects of stimulation on infant development, they found it useful to categorize dimensions of the social and nonsocial environment rather than use the global approach. Examples of dimensions studied were frequency, variety and complexity of stimulation. There is a need for a similar observational approach in hospital settings to identify the relative importance of dimensions of environmental stimulation in relation to psychological variables.

Interpersonal Use of Space

Another aspect of the hospital environment which may contribute to behavioural effects is the space available for patient use. This space may be perceived and used by patients and staff in similar or different ways. There are two terms which have been used in research on interpersonal use of space: territory and personal space (Hayduk, 1978). Territory refers to an area with boundaries which is marked, claimed and defended as the person's own. Personal space, by contrast

(Sommer, 1959, p. 248), is an invisible area with the person's body at the centre. This space "bubble" is carried with the person and intrusions into the personal space may lead to withdrawal or aggression. Altman proposed that privacy is achieved through interpersonal control efforts directed at different levels of behaviour: verbal, nonverbal, territory and personal space. There has been less research effort in the area of privacy than personal space and territory. However, research on crowding (Baron & Rodin, 1978) addresses the issue of stress related to lack of privacy.

Hospital studies related to personal space, territory and privacy have not been extensive. A problem of definition occurs because patients are assigned a space in hospital. Whether the patient claims this space, or part of it, as his or her own depends upon expectations, needs and values. The claim will probably be greater if the patient has paid extra money for a private room. In one study, Allekian (1973) found that patients experienced anxiety with territorial intrusions (e.g., moving the bedside table) but not with personal space intrusions such as touch. Allekian explains this finding by suggesting that patients are psychologically prepared for the latter intrusions but not for the former intrusions which may be seen to reduce "personal control, individuality and identity" (p. 241).

In summary, two issues emerge from the existing literature on the hospital environment. First, the underload versus overload question needs an observational base to determine the relative effects of varying amounts of environmental stimulation. Secondly, there needs to be an examination of the way patients feel about their space or lack of space in terms of prior expectations. Both of these issues must take into consideration the social and nonsocial environment.

Factors such as the space assigned to a patient and hospital environmental stimulation levels are stimulus variables to which a patient responds. The response options available to the patient may also be a factor in the psychological outcome. The response factor which has been emphasized in the recent social psychological literature is personal control. Some of the various perspectives on this variable will be discussed in the section to follow. Given the restriction of response options which accompanies immobility, personal control may mediate the psychological effects of immobility by increasing the available response options.

## Personal Control

### Definition

Glass and Singer (1972) identified two variables which mediate environmental stress effects: predictability and control. Although they refer to perceived control, other research suggests that an objective increase in control does not necessarily increase perceived control (Averill, 1973) and that objective increments of control may be beneficial even though self-reported perceived control remains unchanged (Langer & Rodin, 1976).

Baron and Rodin (1978) use the term personal control to include both explicit and tacit awareness of control-relevant responses. They describe two types of personal control: decision freedom and outcome control. Decision freedom refers either to an explicit belief in self control of means and ends, or to the inference of tacit control through such indicators as the absence of reactance or postdecision regret.

The second type of personal control, according to Baron and Rodin, is outcome control. They identify two categories of outcome control: onset and offset control (p. 153). Onset control refers to "the ability to delay, avoid, or initiate contact with environmental challenges"; while offset control "determines the person's ability to terminate contact with a potential stressor". The Baron and Rodin definitions will be used here because they are broad enough to include both predictability and control in the Glass and Singer sense. The definition of onset control presumes that an individual knows what to expect or can predict an outcome. Predictability, in this definition, is a necessary but insufficient precondition for achieving outcome control (Baron & Rodin, p. 148).

**Information and Outcome Control**

Studies of hospitalized patients have examined the stress-reducing aspects of information which may mediate stress through increased outcome control. Meyers (1964) found that patients who received structured communication regarding a procedure had less stress than patients who had either irrelevant or no communication. In a study of the effects of information and coping style, Andrew (1970) found that information about surgery improved recovery for patients with a neutral style, but had no effect for sensitizers and impeded progress for avoiders. This research underscores the complexity of the relationship between personal control and stress, which has prompted Averill (1973) to conclude that generalization should be guarded. The meaning of the control response to the individual in the specific context must be considered.

A series of studies by Johnson and colleagues (Johnson, 1972; Johnson, 1975; Johnson, Fuller, Endress & Rice, 1978; Hartfield, Cason & Cason, 1982) have demonstrated that sensory information (i.e., which sensations to expect during a procedure) has more stress-reduction effect than general information about procedures such as diagnostic tests. Langer, Janis and Wolfer (1975) compared the effectiveness of two approaches designed to reduce stress in surgical patients. They found that a coping device which emphasized cognitive reappraisal of anxiety-provoking events was more effective than information for the purpose of emotional inoculation. The cognitive reappraisal manipulation included cognitive control through selective attention and calming self-talk. In a meta-analysis of 49 studies of "psychoeducational interventions", including the above research, Devine and Cook (1983) found that these interventions reduced hospital stay by about 1.25 days and therefore have economic as well as personal benefits.

## Causal Attributions and Outcome Control

Personal control has also been studied from the perspective of causal attributions (Wortman, 1976). There has been considerable research on assignment of causality for an accident (Walster, 1966;

Lerner, 1970). However, this literature has mainly included laboratory studies designed to examine reactions to victimization and rarely has included data from the victims themselves. Recently, there has been some field research which focused on attributions of immobilized patients. In a study of spinal cord injury patients, Bulman and Wortman (1977) found that self-blame (for the accident that produced injury) led to good coping, whereas blaming another for the accident was predictive of poor coping. In terms of control, they found that many patients seemed to have "an exaggerated notion of their own causal powers" (p. 362) in that they attributed causality to themselves when external factors were more probable causes from an objective standpoint. Bulman and Wortman also found that perceived avoidability predicted poor coping. People who thought that they could have avoided the accident did not cope as well as those who thought that the accident could not be avoided. Bulman and Wortman interpret this apparently contradictory finding in terms of control. That is, personal control may be adaptive in general, but may be maladaptive when the person is faced with a permanent, uncontrollable outcome.

Most of the literature on causal attributions for accidents gives "indirect evidence at best for control motivation" (Wortman, 1976, p. 28). Pittman and Pittman (1980) provide direct data which link attributional processes to the control motivation hypothesis. They found that manipulated variations of lack of control affected subsequent attributions. Their data suggest that control deprivation enhances attributional activity in general, regardless of the deprivation source or the degree to which the attributions could increase control in the future.

**Primary and Secondary Control**

Rothbaum, Weisz and Snyder (1982) observed that the learned helplessness model (Seligman, 1975) and locus of control research (Lefcourt, 1976) both interpret "inward" behaviours, such as passivity and withdrawal, as signs of the perception of loss of control. According to this research, helpless individuals and those with an external locus of control tend to have increased negative affect. Stewart (1977) found that, while orthopedic patients reported feelings of loss of control over time, scores for control, helplessness and locus of control were not correlated with negative affect over time. The Rothbaum et al. proposal does not accept inward behaviours as signs of loss of control. Rather, they maintain that there are two kinds of perceived control: primary and secondary control. Primary control exists when the individual tries to change the environment; whereas secondary control means changing the self (e.g., inward behaviours) to fit the environment.

Taylor (1979) advocated that hospital patients should have increased control through a more informed, participative role, based on the reactance-helplessness-control literature. As Friedman and DeMatteo noted (1979, p. 8), while this position may be theoretically "correct," the predicted positive outcomes may not occur unless the complexity of situational factors within the particular setting is accounted for. The interface of patient-staff relations has both an affective (DeMatteo,

1979) and a power (Rodin & Janis, 1979) dimension. If a patient exercises control beyond the limits prescribed by his role in the power structure, then he will likely incur sanctions and lose positive affect from the staff. The other problem with Taylor's proposal is that a patient may not want active control at a certain phase of recovery. Some patients may maintain control for a time through inward or passive behaviour (secondary control) rather than the active, primary control approach that Taylor promoted.

To this point, personal control has been examined from various perspectives which all fit in the "personal factors" section of the Moos and Tsu model. Information, which is clearly an independent variable, could affect the cognitive appraisal of an injury or illness. This appraisal, or perceived meaning of the event, could in turn affect the psychological outcome of a crisis situation. Attributions and primary/secondary control could be thought of as either dependent or independent variables. As a response (i.e., dependent variable) to a given situation, these control variables could further contribute (i.e., independent variable) to subsequent psychological effects over time. Noncompliance, which is another control-related variable, may be an outcome of crisis according to the Moos and Tsu framework. The concept of noncompliance, as presented below, is a dependent variable.

**Noncompliance**

In the literature concerning health hazards, the term "noncompliance" refers to the failure of patients to follow the advice of health care workers (Stone, 1979). A particular type of noncompliance which appears related to imagery has been reported in both eye surgery patients (Jackson, 1969) and orthopedic patients (Stewart, 1977). For example, Ziskind, Jones, Filante and Goldberg (1960) found that patients with bilateral eye patches following surgery demonstrated noncompliant behaviours of sitting up (80% of patient group) and removing eye patches (90%) even though they had been told that such activity might result in loss of eyesight. Ziskind's observations suggest that such behaviour stems from acting out vivid dreams or hypnagogic imagery. It appears that this type of noncompliance is involuntary and probably does not relate directly to personal control.

A second type of noncompliance is voluntary and relates to personal control. This type of noncompliance, described in the article by Putnam and Yager (1978) on "traction intolerance syndrome", resembles Brehm's (1966) concept of reactance. Wortman and Brehm (1975), in their integration of the helplessness model with reactance theory, suggest a temporal phasing as a response to loss of control: reactance followed by compliance or helplessness if control is not restored over time. In the terms of Rothbaum, Weisz and Snyder (1982), this two-phase response to stress would be called primary control followed by secondary control. However, Rothbaum et al. note that "the evidence is far from clear-cut, and we suspect that vacillation between primary and secondary control is common" (p. 8-9).

Returning to the Baron and Rodin definition of personal control, one can classify voluntary noncompliance in two ways. The comparison of noncompliance to reactance suggests a lack of decision freedom and hence a reaction to loss of control. On the other hand, noncompliance described as primary control (i.e., offset control), suggests that it is a means to increase control. In this case, noncompliance could be due to the search for stimulation related to boredom associated with immobility. More data from immobilized patients will be needed to indicate which definition is preferable. Possibly, both definitions have relevance. As in the case of the Bulman and Wortman study of causal attributions, control (noncompliance) may be adaptive or maladaptive depending on the degree to which the outcome is uncontrollable in objective terms.

**Optimal Levels of Control and Stimulation**

The notion of adaptive versus maladaptive control suggests that there may be an optimal level of control which best serves the psychological functioning of immobilized patients. For example, some intermediate level of personal control (as opposed to very high or low levels) may be optimal in terms of correlation with low stress from patient reports. This optimal level could be influenced by other factors such as the actual or perceived controllability of the outcome and individual differences of patients. Another possible formulation of optimization could be based on oscillation between primary and secondary control, as suggested by Rothbaum et al. In this case, one might predict a balance over time between efforts at direct primary control and indirect secondary control.

The concept presented here of an optimal level of personal control parallels Zuckerman's (1969, p. 428) optimal level of stimulation theory. Zuckerman predicted that psychological effects (e.g., illusions, hallucinations) occur more frequently with either extremely high or low levels of stimulation. The optimal level, which is specific to the individual, tends to be at a moderate level of stimulation.

Cohen's (1978) model regarding high stimulation states that informational overload exists when "the demand for attention exceeds total available capacity" (p. 18). According to Cohen, there is less capacity for attention when a person is exposed to lengthy demands. Thus, both amount and duration of stimulation are factors which lead to "cognitive fatigue" or "depletion of attentional capacity" (p. 13). This model may have particular relevance to immobile patients who often have a long period of hospitalization. Cohen also suggests that perceived control has a mediating effect on overload by reducing the fatigue factor.

Zuckerman proposed the optimal level of stimulation theory in the context of data from laboratory research on the effects of restricted environmental stimulation. The section to follow will examine this literature as it relates to imagery and will also raise issues in the definition of mental imagery from the general psychological literature.

## Mental Imagery

### Definition

A definition of mental imagery with absolute criteria has not been achieved to date. Richardson (1969, pp. 2-3) distinguished imagery as "quasi-sensory" or "quasi-perceptual" conscious experiences which are nonstimulus-bound and differ in consequences from actual sensory/perceptual experiences. In a recent revision of this definition, Richardson (1983, p. 15) rejects the latter characteristic (i.e., different consequences) in view of data which shows that consequences of self-induced imagery do not differ from their sensory complement. Otherwise, the definition remains current in its identification of imagery in terms of phenomenological experience or, at least, the potential for such experience with shifts in attention.

Yuille (1983) argues that intuitive definitions of imagery need to be replaced by theoretical concepts which can clearly be testable and falsifiable. Research in this field has emphasized the function of imagery over the nature of imagery (White, Sheehan & Ashton, 1977). Consequently, precise definitions of mental imagery have yet to be developed. In a clinical setting, however, Richardson's definition is useful to describe the experience of patients.

In the restricted environmental stimulation literature, Zuckerman (1969) has dealt with the dispute concerning the use of the terms "hallucination" versus "reported sensations" versus "images", by classifying all such visual and auditory phenomena into two groups according to the degree of structure and meaningfulness of the content.

Accordingly, Type A reported visual sensations (RVSs) included unstructured or geometric sensations while Type B included integrated or animated scenes. Unfortunately, this classification does not include kinesthetic phenomena which have generally been recorded in the immobilization literature as "unusual body sensations" (e.g., Zubek, Aftanas, Kovach, Wilgosh, and Winocur, 1963).

Suedfeld and Vernon (1964) applied introspective criteria (e.g., apparent reality) to differentiate RVSs from hallucinations. With this approach, few subjective phenomena under restricted environmental stimulation conditions would be categorized as hallucinations. Zuckerman (1969) concluded that RVSs were more similar to drug-induced reactions than to psychosis. Richardson (1969, p. 93) classified "imagination imagery" to include several forms of imagery such as hypnagogic, isolation, sleep deprivation and drug imagery. Imagination imagery does not have a personal reference and may be bizarre in nature, as distinct from memory or thought imagery (Richardson, 1969; 1983) which refers to a recognizable object or event.

## Theoretical and Methodological Issues

Much of the psychological literature on mental imagery refers exclusively to visual imagery. Theoretical debates continue over the issue of whether the neural representation for visual imagery is the same as (Pylyshyn, 1981) or different from (Paivio, 1971; Kosslyn, 1981) that underlying verbal processing. The behavioural and physiological data available do not allow for an unequivocal decision about the neural representation for mental imagery (Anderson, 1978). However, Strosahl and Ascough (1981), in a discussion of the use of imagery in clinical settings, suggest that "multiple representational/processing events of a cognitive and affective nature transpire within any one visualization sequence" (p. 424).

The study of mental imagery was essentially nonexistent during the behaviourist period in psychology (Holt, 1964). For this reason, there has been a relatively short time span for methodological development in this area. Assessment of imagery by self-report questionnaires has included several measures with acceptable reliability and predictive usefulness (White, Sheehan & Ashton, 1977). However, construct validity of scales has been more difficult to achieve than other psychometric properties. Hiscock (1978) concluded that this difficulty may be due to the fact that imagery is not a unitary construct and that criteria other than visuospatial tests should be used in validation studies. Neisser (1972) emphasized the complex, multidimensional nature of imagery. Indeed, the validity problem cited may relate to lack of clarity in the definition of various forms of imagery.

Tower (1981) provides a review of dimensions of imagery in relation to the type of research question asked and measures to fit the question. In addition to self-report measures, which assume the importance of subjective experience, imagery assessment has included behavioural, projective and physiological measures. Tower (p. 83) notes that the type of question may pertain to the structure, function, generation or process of imaging. In clinical situations, such as a hospital setting, the purpose of the question also needs to be considered. That is, the imagery assessment may contribute to diagnosis, intervention or evaluation of care.

**Environmental Stimulation Levels**

With regard to imagery, the laboratory research data from restricted stimulation environments varies according to the duration of the experiments. Zubek (1973) reviewed long duration studies (1-16 days) from four countries and found imagery reports were rare or absent. In one study (Zubek, Aftanas, Kovach, Wilgosh & Winocur, 1963) involving severe immobilization for 14 days, imagery effects were rare but were more frequent during the evening and night. Zubek concludes that these effects occur when immobility is combined with restriction of one or more sensory modalities.

Short duration studies (1 - 12 hours), by contrast, report more frequent imagery effects. Zuckerman and colleagues found an increase in imagery reports after only three hours (Zuckerman, Levine & Biase, 1964) and eight hours (Zuckerman, Persky, Link & Basu, 1968). In a study of the effects of bedrest, Downs (1974) varied auditory input to simulate the hospital situation where a patient hears portions of comments by staff. In this situation with ambiguous auditory input, over 20% of 180 subjects experienced sensory distortions in the visual, auditory, kinesthetic, olfactory and tactile modalities in less than 3 hours. Zuckerman and Cohen (1964), in a survey of the literature, found that the median percentages of imagery reports were 43 per cent for Type A sensations and 19 per cent for Type B sensations.

In an analysis of these apparently discrepant findings, Zubek (1973) examined two possible explanations. Results may differ because of retrospective reporting as opposed to ongoing spontaneous reports. It is possible that imagery changes are more prevalent during the early experience but are not remembered by the time of retrospective report. Another explanation may relate to how stringent the criteria are for reported sensations. Studies which define "hallucination" in terms of apparent reality will have a much lower incidence than those which include reports of heightened normal imagery. Zubek emphasized the importance of the establishment of normal baselines for comparison of results.

Another issue related to imagery reports is whether or not the individual is aware of ongoing experiences. Pope and Singer (1978) suggest that there is a continual "stream" of imaginal events in adults throughout the day and night. These events may or may not be noticed. Likewise, McKellar (1979) proposes that hypnagogic imagery, which occurs as one falls asleep, is universal but that individuals vary in their awareness of these experiences. Schacter (1976) concludes that, while hypnagogic imagery does not appear to be a major part of reported sensations in restricted environmental stimulation studies, it represents one aspect of the "potpourri" (p. 465) of ideation which may occur including daydreams, fantasies and dreams.

## Imagery and Affect

During the early period of revival of interest in imagery, Tomkins (1962, 1963) proposed that the affective and cognitive systems were closely related. Much of the research since that time, however, has treated imagery as a cognitive concept with little, if any, relationship to affect. Recent computer simulation models (Pinker & Kossyln, 1983) move imagery research even farther from the affective domain. On the other hand, some recent writings (e.g., Singer, 1979; Rogers, 1983) do emphasize the importance of examining cognition in relation to affect, particularly to increase ecological validity and the potential for clinical application.

Examination of the clinical literature provides some evidence for the relationship between imagery and affect. In the early research on the grief process, Lindemann (1944) found that characteristics of normal grieving included visual imagery of the deceased as well as affective reactions such as anger and sadness. In a more recent analysis of the relationship of imagery and affect in psychotherapy, Singer (1979) concluded that "the special role of imagery may be its strength in evoking a varied but relatively intense affective response" (p. 36). The grief literature suggests that affect evokes imagery, whereas the current psychotherapy practice implicates imagery as evoker of affect. This suggestion of a bidirectional causality concurs with the perspective of Rogers (1983).

The studies of immobilized patients, reviewed previously, provide further evidence of a relationship between imagery and affect. Imagery experiences led to affective changes (i.e., increased stress) in reports from both orthopedic (Stewart, 1977) and spinal cord injury (Conomy, 1973) patients.

The relationship between imagery and stress has been documented in Horowitz's (1976) description of the "stress response syndrome." Data from experimental and field studies (Horowitz, 1978, p. 215) support clinical observations that traumatic perceptions tend to recur as "unbidden images". Based on a Freudian definition of trauma as excessive stimulation, Horowitz theorizes that unbidden images combine past memories and present concerns with a representation of the traumatic event in active memory storage which tends toward repetition until actively terminated (i.e., until information-processing is complete). This suggests that trauma, past and present, may increase imagery frequency.

In the following section, the concept of stress will be examined as it relates to hospitalized patients. A conceptual model based on crisis theory, which pertains to coping with life stress, will provide a framework for the variables in the present project. The theoretical base for this project will also draw from theories of environmental stimulation (Zuckerman, 1969, 1979; Cohen, 1979) and personal control (Baron & Rodin, 1978; Rothbaum, Weisz & Snyder, 1982).

# Stress

## Hospital Stress

A stressor, as defined by Cohen (1978), is "stimulation that represents an adaptive threat or potential adaptive threat to the organism" (p. 1). Stress, in this analysis, is the person's response to the stressor. In the context of hospitalized patients, for example, the hospital environment could be seen as the stressor, whereas stress would include the subjective experience of anxiety in response to hospitalization. In much of the literature, however, the terms stress and stressor are used interchangeably so that "stress" may refer to either an independent or dependent variable.

Volicer, Isenberg and Burns (1977) analyzed hospital stress factors (i.e, stressors) and found that surgical patients reported greatest subjective stress related to unfamiliarity of surroundings, loss of independence and threat of severe illness. To the extent that these results generalize to immobile orthopedic surgery patients, the present emphasis on environmental and personal control variables appears justified. Volicer (1978) has also correlated hospital stress with reports of negative physical status both during and after hospitalization.

## Life Stress

The relationship between stress and illness has been explored through research on life events or life change. In one approach, both positive and negative changes are seen to require an adaptive physiological response and hence, when excessive, can result in illness

(Holmes & Masuda, 1974). The theory which appears to underlie this approach is Selye's theory of stress. According to Selye (1974), stress is the "nonspecific response of the body to any demand made upon it" (p. 14).

Another approach to the study of life event stress and illness has emphasized the relationship between negative life stress and illness. Although both positive and negative events increase physiological activity, the evidence does not implicate these events equally as precipitants of illness. For example, Vinokur and Selzer (1975) found that negative life events had a stronger relationship to illness than do positive life events. Lazarus (1966) proposed that cognitive factors, such as appraisal of the stressor, mediate the psychological response during adaptation. In Lazarus' framework there are two types of appraisal: primary appraisal of the importance of an event for the well-being of the individual, and secondary appraisal of coping options and resources.

In addition to a relationship to physical illness, life stress has been correlated with psychological reactions such as anxiety, depression and aggression (Johnson & Sarason, 1978, 1979). In general, the research linking life stress to physical illness and psychological effects has been correlational in nature, with modest correlations in the .20 to .30 range. Clearly, life stress is only one variable in a multivariate situation. However, life events with a negative impact have been shown to have more predictive power (Johnson and Sarason, 1979) than those with a positive impact.

The trauma of an accident, which many immobile orthopedic or spinal cord injury patients have endured, is an example of a life event with a negative impact. Extreme situations, such as trauma with deleterious effects, may lead to a crisis for the individual.

**Theoretical Framework**

Crisis theory (Aguilera & Messick, 1982) concerns the way that people deal with life stresses, which may be either situational events or developmental transitions. A crisis exists when the individual is faced with a situation which is perceived as a psychological threat and for which previous coping mechanisms are ineffective. This leads to mounting anxiety and psychological disequilibrium unless balanced by other factors such as situational support. According to the theory, a crisis is self-limiting and equilibrium will be restored (usually in days or weeks) because a person cannot stay in an extreme state of disequilibrium indefinitely. The outcome of this adaptive process may be at a higher or lower level of psychological functioning, depending on the way the crisis was managed. This resolution, in turn, affects the person's ability to cope with future crises. Therefore, crisis theory could predict that previous life stresses or traumatic experiences may have either a positive or negative effect on coping with an existing crisis, depending on a number of factors.

The present research examined a group of factors which may affect the psychological outcome for hospitalized patients. This research was based on the assumption that multivariate determinants exist in the hospital situation. For this reason, the multivariate model presented earlier of physical illness as crisis (Moos & Tsu, 1977) was used. The theoretical background also included theories of personal control (Baron & Rodin, 1978; Rothbaum, Weisz & Snyder, 1982) and environmental stimulation (Zuckerman, 1969; Cohen, 1978) which relate to specific categories of the Moos and Tsu model.

## Hypotheses

This project included five categories of hypotheses related to the following independent variables which fit the Moos and Tsu model: immobility, a cognitive intervention, the hospital environment, previous life stress and personal control. Study 1, which examined the psychological effects of external immobility, included predictions on all five independent variables. In Study 2, which had patients with both internal (paralysis) and external (apparatus or confinement) immobility, predictions were made for only two of the independent variables: immobility and the hospital environment. The reason for this difference in approach was because Study 2, which was a retrospective study, obtained data exclusively from the charts. The chart data did not have reports on the other three independent variables. Study 1 examined the full range of predictors by a variety of concurrent data collection procedures: questionnaires, observations and interviews.

In both studies, the dependent variables of interest were imagery, stress and noncompliant behavior. Where possible, multiple operationism (Crano & Brewer, 1973) was used in an attempt to increase the external validity of findings. That is, several measures of the same variable (e.g., stress) were included to provide validation from more than one source (patient and nurse).

## Category 1: Hypotheses Related to Immobility

It was predicted that immobility would lead to an increased incidence of imagery, stress and noncompliant behaviour as follows:

Hypothesis 1(a).

Study 1 - Imagery as measured by the Modified Imaginal Processes Inventory (Appendix B.3, p. 216).

Study 2 - Imagery as recorded in the patient charts (Appendix C.2(c)[ii], p. 239).

Hypothesis 1(b).

Study 1 - Stress related to imagery as measured by subscale IV of the Environmental Stress Scale (Appendix D, p. 240).

Study 2 - Stress related to imagery as recorded in the patient charts (Appendix C.2(c)[ii], p. 239).

Hypothesis 1(c).

Study 1 - Stress as measured by the:

i) Subjective Stress Scale (Appendix B.4, p. 220).
ii) Distress record from patient charts (Appendix C.2(c)[i], p. 238).
iii) Environmental Stress Scale - total.

Study 2 - Stress as recorded in the patient charts (Appendix C.2(c)[ii], p. 239).

Hypothesis 1(d).

Study 1 - Noncompliant behaviour as measured by:

i) Record from the patient charts (Appendix C.2(c)[i], p. 238).
ii) Self-report on Environmental Stress Scale. (Question 58, Appendix D).

Study 2 - Noncompliant behaviour as recorded in the patient charts (Appendix C.2(c)[ii], p. 239).

The dependent variables selected here have emerged from previous laboratory research on immobility (Zubek, 1969) and field studies (e.g., Johnson, 1976; Stewart, 1977) of immobilized patients in hospital settings. The relationship of imagery to external immobility has been suggested by some studies (Bolin, 1974; Wood 1977), but other research (Stewart, 1977) indicates that variables such as room assignment, emergency admission and trauma may contribute to an explanation of imagery effects. Study 1 of the present project is designed to provide greater control of confounding variables and greater emphasis on measurement with instruments which have had psychometric testing than previous hospital studies.

Imagery effects in paralyzed patients (internal immobility) have been explained in terms of restricted environmental stimulation (Johnson, 1976) in the psychological literature. Studies with a medical orientation, by contrast, have described imagery effects as body image distortions (Conomy, 1973) or phantom sensations (Hohmann, 1975) analogous to phantom limb pain. The above studies have focused on single modalities such as visual sensations (Johnson, 1976) or body sensations (Conomy, 1973; Hohmann, 1975). Both studies in the present project will examine the multiple modalities of visual, auditory and kinesthetic imagery based on previous interview data from orthopedic patients (Stewart, 1977). Study 2 will also include data on unusual body sensations such as tactile imagery and temperature regulation anomalies. No previous research has provided comparative imagery data from patients with external immobility (Study 1) and patients with internal and external immobility (Study 2).

Category 2: Hypotheses Related to the Intervention

The cognitive intervention tested here was tape-recorded information (Appendix E, p. 253) which provided an expectancy for vivid dreams and imagery, a positive set, and an environmental explanation for imagery effects. For Study 1 only, it was hypothesized that the cognitive intervention would lead to decreased negative affect (stress) as follows:

Hypothesis 2(a) Stress related to imagery as measured by subscale IV of the Environmental Stress Scale.

Hypothesis 2(b) Stress as measured by the:

i) Subjective Stress Scale.
ii) Distress record from patient charts.
iii) Environmental Stress Scale - total.

The rationale for these hypotheses comes from four sources: (1) the experimental research on predictability and control (Glass & Singer, 1972); (2) hospital studies which demonstrate the alleviation of surgical stress through cognitive reappraisal and control (Langer, Janis & Wolfer, 1975); (3) clinical and laboratory research (Johnson, 1975) on the stress-reducing effects of accurate expectations for sensory information; and (4) the laboratory research on restricted environmental stimulation (Suedfeld, 1975; 1980), in which a positive set and nonstressful atmosphere have led to decreased negative affect associated with the experience. When imagery effects are expected in the laboratory, they may be enjoyed rather than feared.

The intervention will increase predictability by providing information on what to expect. It will also provide a basis for cognitive reappraisal of imagery effects as normal rather than as indicative of mental illness, and therefore should increase perceived control. Information which provides a description of a typical sensory experience (what is seen, heard, etc.) has been shown to be more effective in alleviating stress of surgical patients than objective "textbook" information about the time, duration and mechanics of procedures (Johnson, Fuller, Endress, & Rice, 1978). In line with these findings regarding sensory information, the proposed intervention focuses on visual, auditory and kinesthetic sensory experiences.

Rather than alter the incidence of imagery, the intervention aimed to decrease negative affective responses to imagery. Previous research (Stewart, 1977) demonstrated a range of affective reactions to imagery, from extreme fear to mild amusement. Recent studies have shown that imagery may as readily have beneficial (Singer, 1979) as deleterious effects. Therefore, there is no necessary reason to attempt to decrease the incidence of imagery so long as the patient has a neutral or positive reaction to its occurrence. Suedfeld (1974) notes the positive reactions of religious isolates who choose (i.e., control) their experience and are prepared for what to expect (i.e., predictability) as contrasted with negative reactions of those, such as the shipwreck victim, who face sudden, unexpected isolation. The patient admitted to hospital as an emergency, confined to bed and isolated from normal contacts will likely fall in the latter group. The intervention represents an attempt to neutralize negative reactions from this experience.

An argument can be made from the literature to support either the hypothesis that this intervention, which provides an expectancy for imagery, would increase (Jackson & Pollard, 1962) or decrease (Zuckerman, Persky, Link & Basu, 1968) the incidence of imagery. Since some health care professionals use the former assumption to validate their "no information" approach relative to imagery, the intervention will be examined for any change in the incidence of imagery as well. No prediction was made for a significant change in imagery incidence.

**Category 3: Hypotheses Related to the Environment**

It was hypothesized that restricted environmental stimulation would be predictive of increased imagery and noncompliant behaviour as follows:

Hypothesis 3(a).

Study 1 - Imagery as measured by the Modified Imaginal Processes Inventory.

Study 2 - Imagery as recorded in the patient charts.

Hypothesis 3(b).

Study 1 - Noncompliant behaviour as measured by:

i) Record from the patient charts.
ii) Self-report on the Environmental Stress Scale.

Study 2 - Noncompliant behaviour as recorded on the patient charts.

The definition of restricted stimulation was determined directly in Study 1 and indirectly in Study 2. In the first instance, direct observations of dimensions of the social and nonsocial environment were obtained. In Study 2, a comparison was made between the effects of the intensive care and ward environments. Based on the preponderance of articles which characterize the intensive care environment as "sensory deprivation" (e.g., Worrell, 1977), as opposed to overload, the assumption was made that intensive care could be defined as restricted stimulation. The literature is lacking a direct observational base to make this definition.

The rationale for hypotheses 3(a) and 3(b) is derived from both laboratory (Zubek, 1969) and hospital research (Johnson, 1976) on restricted environmental stimulation. Since restricted stimulation such as social isolation in a private hospital room may have positive as well as negative effects (Stewart, 1977), no consistent relationship with stress scores was predicted. These hypotheses differ from hypothesis 1(a) and 1(d) in their focus on aspects of the hospital environment other than immobility. For example, observation of dimensions of stimulation, such as variety, included nonsocial (television, radio, books) and social (nurses, doctors, visitors) stimulation, regardless of the degree of immobility.

**Category 4: Hypotheses Related to Life Stress**

For Study 1, it was hypothesized that high life stress for the year prior to admission as measured by negative change scores on the Life Experiences Survey (Appendix B.1) would be predictive of increased imagery and stress as follows:

Hypothesis 4(a). Imagery as measured by the Modified Imaginal Processes Inventory.

Hypothesis 4(b). Stress as measured by the:

i) Environmental Stress Scale.
ii) Subjective Stress Scale.
iii) Distress record from patient charts.
iv) Psychological adjustment subscale of the Psychosocial Adjustment to Illness Scale (Appendix B.5, p. 222) two months post-discharge.

The reasoning behind these hypotheses comes from crisis theory (Aguilera & Messick, 1982), Sarason's research using the Life Experiences Survey (Sarason, Johnson & Siegel, 1978), and research on traumatic images (Horowitz, 1978). The classic study of grief as crisis (Lindemann, 1944), for example, found imagery to be part of the normal grief process which lasts for about one year. The analogy of the reaction to sudden loss of physical activity with grief has had some support through data from immobilized trauma patients (Stewart, 1977).

Crisis theory can predict improved coping through learning to deal effectively with stress. However, in the present instance, the hypothesis assumes an overload of stressful events over the year previous to hospitalization without adequate coping time. In this case crisis theory predicts mounting anxiety.

**Category 5: Hypothesis Related to Personal Control**

Personal control was determined by nurse assessment in hospital (independence subscale, Appendix B.2(a), p. 211) and patient reports of low subjective helplessness (Appendix B.2(b), p. 215) prior to hospitalization.

Hypothesis 5. In Study 1, it was hypothesized that high personal control would predict decreased stress as measured by the:

i) Environmental Stress Scale.
ii) Subjective Stress Scale.
iii) Distress record from patient charts.
iv) Psychological adjustment subscale of the Psychosocial Adjustment to Illness Scale two months post-discharge.

Support for this hypothesis can be found in the literature, although some findings suggest short-term increased stress and long-term decreased stress (Averill, 1973). For this reason, the follow-up measure was included in this research. If, indeed, the stress results show this pattern of increase and decrease, they may well fit into crisis theory which predicts a reintegration at a higher level of functioning in the long run, despite the debilitating anxiety experienced during the immediate crisis period.

No hypotheses were made about the relationship between personal control and either imagery or noncompliance. In the former case, the literature provides no basis for prediction. As for noncompliance, the initial impetus for study of this variable came from patient data in which involuntary noncompliance was associated with vivid imagery. The only logical basis for a predicted relationship between control and noncompliance would be for voluntary noncompliant behaviour where the patient is conscious of his or her actions.

# METHOD

## Study 1: Experimental Design

This study investigated the effects of immobility and a cognitive intervention (cognitive reappraisal) on imagery, stress and noncompliant behaviour. The 2 X 2 factorial design had the following two factors: (1) immobility (IM) versus mobility (MO), and (2) cognitive intervention (CI) versus no intervention (NI). The research was conducted in a hospital setting and the first factor was determined by the treatment regimen of nonequivalent patient groups who differed in degree of mobility. The immobile group was immobilized (e.g., bedrest, traction) for 5 days or more. The comparison group was mobilized (able to get out of bed) within the first two days after admission to hospital or after surgery. The second factor was manipulated and randomly assigned by a research assistant. This intervention (Appendix E) was a tape recording of information which provided an expectation for imagery and vivid dreams, a positive set, and an environmental explanation for these effects.

Double blind precautions were observed. That is, nursing staff were unaware of the content of the tape (patients listened to the information with earphones) and the experimenter did not know which patients heard the tape because the research assistant did the random assignment. At times pre-arranged with the research assistant, the experimenter avoided the ward where a potential intervention candidate was located. The presence of the research assistant on the ward would reveal the results of the random assignment because data acquisition was slow, often with only one patient meeting the sample criteria at a given time. As a further precaution, the research assistant asked patients who heard the tape to refrain from discussing this during the subsequent interview which the experimenter conducted.

To examine other factors which could contribute to changes in the three dependent variables, two stepwise regression analyses were performed. The first analysis examined the predictive effect of dimensions of the social and nonsocial environment based on observational data. Secondly, stepwise regression analysis was done using demographic, personal control and situational variables. Definitions of the variables used for these analyses are described in the measurement section to follow. An intercorrelation matrix was obtained for variables in the regression analysis and also for reaction, expectation and previous hospitalization scores from the interview (Environmental Stress Scale, Appendix D). All statistical analyses in this project used either BMDP (Dixon & Brown, 1979) programs developed for biomedical research or SPSS (Nie, Hull, Jenkins, Steinbrenner & Bent, 1975) programs for the social sciences.

## Subjects

The sample for this study consisted of 48 patients (12/cell) selected from the orthopedic unit (2DE) and two general surgery units (Surgery 30 and Surgery 33) at the University Hospital (UH) in Saskatoon, Saskatchewan, from November 1980 to May 1982. Excellent support for the study was received from all levels of nursing, medical and administrative staff. Three patients refused to participate in the study. Of those who agreed to participate, all patients completed the hospital portion of the study unless they were unexpectedly discharged before data collection could be completed. There was a 77% return rate on the follow-up questionnaire two months after discharge.

Sample criteria included:

1) Age - 15 to 65 years.

2) Male or female.

3) Emergency admissions.

4) On unit within 48 hours after admission (i.e., not in the Intensive Care Unit longer than 48 hours).

5) Hospitalized for nine days or longer.

6) No psychiatric history; no alcohol or drug abuse.

7) No suicide or homicide attempts.

8) No neurological deficit.

9) No head injury except mild concussion (i.e., blow to head with loss of consciousness for a few minutes as maximum).

10) No malignancy or heart condition.

All admissions who met the criteria were potential candidates for the research. The sample criteria were patterned after previous research (Stewart, 1977) with the exception that the current sample were exclusively emergency admissions. Although random selection was not strictly possible, the subjects were a random sample to the degree that emergency admissions to hospital occurred on a random basis. Subject characteristics are outlined in Appendix F.1. All units had private and nonprivate rooms available. The private rooms had an extra charge unless the condition of the patient warranted the room, in which case the charge would be waived. The majority of the patients on each ward were in rooms with two to four beds.

Informed consent (Appendix A) was obtained from each patient. To allow for initial adjustment time, consent was not obtained until 48 hours post-operative or 48 hours post-admission in the event that no surgery was done.

**Development of the Intervention**

The script for the cognitive intervention (Appendix E), which was developed for this study, used data from previous interviews with immobilized, orthopedic patients (Stewart, 1977). The three-minute cassette recording was produced in a soundproof room using a style (e.g., speed of reading, pauses) similar to that used for tape-recorded information presented to subjects in restricted environmental stimulation laboratories. A female graduate student in psychology read the script for the recording.

As a preliminary pretest, a group of five researchers critiqued the tape. Repeat recordings were made until an outcome satisfactory to the group was achieved. A second pretest was conducted at Shaughnessy Hospital, where four spinal cord injury patients listened to the tape and made individual comments. Each patient responded positively to the tape. One incomplete quadriplegic patient in particular felt that it would have been very helpful to hear this tape during the early hospitalization period. He had been extremely frightened by his experiences of imagery and vivid dreams because he thought, erroneously, that the unusual imagery indicated that he had permanent brain damage. No further changes were made to the tape as a result of the patient pretest.

**Measurement of Predictor Variables**

Dimensions of Stimulation. The assessment of stimulation levels from the social and nonsocial environment was based on the observational categories (dimensions) used by Yarrow, Rubenstein, Pedersen & Jankowski (1972) in their research concerning the effects of early stimulation on infant development. Environmental observations of one hour/patient were obtained on four 15-minute observation periods selected from each of the following intervals: 8:30-10:00 a.m., 11:00-12:00 a.m.; 1:00-2:00 p.m. and 3:30-5:00 p.m. (Appendix C.1).

The dimensions of interest for the nonsocial environment were variety, responsiveness, complexity, and noise. Variety was measured in terms of the number of different objects, such as television and books, within reach of the patient during the observation period. Responsiveness, an index of feedback potential inherent in objects, was measured according to the degree of change in the visual, auditory or tactile properties of objects as a result of the patient's behaviour. For example, a radio which a patient could adjust would be scored for responsiveness. Complexity was measured as the degree to which objects provide information to various modalities. Televisions, for instance, inform the visual and auditory modalities. Noise was identified according to type (e.g., humidifier), duration, and location (inside or outside room). At the side of the observation form, the observer sketched a diagram of the physical layout of the room with nonsocial stimulus features in relation to the position of patients in the room. The ongoing awareness of the patient (eyes open vs. closed) was also noted.

Observation of the social environment included frequency and variety of people, (e.g., nurses, visitors) in the room. These observations were further categorized according to the location of the social stimuli. Each observation of social stimulation was coded as either inside or outside the observed patient's space. This space was defined as the territory around the patient, identified by boundaries such as bedside curtains around the bed or furniture surrounding a patient who was sitting in a chair. The type of behaviour was categorized as verbalization to the patient, nonverbal behaviour (e.g., sitting by the patient), treatment/care of the patient, other-directed (communication with someone other than the patient), and directed at the physical environment (e.g., housekeeping). Contingency responses, in which someone responded to patient behaviour, included eye contact, verbalization and assistance. Finally, there was a record of the modality (i.e., visual, auditory, etc.) of the above stimulation. The modality record (p. 194), which was unrelated to patient space, provided a measure of complexity which paralleled the complexity measure for nonsocial stimulation (p. 193).

The experimenter developed the observational tool on the Acute Spinal Cord Injury Unit of Shaughnessy Hospital. During the early development phase, it became apparent that social stimulation was too abundant to allow for reliable coding of each interaction. After numerous trials, the present format evolved. Frequency and variety were coded simultaneously by using a letter to indicate the category of person (N for nurse, D for doctor, etc.) and a number to indicate whether the same or different persons entered the space (e.g., N1, N2, D1). The resultant frequency and variety scores, which had no maximum value, were summed after observations were complete. A correlation matrix of stimulation dimensions from later observations for Study 1 at the University Hospital revealed that frequency and variety were highly related, $r = .96$ inside the patient space; and $r = .93$ outside this space. Due to the high degree of shared variance, the regression analysis for Study 1 only included one of these variables. Frequency was excluded, rather than variety, because the nonsocial stimulation observations (p. 193) did not have a "frequency" category but did have a "variety" category which could be used for comparison purposes. The other dimensions of social stimulation were coded by placing one check in the box representing a one-minute interval, if one or more stimuli occurred during this interval. In these cases, the score ranged from 0 to a maximum of 10 for the 10-minute interval. Separation of nonsocial and social observations also enhanced reliability because simultaneous observation of these domains would have overtaxed the attentional capacity of the observer. Reliability of the observational tool was tested by two simultaneous observers, the experimenter and a research assistant, with $r = .99$.

To reduce the number of possible predictors for the stepwise regression analysis of stimulation dimensions in Study 1, some of the social data were collapsed under the heading patient-directed stimulation, that is, stimulation directed at the patient. This variable included verbalization, nonverbal behaviour, treatment, and contingency responses, all within the patient's space. The stepwise regression analysis included 10 predictors: four from the nonsocial stimulation (variety, responsiveness, complexity and noise) and six from the social stimulation (variety inside the patient space, variety outside the patient space, patient-directed, other-directed, directed at the physical environment, and complexity). A correlation matrix of these 10 predictors and the dependent measures for Study 1 can be found in Appendix G.6.

General Predictors. A second stepwise regression analysis examined the predictive power of 10 general variables: age, sex, private room, accident, surgery, traction, life stress in the year prior to hospitalization, helplessness prior to admission, dependence and independence. Age was categorized into three groups: 15-26, 27-45, and 46-65 years old. The first two categories are the same as those used by Putnam and Yager (1978). Sex, private room, accident, and traction were all coded as dichotomous variables. Surgery was coded as the number of times that a patient had a general anaesthetic. Data on these variables were obtained from the demographic record in Appendix C.2(a)[i].

Life stress over the past year was assessed using Sarason's Life Experiences Survey (Appendix B.1). This 60-item self report measure lists 57 events (e.g., marriage, death of a spouse, etc.) and has three blank items to which the subject may add other events experienced. For each event that occurred during the past year, the subject must: (1) categorize the event as "good" or "bad", and (2) rate the degree of impact that the event had on his or her life (no effect, some effect, moderate effect or great effect). Negative impact scores (the sum of impact ratings for "bad" events) were used for this study based on previously cited research (Vinokur & Selzer, 1975). Sarason, Johnson and Siegel (1978) found that test-retest reliabilities over 5 - 6 weeks for negative change scores were .56 ($p < .001$) and .88 ($p < .001$) in two studies. They note that test-retest scores with an instrument of this type tend to underestimate reliability because life events continue to occur between testings. This questionnaire was useful for hospitalized patients because of the relative ease of its completion. Although it appears long, the patient is instructed to leave everything blank except the events that have occurred in the past year. For most people, only a few events had happened.

The other three measures were from scales related to personal control. The first of these, helplessness, was a patient questionnaire. The measures of dependence and independence were from subscales of the nurse questionnaire.

The patient report measure of personal control was the Subjective Helplessness Scale (Appendix B.2(b)). This 25-item questionnaire has instructions for subjects to rate the degree that they were able to influence or control outcomes including "social-interpersonal behaviours; academic, vocational, avocational pursuits; and a variety of behaviours providing a means of achieving self-confidence, relaxation, and general life satisfaction" (Donovan, O'Leary & Walker, 1979, p. 462). The original measure, developed by Glass (1977), used an 11-point scale, but for present purposes a 7-point scale was used because it was less cumbersome and hence more realistic for hospitalized patients who may be low on cognitive energy. The instructions were also altered for this sample to indicate "before you came to hospital". Glass (1977) found that the test-retest reliability was .93 over a 3 week period. The Subjective Helplessness Scale was significantly correlated ($\underline{r}$ = .42) with the level of depression as measure by the Beck Depression Inventory (Glass, 1977).

Personal control was assessed by a nurse questionnaire as well as patient self-report. Although the labels on the measure differed (i.e., helplessness, independence), it appeared that these constructs were all relevant to Baron and Rodin's (1978) definition of personal control. More than one measure was used to define aspects of the domain of personal control and to attempt to obtain convergent validity (Campbell & Fiske, 1959).

The original two-part questionnaire for nursing assessment of patient behaviour included a scale derived from the psychological literature and another scale from nursing research literature. The former measure (Appendix B.2(a)[i]) is a 7-point semantic differential scale developed from research which has differentiated two basic dimensions, affiliation and dominance, in interpersonal relationships (Wiggins, 1979) and role relationships (Benjamin, 1974).

The second nurse assessment measure (Appendix B.2(a)[ii]) was developed using a 5-point Likert scale with the categories from Derdiarian and Clough's (1976) observational tool which has been used to measure dependence and independence in hospitalized orthopedic patients admitted for elective surgery. The categories include five dependence items (e.g., seeks attention) and five independence items (e.g., takes initiatives) based on the theory that dependence and independence are separate but related entities, rather than bipolar items on the same continuum.

The reliability data from these questionnaires, based on a sample of 88 nurses from the University Hospital, can be found in Appendix G.1. Because the dominance - affiliation scale lacked internal consistency (two items were negatively correlated with the scale), this measure was not used in the regression analysis. In the case of the dependence - independence scale, item subscale correlations were examined to maximize the subscale alpha. Removal of the fourth item of the independence subscale (IND4 which is item 8 in Appendix B.2[a]) increased the alpha from .80 to .85. For this reason, scores were recoded to delete this item for the regression analysis. The dependence subscale alpha was not increased by deletion of any of the items so it was analyzed in the original form.

**Measurement of Dependent Variables**

Imagery. Assessment of imagery was obtained through self-report on a questionnaire which was a modification of Singer's Imaginal Processes Inventory (IPI). The original IPI, which was designed to tap ongoing imaginal processes, had 400 items with 29 subscales (Singer & Antrobus, 1972). The Modified Imaginal Processes Inventory (Appendix B.3) included three of Singer's original scales (36 items) plus an additional 14 items to assess kinesthetic imagery (nine items), hypnagogic imagery (three items), and change in dreams and daydreams (two items) since hospitalization. Another modification from the original was the use of a 2-point (true-false) scale, rather than Singer's 5-point scale, in view of possible limitations in patient tolerance for a more complex scale.

Psychometric data have been reported on the IPI by Singer & Antrobus (1972). Normative data on the IPI were obtained in a study of 130 male and 76 female college student volunteers from introductory psychology classes. Data from the scales of interest here were: (1) Visual imagery in daydreams - mean = 38; S.D. = 9.6; Cronbach's alpha = .86; (2) Auditory images in daydreams - mean = 39; S.D. = 5.2; Cronbach's alpha = .39; and (3) Hallucinatory-vividness in daydreaming - mean = 24; S.D. = 8.8; Cronbach's alpha = .87. Because of the low reliability of the auditory subscale, the coefficient alpha for the most recent version of Singer's "auditory images in daydreams" was obtained on a sample of 67 patients ($\alpha$ = .81). The coefficient alpha values for the new subscales (n = 67 patients) were: kinesthetic = .62; hypnagogic = .31; and dreams and daydreams = .55. The latter two "subscales" were only three and two items, respectively.

Stress. Assessment of stress included three measures obtained during hospitalization and a postdischarge questionnaire. The former measure included a patient questionnaire regarding subjective stress, a patient interview assessment of environmental stress and the nursing staff record in the patient charts.

The Subjective Stress Scale (SSS) was a 14-item self-report measure (Kerle & Bialek, 1958) of situational stress (Appendix B.4). The SSS was developed through a Thurstone Scaling Technique and has been tested for use with army (Berkun, Bialek, Kern & Yagi, 1962), student (Neufeld & Davidson, 1972), and hospitalized (Parisen, Rich & Jackson, 1969) subjects. The last research, which used 50 medical-surgical patients as judges for the scaling procedure, found extremely similar results to those obtained from the original study which used army personnel judges. This scale is statistically appropriate for use with hospitalized patients and has the practical advantage of only requiring a single response, choosing the item which best describes how the patient feels "to-day".

The Environmental Stress Scale (ESS) was a semi-structured interview (Appendix D) which examined expectations and reactions to the following potential sources of stress: (I) Personal space and privacy, (II) Environmental stimulation levels, (III) Personal control and response restriction, and (IV) Dreams and imagery. These four subscales of the ESS relate to the external environment (I, II and III) and the internal environment (IV). The interview format was developed for this project based on the literature reviewed and the experimenter's experience as a nurse in hospital. The questions on imagery, which proceed from ambiguous to highly structured, were based on the interview format used in earlier research with eye surgery patients (Ellis, 1976; Jackson, 1969) and subsequently used with orthopedic patients (Stewart, 1977). Also included were three questions on attributions (37-39) based on research (Bulman & Wortman, 1977) with severe accident victims.

A pretest of the interview was conducted with two orthopedic patients and nine spinal cord injury patients. Revisions in format were made based on patient comments concerning ambiguous items.

Coding of the reaction and expectation scores for the interview was accomplished by summation of scores for a subscale and then division of this sum by the number of items applicable to the particular patient. This correction factor made scores equivalent between patients and allowed for inclusion of additional areas of environmental stress mentioned by the patient (e.g., noise).

The Distress Record from the patient charts used the existing progress notes (Appendix C.2(c)[i]) recorded by the health care staff. All words which related to stress were summated for the first eight days of hospitalization. Relevant words included: anxious, tense, nervous, frightened, worried, upset, distressed, restless, apprehensive and agitated. Occasionally, a phrase which conveyed the same meaning as one of the above words was the unit of analysis (e.g., "thrashing about in bed"). The reliability for the system of coding from the chart was tested at Shaughnessy Hospital ($r$ = .99), where the same method of chart analysis was used. Each word or synonymous phrase had a score of 1, so that if several of the above words appeared in the same sentence the score would be the sum of the relevant words.

The Psychosocial Adjustment to Illness Scale (PAIS) was developed by Derogatis in 1975. In the version of the questionnaire found in Appendix B.5, the word "illness" has been replaced with "medical problem". Additional items have been added to assess reactions to nursing care (item 5) and compliance to health-related instructions (item 10) after discharge. This questionnaire was mailed to patients two months after discharge. Of the 37 patients who returned the questionnaire, only 28 had completed all seven sections. In some cases, the patients wrote notes to indicate that items were not applicable to their situation. All 37 patients (77% of the sample) had completed subscale VII on psychological distress. Scores on subscale VII (coefficient $\alpha = .87$) were used for the regression analysis.

Noncompliant Behaviour. The progress notes from the health care staff records in the patient charts (Appendix C.2(c)[i]) were used as one measure of the incidence of noncompliance. The method of coding and reliability for these data were the same as for the Distress Record from the chart. Noncompliance included resistance or refusal of care and behaviours which interfered with treatment (e.g., removal of traction). This category of behaviour also included aggressive behaviour such as verbal abuse to the nurse.

The second measure of noncompliant behaviour came from patient self-report on interview. Item 58 of the Environmental Stress Scale (Appendix D), which related to whether patients had broken any of the regulations on the unit, was the basis for this measure.

Procedure

The experimenter visited the three participating University Hospital units (2DE, Surgery 30 and Surgery 33) on a daily basis to review the admission record. All patients who met the sample criteria were included in the study. There were no restrictions placed on sample acquisition by medical or nursing staff. Therefore, a random sample was achieved in that emergency admissions are chance events and each admission had an equal probability of inclusion in the study. Before the initial approach to a patient, the experimenter discussed the case with the Head Nurse or the Assistant Head Nurse to check for additional information (i.e., not in the patient's chart) which would indicate whether or not the patient met the sample criteria. The timing of the first visit was also discussed with staff so that the patient's comfort would be disrupted as little as possible. No patients were approached about the study until after a 48-hour period of adjustment to admission or to surgery. On day three after admission or surgery, the experimenter obtained informed consent from the patient by discussing the information on the consent form in Appendix A. The experimenter wore street clothes and a lab coat throughout the study.

The data collection took place on days three, four, eight and nine after admission or surgery, and the intervention was presented on day five. Due to the emergency nature of admissions, it was impossible to do actual pretests, but measures which related to experience prior to hospitalization (Appendices B.1 and B.2(b)) were obtained as early as possible on days three and four. On day four, the nurse questionnaire (Appendix B.2(a)) and nonparticipant observations (Appendix C.1) were completed. During the observation period, the experimenter sat with a clipboard in the patient's room or immediately outside the room, if it was possible to view the activity from that position.

Prior to day five, the experimenter contacted a research assistant who randomly assigned patients to the intervention or no intervention groups. The research assistant, who was an experienced Registered Nurse, gave a brief, standardized introduction to the taped intervention (Appendix E). None of the staff nurses on the ward were aware of the content of the intervention. The Head Nurse had read the script for the intervention initially to give approval for the study and indicated that she would not discuss this information with the staff. After the patient heard the tape, the research assistant had a brief discussion with the patient to assess their immediate response. All patients had a positive or neutral response to the tape; none were negative.

On day eight, a stress questionnaire (Appendix B.4), the interview (Appendix D) and the imagery questionnaire (Appendix B.3) were administered to the patient. All interviews were recorded with the exception of one case in which the patient requested that notes be taken instead. Data from the chart (Appendix C.2(c)[i]) were obtained throughout the hospital stay up to the end of day eight. All patients in the study were in hospital for nine days or more. Two months after discharge, the follow-up questionnaire was mailed with an explanatory letter and a stamped, addressed return envelope.

## Study 2: Experimental Design

This study examined the effects of type of spinal cord injury (with consequent immobility) and hospital environment on imagery, stress and noncompliant behaviour. The design was a 2 x 2 x 2 Analysis of Variance and Covariance with Repeated Measures and had the following factors: (1) Level of injury - quadriplegia (paralysis involving arms and legs) versus paraplegia (paralysis below waist); (2) Degree of injury - complete or incomplete transection of the spinal cord (which results in complete or partial paralysis of the affected area) and; (3) Environment - intensive care unit (ICU) versus ward. The third factor was the repeated measures variable in that all patients progressed from intensive care to the ward over time.

Because imagery effects could be explained as side effects of narcotics or other analgesics, a covariate analysis was used to remove the effect of morphine, demerol, talwin and codeine when given by injection. Analgesics administered by injection were reduced to a common unit based on an equianalgesic table in which morphine 10 mg. is equivalent to demerol 75 mg., talwin 60 mg., or codeine 130 mg. (McCaffery, 1979). Only injectable analgesics were included in the covariate analysis because: (1) graphs of imagery data showed that imagery was greatest during the early hospitalization period when injectable, rather than oral, analgesics tend to be given; (2) oral analgesic dosages were less potent than injectable analgesics and were therefore less likely to have psychotomimetic side effects; (3) oral narcotics were usually mixed with another drug (e.g., tylenol with codeine) so that the equianalgesic table could not be applied accurately; and (4) other drugs which might have confounded results (e.g., cortisone, sedatives) were not given consistently across patients.

The time frame for the study was the first eight weeks of hospitalization. Because the length of time in ICU varied from patient to patient, all scores on dependent measures and the covariate were made equivalent by dividing the ICU scores by the number of weeks in ICU and the ward scores by the number of weeks on the ward. The analysis of variance was conducted with and without the covariate, injectable analgesics, for each of the three dependent measures.

A subsidiary analysis was done to examine the implications of the unequal n in this study. An unweighted means solution was obtained by increasing each cell by enough "subjects", each with a score equal to the cell mean, to bring the n/cell up to the largest n/cell which was 18 subjects. Adjustment of the effects from the unweighted means solution was done by multiplying by the harmonic mean (Glass & Stanley, 1970, p. 72) divided by the artificial N (i.e., 72). The F values of this solution were then compared with the F values of the weighted means solution done in original analysis to determine the degree of discrepancy of results, and hence the degree of distortion produced by the unequal n.

A Stepwise Regression Analysis was done using the following nine predictor variables: sex, age, concussion, surgery, days in the ICU, days immobile (horizontal position), employment status, sleep deprivation and immobilizing apparatus. As well as the three dependent variables of the project (imagery, stress and noncompliant behaviour), a fourth dependent variable was included in this analysis: disturbance of temperature regulation.

As far as possible, the definitions used here for the regression analysis were the same as for Study 1. Concussion was either present or absent. Days in ICU and days immobile were calculated according to complete days in either condition. The transfer day to the ward was considered a ward day and the day mobilized was excluded from the number of days immobile. Employment status was a binary variable: unemployed versus other status (e.g., employed, student, housewife). This variable was defined according to the admission record on the chart which included employment status. Sleep deprivation was based on a total score which included specific reference to deprived sleep as well as effects of sleep deprivation (e.g., tired, drowsy). The immobilized apparatus was also binary: cervical tongs or halo ring versus other immobilizing apparatus.

Originally, two additional variables were selected: type of accident and other fractures. An intercorrelation matrix of the 11 variables (Appendix G.14) showed that other fractures was significantly correlated with three of the variables and type of accident correlated with two variables. Therefore, type of accident and other fractures were excluded from the stepwise regression analysis. Rather than exclude other fractures, it might have been logical to exclude the concussion variable, because it was significantly correlated with three variables as well. However, when concussion is removed, other fractures is still correlated with two variables, whereas the decision that was made left concussion correlated with only one variable.

Subjects

A random sample of hospital records of 50 patients were selected from the admissions to the Acute Spinal Cord Injury Unit (ASCIU) at Shaughnessy Hospital (SH) in Vancouver from 1975 - 1980. The 22-bed unit, which is a referral centre for the province, opened in May 1975. Four beds are used for intensive care. The "prime philosophy" of this Unit (Schweigel, 1977, p. 390) is "early mobilization". Using devices such as the halothoracic brace for protection, and surgery to stabilize the spine when necessary, most patients are mobilized within two to three weeks after injury. There is a high staff/patient ratio with physiotherapy, occupational therapy, a social worker and sexual health counsellors on the Unit. An active rehabilitation program begins at admission and patients have a very full schedule. After an average stay of three months, patients are usually transferred to G.F. Strong for continued rehabilitation in a less staff-intensive atmosphere.

All patients on the ASCIU have a neurological deficit with motor and/or sensory loss. In Study 2, there were 12 complete quadriplegics, 12 incomplete quadriplegics, 18 complete paraplegics, and 8 incomplete paraplegics. Sample criteria were the same as for Study 1 except for the neurological deficit. See Appendix F.2 for subject characteristics.

A second sample of nine patients was obtained from the admissions to the ASCIU from June - August 1980. Each new admission was a potential candidate for the research. However, the ASCIU is a small unit and sample acquisition was slow. The same sample criteria were used as for the above study and the subject characteristics are listed in Appendix F.3. This sample was used to pretest the interview, to develop an observational tool and to provide descriptive data from direct patient contact for comparison with the above study for which data were obtained from charts. The imagery questionnaire (Appendix B.3) was administered to these nine patients and an additional 10 patients (Appendix F.3). The latter 10 patients were contacted by a research assistant after August 1980 when the experimenter began data collection at the University Hospital in Saskatoon.

**Procedure**

Data for the study of 50 charts were collected on each of three shifts per day for an eight-week period after admission (see Appendix C.2(c)[ii]). The word "imagery" was not used in the charts but imagery reports were coded from notes describing unusual sensations. These sensations were usually visual (e.g., crawling bugs), kinesthetic (e.g., feeling the room rotating), or tactile (e.g., feeling weight on paralyzed limbs). Incidents coded as "temperature anomaly" included patient statements of being cold or hot. The nurses of the ASCIU mentioned that this was a frustrating aspect of nursing care because nursing care measures (e.g., blankets, fans) tended to be ineffective. Records of dreams and hallucinations were coded as imagery. Dreams are not generally recorded in the charts so that when they are recorded they tend to be unusual in some way (e.g., extremely vivid).

The stress score from the chart was a global distress score rather than stress related to the environment because much of the record of affective changes did not refer to an area of concern. Occasionally, stress related to imagery was recorded (e.g., patient quotes about "going bonkers") but these were too infrequent to merit separate analysis and were included as a subscore of stress. Noncompliant behaviour included interference with care or removal of some apparatus required for treatment. The coding method was the same as for Study 1. Demographic data were obtained on the form shown in Appendix C.2(a)[ii].

The measures used in Study 1 were pretested with the nine patients on the ASCIU. The observational tool was developed through observations in both the intensive care and ward environment.

# RESULTS

The three dependent variables common to both studies were examined by both analysis of variance and stepwise regression analysis. In Study 1, which was conducted at the University Hospital, the design was a 2 x 2 (Immobility x Cognitive Intervention) analysis of variance. The Shaughnessy Hospital study (Study 2) was based on a 2 x 2 x 2 (Level x Degree x Environment) repeated measures analysis of variance and covariance design with repeated measures on the environment (intensive care vs. ward) variable. Level (quadriplegia vs. paraplegia) and degree (complete vs. incomplete) of injury were internal immobility variables.

A subsequent multivariate analysis of variance was conducted to examine the effects of immobility on the dimensions of imagery as assessed by the subscales of the imagery questionnaire. For this analysis, three levels of immobility were obtained by including the two levels from the University Hospital study and an additional group from the Shaughnessy Hospital Study. The spinal cord injury patients in the latter study have the most extreme immobility of the three groups due to the combination of the immobilizing impact of paralysis as well as devices such as traction. Subsidiary analyses of sleep deprivation, as a dependent variable, explored predictors of sleep deprivation (Study 1) and correlations of sleep deprivation with imagery, stress and noncompliant behaviour over time (Study 2).

The stepwise regression analyses included predictors from demographic data, environmental data, questionnaires and data related to injury. For the University Hospital study only, a stepwise regression analysis was also conducted to examine the predictive value of dimensions of social and nonsocial stimulation from observation of the hospital environment.

## University Hospital Study

### Analysis of Variance Results

In Study 1, the purpose of the analysis of variance was to test the hypotheses related to immobility and the cognitive intervention. Description of the results will be organized under headings of the dependent variables: imagery, stress and noncompliant behaviour.

Imagery. Hypothesis 1(a) predicted that immobility would lead to an increased incidence of imagery as measured by the Modified Imaginal Processes Inventory (MIPI). The results (see Table 1) provide support for this hypothesis in that there was a main effect for immobility, $F$ (1, 44) = 4.11, $p$ = .05. Cell means can be found in Table 2. The mean imagery score for immobile patients was 16.80, whereas mobile patients had a mean imagery score of 11.63 on the MIPI. As expected, the cognitive intervention did not increase the incidence of imagery on the MIPI, $F$ (1, 44) = 1.39, NS. Mobile patients who were exposed to the intervention had a low mean imagery score as compared to the other three groups. However, the interaction between immobility and the intervention on the MIPI was nonsignificant, $F$, (1, 44) = 1.63.

**TABLE 1**

University Hospital Study

Analysis of Variance for Imagery and Stress Scores

| | | Modified Imaginal Processes Inventory (MIPI) | | Subjective Stress Scale (SSS) | | Distress Record | | Environmental Stress Scale Total | |
|---|---|---|---|---|---|---|---|---|---|
| Source | df | MS | F | MS | F | MS | F | MS | F |
| Immobility (IM) | 1 | 320.33 | 4.11* | 7.52 | 1.49 | 8.33 | 1.75 | 2.91 | 2.28 |
| Cognitive Intervention (CI) | 1 | 108.00 | 1.39 | 20.02 | 3.96* | 8.33 | 1.75 | .04 | < 1 |
| IM X CI | 1 | 126.75 | 1.63 | .52 | < 1 | 4.08 | < 1 | .82 | < 1 |
| Error | 44 | 77.97 | | 5.05 | | 4.75 | | 1.47 | |

* $p < .05$

# TABLE 2

## UNIVERSITY HOSPITAL STUDY

### MEAN IMAGERY SCORES (MODIFIED IMAGINAL PROCESSES INVENTORY)

| | IMMOBILE | MOBILE |
|---|---|---|
| Intervention | | |
| *M* | 16.92 | 8.5 |
| *SD* | 10.65 | 7.09 |
| No intervention | | |
| *M* | 16.67 | 14.75 |
| *SD* | 8.08 | 9.11 |

### MEAN STRESS SCORES (SUBJECTIVE STRESS SCALE)

| | IMMOBILE | MOBILE |
|---|---|---|
| Intervention | | |
| *M* | 3.17 | 4.17 |
| *SD* | 0.84 | 2.41 |
| No intervention | | |
| *M* | 4.67 | 5.25 |
| *SD* | 2.02 | 3.11 |

Stress. In hypothesis 1(b), it was predicted that immobility would lead to greater stress related to imagery as measured by Subscale IV of the Environmental Stress Scale (ESS). This prediction was not supported (Table 3) on this subscale, which measured intensity of stress related to imagery and dreams, $F < 1$. However, there was a main effect for immobility on subscale III (Table 3), which measured reaction to personal control and response restriction, $F$ (1, 44) = 12.91, $p < .001$. Immobile patients had a mean reaction score of 0.76, while mobile patients had a mean score of 0.37 on the reaction to personal control and response restriction subscale. None of the other ESS subscales showed significant immobility effects.

A further prediction, according to hypothesis 1(c), was that immobility would lead to increased stress as measured by the Subjective Stress Scale (SSS), the Distress Record, and the total ESS. There were no significant effects for immobility on any of these measures (Table 1).

The cognitive intervention demonstrated stress-reducing effect on the SSS measure (Table 1), lending support to hypothesis 2(b). As predicted, patients in the intervention group reported less stress ($M$ = 3.67) than did the patients who were not exposed to the intervention ($M$ = 4.90), $F$ (1, 44) = 3.96, $p$ = .05. This finding was not confirmed by nurse reports in the patient charts. Contrary to prediction, there was no intervention effect on the Distress Record, $F$ (1, 44) = 1.75, NS.

**TABLE 3**

UNIVERSITY HOSPITAL STUDY

ANALYSIS OF VARIANCE FOR SUBSCALES OF ENVIRONMENTAL STRESS SCALE (ESS)

| | | I. PERSONAL SPACE AND PRIVACY | | II. ENVIRONMENTAL STIMULATION | | III. PERSONAL CONTROL & RESPONSE RESTRICTION | | IV. IMAGERY AND DREAMS | |
|---|---|---|---|---|---|---|---|---|---|
| SOURCE | df | MS | F | MS | F | MS | F | MS | F |
| IMMOBILITY (IM) | 1 | .12 | < 1 | .01 | < 1 | 1.68 | 12.91*** | .00 | < 1 |
| COGNITIVE (CI) INTERVENTION | 1 | .09 | < 1 | .00 | < 1 | .06 | < 1 | .04 | < 1 |
| IM X CI | 1 | .21 | < 1 | .02 | < 1 | .11 | < 1 | .07 | < 1 |
| ERROR | 44 | .21 | | .10 | | .13 | | .39 | |

*** $p < .001$

The SSS measured nonspecific stress, whereas the other self-report measure (the ESS), examined stress related to the external and internal environment. Hypothesis 2(a), which predicted that the intervention would decrease stress related to imagery and dreams, was not supported by data from subscale IV of the ESS (Table 3), $F < 1$. Similarly, there was no intervention effect on the total ESS (Table 1), contrary to hypothesis 2(b), $F < 1$.

The intervention was devised on the basis of the history of laboratory research on restricted environmental stimulation in which prior expectations for imagery have counteracted negative psychological reactions over time. In the early laboratory studies during the 1950's (e.g., Heron, 1957), neither subject nor experimenter expected the perceptual (imagery) effects. Consequently, the experience was extremely distressing. As time and experimentation have progressed, subjects now tend to expect the possible imagery consequences of stimulus restriction so that the experience is no longer negative and may, indeed, have beneficial effects (Suedfeld, 1975). The present study sought to apply this expectation in the hospital setting in order to reduce distress which could be triggered by imagery.

To examine the relationship between expectations and reactions for a hospital sample, two expectancy-related measures were included in the interview (Environmental Stress Scale). One measure included expectation questions from the first three subscales of the Environmental Stress Scale (ESS). The second measure was a question regarding the number of previous hospitalizations, based on the assumption that expectations would be developed through previous experience in hospital. Appendix G.3 provides an intercorrelation matrix of expectancy and reaction measures. It is interesting to note that three of the reaction measures (R2, R3 and RT) were inversely related to previous hospitalization (PH), $r = -.36$, $p < .01$; $r = -.26$, $p < .05$; $r = -.29$, $p < .05$, respectively. That is, patients who had not been previously hospitalized had higher reaction (i.e., stress) scores. However, none of the expectation scores was significantly correlated with previous hospitalization.

On interview, many patients expressed difficulty in answering questions regarding expectations. In one section of the interview, some patients insisted that they had no expectations and yet, in a later section of the interview, the same patients expressed unmet expectations. For example, when asked about expectations regarding privacy, personal space and environmental stimulation levels (question 4, 11, and 23 of the ESS, Appendix D), a patient would make a generalized statement that he or she had no expectations about the hospitalization experience. By contrast, when asked questions (16, 49, and 56 of the ESS) about visitors, use of the call signal, and administration of medications, the same patient had definite expectations. A reason that some patients gave for not having expectations was that they had turned themselves over to the care of others and hence were prepared to accept what the hospital and staff had to offer.

The most vehement expression of unmet expectations came from a high status professional who lived in an urban setting. This raised the question of whether expectations were related to occupation or rural-urban residence. Pearson product-moment correlations did not support a relationship for either variable with total expectations (ET). The occupational data, (Appendix C.2(a)), which were indexed according to Hollingshead and Redlich (1958), did not correlate with ET, $r$ = +.185, NS. Similarly, the rural-urban data showed no relationship with ET, $r$ = +.002, NS.

The intercorrelation matrix of Appendix G.3 includes 21 significant correlations and 15 nonsignificant findings. The significant results included positive correlations of reaction versus reaction, expectation versus expectation, and reaction versus expectation. Subscales I and III of the ESS had significant expectation-reaction correlations within and between subscales. This reflects the tendency for patients with high environmental stress scores to have unmet expectations. The expectation score (E1) for subscale I (personal space and privacy) was positively correlated with the parallel reaction score (R1), $r$ = +.32, $p < .01$. Subscale III (personal control and response restriction) also had a positive E3-R3 correlation, $r$ = +.72, $p < .001$. Futhermore, expectation on subscale III (E3) had a direct relationship to reaction on subscale I (R1), $r$ = +.27, $p < .05$. Total expectation (ET) was positively correlated with R1, $r$ = +.36, $p < .01$; with R3, $r$ = +.47, $p < .001$; and with RT, $r$ = +.35, $p < .01$.

Noncompliance. Hypothesis 1(d) predicted that immobility would lead to increased noncompliant behaviour. As the table in Appendix G.2 indicates, there were no significant results on either of the measures: record in patient charts, or patient self-report on interview (ESS).

## Summary: ANOVA Results for Study 1

The analysis of variance tested the first two categories of hypotheses which made predictions about the effects of immobility (category 1) and the cognitive intervention (category 2). For Study 1, conducted at the University Hospital in Saskatoon, the following results were demonstrated:

Hypothesis 1(a) was supported. Immobility led to increased self-reported imagery (MIPI).

Hypothesis 1(b) was not supported. Immobile patients did not report greater stress related to imagery (ESS - subscale IV). However, immobility did lead to greater environmental stress related to personal control and response restriction (ESS - subscale III).

Hypothesis 1(c) and 1(d) were not supported. There were no immobility effects on any of the self-report or staff measures of either stress or noncompliant behaviour.

Hypothesis 2(a) was not supported. The intervention did not lead to decreased stress related to imagery (ESS - subscale IV).

Hypothesis 2(b) was supported on the measure of subjective stress (SSS), but not on either the measure of environmental stress (ESS - total) or the nurse record in the patient charts (Distress Record). The cognitive intervention led to decreased self-reports of negative affect on the nonspecific measure (SSS) but not on the measure specific to the environment (ESS). There were no differences in stress recorded by staff in the patient charts for the intervention group as opposed to the group who were not exposed to the intervention.

**Stepwise Regression Results - Dimensions of Stimulation**

A second analysis for Study 1 was stepwise regression used to test hypotheses related to environmental stimulation. This analysis examined the predictive value of dimensions of the social and nonsocial environment on two of the dependent variables: imagery and noncompliant behaviour. Dimensions of the physical environment observed were variety, responsiveness, complexity and noise. Observations of the social environment were grouped according to whether social stimulation occurred within the patient's space (area within bedside curtains) or outside this space. Dimensions of social stimulation within the patient's space were variety of stimulation and patient-directed behaviour (e.g., contingency responses). Outside the patient space, the social dimensions included variety, other-directed behaviour and actions directed at the physical environment. The final dimension of social stimulation, which cut across space, was complexity (i.e., stimulation of different modalities).

Imagery. Hypothesis 3(a) predicted that restriction of environmental stimulation would lead to increased imagery scores on the MIPI. The most potent predictor of the MIPI (Table 4) was other-directed social stimulation (ODII). This variable accounted for

**TABLE 4**

UNIVERSITY HOSPITAL STUDY

STEPWISE REGRESSION ANALYSIS: DIMENSIONS OF STIMULATION AS PREDICTORS OF IMAGERY (MIPI)

| PREDICTOR | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
|---|---|---|---|
| OTHER-DIRECTED SOCIAL (ODII) | +.40 | .16 | 8.79 |
| SOCIAL VARIETY - Outside Space (SVII) | -.54 | .10 | 5.99 |
| SOCIAL VARIETY - Inside Space (SVI) | +.29 | .08 | 5.24 |
| NONSOCIAL RESPONSIVENESS (NSR) | -.25 | .06 | 4.35 |
| PREDICTORS COMBINED | | .40 | |

Note. I = Inside patient's space (within bedside curtains)
II = Outside patient's space

[b]Multiple R: Step 1 = .40; Step 2 = .51; Step 3 = .58; Step 4 = .63.

**TABLE 4 (Continued)**

STEPWISE REGRESSION RERUN: SVII FORCED INTO THE EQUATION AT THE OUTSET

| PREDICTOR | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
|---|---|---|---|
| SOCIAL VARIETY - Outside space (SVII) | +.14 | .02 | .93 |
| OTHER-DIRECTED SOCIAL (ODII) | +.84 | .24 | 14.54 |
| SOCIAL VARIETY - Inside space (SVI) | +.29 | .08 | 5.24 |
| NONSOCIAL RESPONSIVENESS (NSR) | -.25 | .06 | 4.35 |
| PREDICTORS COMBINED | | .40 | |

_Note_. The other six predictors did not reach the F value of 4.00 required to enter the equation in the BMDP2R program: nonsocial (variety, complexity and noise) and social (patient-directed, directed at the physical environment and complexity) dimensions.

[b]Multiple R: Step 1 = .14; Step 2 = .51; Step 3 = .58; Step 4 = .63.

16% of the variance on the MIPI. Examination of the polarity of the standardized regression coefficients (beta weights) shows that, contrary to expectation, the relationship was direct rather inverse. This suggested that while nonoptimal stimulation predicted increased imagery, the effect stemmed from excessive rather than restricted stimulation. Other-directed stimulation occurred when two people engaged in a conversation which excluded the patient being observed and was outside the observed patient's space. Thus, the verbalization was high on social stimulation but relatively low on meaning for the observed patient.

The second variable to enter the equation was variety of social stimulation outside the patient's space (SVII), which accounted for 10% of the variance. Unexpectedly, the relationship appeared to be negative in direction. This finding was unexpected because the initial partial correlation between SVII and MIPI was positive and the pattern of other social stimulation results was positively related to imagery for both the initial partial correlations and the regression coefficients. In some cases, due to a particular constellation of partial correlations of two variables with a third variable, there will be a suppressor effect (Edwards, 1976, p. 64). For this reason, the analysis was rerun with SVII forced into the equation at the outset. The results on the second page of Table 4 show a consistent pattern in which social stimulation has a positive relationship to imagery on all three dimensions which reached significance. In the second analysis, the variance accounted for by SVII has dropped from 10% to 2%, whereas ODII accounts for an increase of variance from 16% to 24%. In the initial analysis, when ODII enters the equation first, it appeared to enhance SVII giving an effect opposite to a suppressor variable.

The third predictor of the MIPI was variety of social stimulation inside the patient's space (SVI), which accounted for 8% of the variance consistently in both analyses. Again the relationship was positive, lending additional support to a stimulus overload argument.

Finally, a further 6% of the variance on the MIPI could be attributed to responsiveness of nonsocial stimulation (NSR). This variable measured the option of control over stimulation as opposed to the quantity of nonsocial stimulation per se. Hypothesis 5, which related to personal control, did not make any predictions regarding imagery. However, the inverse relationship of NSR to imagery shows that when patients have few nonsocial stimuli which have the option for control, the incidence of imagery increases. For example, there may be exposure to nonsocial stimulation from a radio which is out of reach so that there is no option to change the volume or turn it off.

Stress. No specific hypothesis was made concerning the effect of stimulation levels on stress, because previous research suggested that individual differences are such that a given stimulation level might evoke a positive response in one person and a negative response in another. As an exploratory approach, however, the stepwise regression analysis of stimulation dimensions was repeated for the dependent measures of stress used in this study. Significant predictors emerged for two subscales of the ESS and for the SSS. The ESS subscale I, which measured stress related to personal space and privacy, was predicted by the variety of nonsocial stimulation (NSV), which accounted for 10% of the variance (Appendix G.5). The NSV score included nonsocial stimulation (e.g., radio, television) which belonged to, and was controlled by, other patients as well as that controlled by the observed patient. High levels of NSV led to increased stress related to personal space and privacy, again supporting an overload argument. Similarly, high levels of social stimulation directed at the physical environment (Appendix G.5) such as housekeeping, led to increased stress related to imagery and dreams (ESS-subscale IV). None of the stimulation predictors entered the equation for subscales II, III, or the total ESS because they failed to reach the default value of F = 4.00 for the BMDP2R statistical program.

The SSS had two significant predictors in the regression analysis (Appendix G.4). Twenty-one percent of the overall variance on the SSS was accounted for by the combination of nonsocial noise (NSN) and other-directed social stimulation (ODII), with their respective contributions being 14% and 7%. Both effects were in the positive direction, demonstrating that high levels of both social and nonsocial stimulation predicted high stress levels. Nonsocial noise and other-directed social stimulation (social noise) were not patient-directed and, therefore, were relatively low in meaning and informational value for the observed patient as compared to patient-directed stimulation such as contingency responses.

Noncompliance. The prediction from hypothesis 3(b) that low levels of stimulation would lead to increased noncompliant behaviour received support on the noncompliance measure from the interview (ESS). As shown on Table 5, variety of nonsocial stimulation (NSV) accounted for 9% of the variance, with the expected inverse relationship between NSV and noncompliance. No other predictors achieved a sufficient value of F to enter the equation.

On the noncompliance measure from the chart (patient record), nonsocial noise (NSN) accounted for 9% of the variance. The relationship was positive indicating that high noise levels predicted increased noncompliance. This finding, while contrary to the specific hypothesis, was consistent with the theoretical framework of an optimal level of stimulation.

**Summary: Stimulation Regression Results for Study 1**

The first stepwise regression analysis tested hypotheses related to the environment (category 3). The results, while sometimes contrary to the specific hypotheses, are consistent with the theoretical framework of optimal levels of stimulation and control. However, some findings are at the opposite end of the theoretical inverted-U curve than predicted.

Hypothesis 3(a) was unsupported. Low levels of environmental stimulation did not predict imagery (MIPI). However, imagery was predicted by high levels of social stimulation on three dimensions: other-directed, variety outside the observed patient's space, and

TABLE 5

UNIVERSITY HOSPITAL STUDY

STEPWISE REGRESSION ANALYSIS: DIMENSIONS OF STIMULATION AS PREDICTORS OF NONCOMPLIANCE

| | NONCOMPLIANT BEHAVIOUR (INTERVIEW - ESS) | | |
|---|---|---|---|
| PREDICTOR | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
| NONSOCIAL VARIETY (NSV) | -.29 | .09 | 4.36 |

[b]Multiple R = .30

| | NONCOMPLIANT BEHAVIOUR (PATIENT RECORD) | | |
|---|---|---|---|
| PREDICTOR | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
| NONSOCIAL NOISE (NSN) | +.29 | .09 | 4.37 |

Note. None of the stimulation predictors entered the equation for the measure of noncompliance from the nurse questionnaire.

[b]Multiple R = .30

variety inside the patient space. Imagery was also predicted by low control options over nonsocial stimuli as measured by the responsiveness (NSR) dimension.

Hypothesis 3(b) was partly supported. As hypothesized, low levels of variety of nonsocial stimulation predicted self-reported noncompliance. In a direction opposite to hypothesis 3(b), high levels of nonsocial noise predicted noncompliance recorded in the patient charts. These two findings are consistent with the two theoretical extremes of nonoptimal stimulation.

Although no hypotheses were made concerning the effects of stimulation dimensions on stress, an exploratory regression analysis was done. All significant findings were in the direction of high social and nonsocial stimulation predicting self-reported stress on interview (ESS) and questionnaire (SSS). Variety of nonsocial stimulation predicted stress related to personal space and privacy (ESS - subscale I). Social stimulation directed at the physical environment predicted stress related to imagery and dreams (ESS - subscale IV). The questionnaire measure of subjective stress (SSS) was predicted by nonsocial noise and other-directed social stimulation. The latter variable could also be described as social noise.

<u>Stepwise Regression Results - General</u>

The third analysis for Study 1 was a stepwise regression analysis used to test hypotheses related to life stress (category 4) and personal control (category 5). Predictions were made for two of the dependent variables: imagery and stress. Demographic and situational variables were also included as possible predictors in this analysis. The 10 predictors were the Life Experiences Survey, the Subjective Helplessness Scale, Dependence and Independence subscales of the nurse questionnaire, age, sex, private room, accident, surgery, and traction.

Imagery. Hypothesis 4(a) predicted that high negative change scores on the Life Experiences Survey (LES) over the year prior to hospitalization would be predictive of increased imagery as measured by the MIPI. This hypothesis was supported by the findings reported in Table 6. Of the ten possible predictors of MIPI scores, only two reached the minimal acceptable F value of 4.00 to enter the equation in the BMDP2R program. The LES predictor accounted for 32% of the variance. The second predictor to emerge in the analysis was age, which accounted for 9% of the variance. Young patients with high negative impact scores (life stress) on the LES tended to have high scores on the imagery questionnaire.

Stress. Hypothesis 4(b) stated that previous life stress would be predictive of stress during hospitalization and two months after discharge. This hypothesis received support on the post-discharge measure but not on the measures taken while in hospital. Table 7 shows the post-discharge results on the psychological adjustment subscale of the Psychosocial Adjustment to Illness Scale (PAIS). The LES variable was the only predictor to enter the equation and it accounted for 21% of the variance. The relationship between LES and the PAIS measure was positive as predicted. That is, high negative impact scores on the LES predicted high scores on the psychological adjustment subscale (i.e., decreased adjustment).

**TABLE 6**

UNIVERSITY HOSPITAL STUDY

STEPWISE REGRESSION ANALYSIS: GENERAL PREDICTORS OF IMAGERY (MIPI)

| PREDICTOR | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT OF MULTIPLE $R^2$ | F-TO-ENTER |
|---|---|---|---|
| Life Experiences Survey | + .56 | .32 | 15.73 |
| Age | - .31 | .09 | 4.97 |
| Predictors Combined | | .41 | |

<u>Note.</u> The other eight predictors did not reach the F value of 4.00 required to enter the equation in the BMDP2R program: helplessness, dependence, independence, accident, sex, private room, surgery, and traction.

[b]Multiple R: Step 1 = .56; Step 2 = .64.

## TABLE 7

### UNIVERSITY HOSPITAL STUDY

### STEPWISE REGRESSION ANALYSIS: GENERAL PREDICTORS OF THE PSYCHOLOGICAL SUBSCALE OF THE PSYCHOSOCIAL ADJUSTMENT TO ILLNESS SCALE (PAIS)

| PREDICTOR | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT MULTIPLE $R^2$ | F-TO-ENTER |
|---|---|---|---|
| Life Experiences Survey | + .46 | .21 | 8.89 |

Note. The default value of F = 4.00 necessary for the BMDP2R program was not reached by the other nine predictors: helplessness, dependence, independence, age, sex, private room, accident, surgery and traction.

The results in Table 7 do not support hypothesis 5, which predicted an inverse relationship between personal control and post-discharge stress. It was expected that high personal control would be related to decreased stress on the PAIS measure. However, none of the measures of personal control were predictors of post-discharge adjustment.

The measures of stress during hospitalization were from patient interview (ESS), patient questionnaire (SSS) and staff records in patient charts (Distress Record). Hypothesis 4(b) predicted a direct relationship between life stress (LES) and the hospital stress measures, whereas hypothesis 5 predicted an inverse relationship between personal control and the three stress measures.

On the environmental stress measure (ESS), the stepwise regression analysis was done for each of the subscales as well as for the total scale (Table 8). Contrary to hypothesis 4(b), LES did not emerge as a predictor for any of these analyses.

The ESS findings provided support for hypothesis 5, which predicted that personal control would be inversely related to environmental stress. On the total ESS (second page of Table 8), accident and helplessness emerged as predictors accounting for 27% and 13% of the variance respectively. Accident victims with high scores on the Subjective Helplessness Scale (i.e., low personal control) had greater environmental stress overall.

Data from the subscales of the ESS provide additional support for hypothesis 5. On subscale II, which examined stress related to environmental stimulation levels, high helplessness (i.e., low personal

UNIVERSITY HOSPITAL STUDY

STEPWISE REGRESSION ANALYSIS: GENERAL PREDICTORS OF ENVIRONMENTAL STRESS (ESS)

| | SUBSCALE I: PERSONAL SPACE AND PRIVACY | | |
|---|---|---|---|
| PREDICTORS | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
| ACCIDENT | +.40 | .16 | 6.62 |

[b]Multiple R = .40

| | SUBSCALE II: ENVIRONMENTAL STIMULATION LEVELS | | |
|---|---|---|---|
| PREDICTORS | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
| AGE | -.45 | .21 | 8.79 |
| HELPLESSNESS | +.34 | .11 | 5.17 |
| SEX | +.34 | .10 | 5.51 |
| PREDICTORS COMBINED | | .42 | |

[b]Multiple R: Step 1 = .45; Step 2 = .56; Step 3 = .64.

**TABLE 8 (Continued)**

UNIVERSITY HOSPITAL STUDY

STEPWISE REGRESSION ANALYSIS: ENVIRONMENTAL STRESS SCALE (ESS)

| | SUBSCALE III: PERSONAL CONTROL AND RESPONSE RESTRICTION | | |
|---|---|---|---|
| PREDICTORS | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
| ACCIDENT | +.61 | .37 | 20.32 |
| INDEPENDENCE | -.28 | .08 | 4.75 |
| PREDICTORS COMBINED | | .45 | |

[b]Multiple R: Step 1 = .46; Step 2 = .55.

| | TOTAL: ENVIRONMENTAL STRESS SCALE | | |
|---|---|---|---|
| PREDICTORS | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
| ACCIDENT | +.52 | .27 | 12.56 |
| HELPLESSNESS | +.37 | .13 | 6.95 |
| PREDICTORS COMBINED | | .40 | |

Note. None of the 10 predictors reached the default value of F = 4 to enter the equation for subscale IV: Imagery and Dreams.

[b]Multiple R: Step 1 = .52; Step 2 = .37.

control) accounted for 11% of the variance in the predicted direction. As well, age and sex predicted 21% and 10% respectively to the variance. Young, female patients who rated themselves as high on helplessness prior to admission, reported greater environmental stimulation stress on interview. Further support for hypothesis 5 was found on ESS subscale III which measured stress related to personal control and response restriction. An accident accounted for 37% of the variance, while low independence (i.e., low personal control) contributed another 8% in the predicted direction. Subscale I (stress related to personal space and privacy) was also predicted by an accident, which accounted for 16% of the variance.

There were two other measures of stress in this study: the Subjective Stress Scale (SSS) and the Distress Record obtained from the chart. On the SSS, none of the ten variables reached a sufficient F value to emerge as predictors in the regression analysis. Thus, neither hypothesis 4(b), which predicted a direct relationship between LES and SSS, nor hypothesis 5, which predicted an inverse relationship between personal control and SSS, is supported on this measure.

Support for hypothesis 5 was found on on the Distress Record (Table 9). Low independence accounted for 24% of the variance in the predicted inverse relationship to distress.

## TABLE 9

UNIVERSITY HOSPITAL STUDY

STEPWISE REGRESSION ANALYSIS: GENERAL PREDICTORS OF THE DISTRESS RECORD

| PREDICTORS | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
|---|---|---|---|
| INDEPENDENCE | -.49 | .24 | 10.60 |

[b]Multiple R = .49.

## Summary: General Regression Results for Study 1

The second stepwise regression analysis tested hypotheses related to life stress (category 4) and personal control (category 5). Predictions were made from life stress to measures of imagery and stress. Personal control predictions related exclusively to measures of stress. In neither category were there predictions regarding noncompliance, the third dependent variable in this project.

Hypothesis 4(a) was supported. High life stress over the year prior to hospitalization measured by negative impact scores on the Life Experiences Survey, predicted increased imagery on the MIPI questionnaire. Young patients reported greater imagery than older patients.

Hypothesis 4(b) was supported on the post-discharge measure but not on the measures taken while in hospital. High previous life stress predicted high stress (i.e., decreased adjustment) two months after discharge. By contrast, hypothesis 4(b) was unsupported on all three stress measures taken during hospitalization: patient interview (ESS), patient questionnaire (SSS), and staff records in the patient charts (Distress Record).

Hypothesis 5 was not supported on the post-discharge measure but did receive support from the in-hospital measures. Personal control was not inversely related to stress two months after discharge. On the other hand, during hospitalization the predicted inverse relationship between control (helplessness) and stress was found on the interview measure of environmental stress (total ESS) and on the ESS subscale which measured stress related to environmental stimulation levels. Further support for hypothesis 5 was provided by subscale III (stress related to personal control and response restriction) which was inversely related to control as measured by low independence scores on the nurse questionnaire.

The other two measures of stress were from patient questionnaire (SSS) and the staff record in patient charts (Distress Record). In this analysis, there were no significant predictors on the SSS, contrary to prediction. As predicted, distress was inversely related to personal control (i.e., low independence).

## Shaughnessy Hospital Study

### Analysis of Variance Results

Study 2, conducted at Shaughnessy Hospital, tested hypotheses related to immobility (category 1) and the environment (category 3). All patients in this study had some degree of paralysis or internal immobility as well as external immobility (Appendix F.2). With respect to the hospital environment, each patient was admitted to the intensive care unit and later transferred to the ward. The analysis of variance results in this section relate to internal immobility, whereas the stepwise regression results (in the section to follow) examine the effects of external immobility.

Imagery. Hypothesis 1(a) predicted that immobility would lead to increased imagery. This hypothesis received support from two main effects in the 2 x 2 x 2 analysis of variance and covariance with repeated measures (Table 10). Mean scores for this analysis are presented in Table 11. The first main effect was for level, which represented the level of injury to the spinal cord (quadriplegia vs. paraplegia), $F$ (1, 45) = 9.73, $p < .01$. These results offered support to Hypothesis 1(a) because quadriplegics, who had a high level (i.e., cervical) injury and consequently experienced the greatest restriction in movement due to paralysis from the neck or upper trunk down had greater imagery than paraplegics with a low level injury. The second main effect was for degree of injury (complete vs. incomplete), $F$ (1, 45) = 10.05, $p < .01$. Patients with complete injuries had total loss of neurological function below the level of injury and hence experienced greater immobility than patients with incomplete injuries who, in some cases, walked out of the hospital. Again, the greater the immobility, the greater the imagery. There was also a Level x Degree interaction, $F$ (1,45) = 7.91, $p < .01$. Examination of the means (Table 11) reveals that this interaction effect can be accounted for by the group of complete quadriplegics in intensive care, who have a mean imagery score at least seven times greater than each of the other group means. The covariate analysis for injectable analgesics was nonsignificant throughout this analysis, $F < 1$. Therefore, imagery effects could not be attributed to hallucinatory side effects of narcotics and other injectable analgesics (e.g., Talwin).

Hypothesis 3(a) stated that restricted environmental stimulation would predict increased imagery. The data from the repeated measures variable, environment (intensive care vs. ward), revealed a main effect

TABLE 10

SHAUGHNESSY HOSPITAL STUDY

ANALYSIS OF VARIANCE AND COVARIANCE: IMAGERY

| Source | df | MS | F |
|---|---|---|---|
| LEVEL (L) | 1 | 90.10 | 9.73** |
| DEGREE (D) | 1 | 93.10 | 10.05** |
| L x D | 1 | 73.24 | 7.91** |
| COVARIATE | 1 | 3.77 | < 1 |
| ERROR | 45 | 9.26 | |
| | | | |
| ENVIRONMENT (E) | 1 | 47.01 | 6.83** |
| E x L | 1 | 78.85 | 11.46** |
| E x D | 1 | 76.02 | 11.05** |
| E x L x D | 1 | 45.91 | 6.67** |
| COVARIATE | 1 | .01 | < 1 |
| ERROR | 45 | 6.88 | |

** < .01

Note. Covariate = injectable narcotics reduced to a common unit on an equianalgesic table.

TABLE 11

SHAUGHNESSY HOSPITAL STUDY

MEAN RECORDED IMAGERY OVER TIME

| Group Level/Degree | n | ENVIRONMENT: INTENSIVE CARE IMAGERY | INTENSIVE CARE COVARIATE | WARD IMAGERY | WARD COVARIATE |
|---|---|---|---|---|---|
| Quadriplegics/ Complete | 12 | | | | |
| M | | 8.25 | 5.90 | 0.75 | 0.24 |
| SD | | 6.93 | 5.40 | 1.77 | 0.68 |
| Quadriplegics/ Incomplete | 12 | | | | |
| M | | 1.00 | 3.54 | 0.17 | 0.28 |
| SD | | 2.26 | 3.53 | 0.39 | 0.65 |
| Paraplegics/ Complete | 18 | | | | |
| M | | 1.17 | 8.78 | 0.28 | 0.47 |
| SD | | 2.33 | 4.44 | 0.58 | 0.66 |
| Paraplegics/ Incomplete | 8 | | | | |
| M | | 0.38 | 6.54 | 0.50 | 1.80 |
| SD | | 0.74 | 5.37 | 1.07 | 2.37 |

Note. Covariate = injectable analgesics reduced to a common unit according to an equianalgesic table.

The intensive care environment preceded the ward environment in all cases.

for environment, $F$ (1, 45) = 6.83, $p < .01$, as shown in Table 10. All of the interactions were also significant at the .01 level: environment x level, $F$ (1, 45) = 11.46; environment x degree, $F$ (1, 45) = 11.05; and environment x level x degree, $F$ (1, 45) = 6.67. The effects for environment, however, do not directly address the issue of whether the ICU effect is due to restricted or excessive environmental stimulation.

The pattern of results for the Analysis of Variance without the covariate (Appendix G.11) are similar to those with the covariate (Table 10). However, in the former analysis the effect of environment is enhanced. Without the covariate, the main effect for environment is significant at the .0001 level, as compared to the .01 level of significance with the covariate.

Because of the unequal n in this study, a subsidiary analysis was done to arrive at an unweighted means solution for comparison with the original results (see method, p. 58). The F values obtained from the unweighted means solution (Appendix G.10) closely resembled the original F values (Table 10) with a negligible range of 0.09 to 0.03 difference in the effects. This difference was obtained by subtracting corresponding F values for the two analyses. Table 11 shows the change in mean imagery scores over time from the intensive care unit (ICU) to the ward. The complete quadriplegics had by far the greatest change in imagery scores with the change of environment. The only group which had lower mean imagery in the ICU than the ward was the incomplete paraplegic group, with a negligible difference score of .12.

Subsequent analysis of simple effects (Appendix G.9) revealed that degree of injury influenced the frequency of imagery recorded for the 24 quadriplegic patients but not the 26 paraplegic patients. Quadriplegics with complete lesions had greater recorded imagery than did quadriplegics with incomplete lesions, $\underline{F}$ (1, 45) = 18.60, $\underline{p} < .01$, but there was no corresponding difference between paraplegics with complete and incomplete lesions, $\underline{F} < 1$. Analysis of simple effects for level of injury within each degree category yielded complementary results; namely among quadriplegics, patients with complete lesions had greater recorded imagery than did patients with incomplete lesions, $\underline{F}$ (1, 45) = 18.36, $\underline{p} < .01$; but, among paraplegics, completeness of lesion had no significant effect on the frequency of imagery, $\underline{F} < 1$. The simple effects analysis for environment, the repeated measures variable, followed the same pattern.

Further simple effects analyses within the repeated measures variable (environment) showed that the level of injury only influenced imagery in intensive care, $\underline{F}$ (1, 45) = 22.58, $\underline{p} < .01$, and not on the ward, $\underline{F} < 1$. When degree of injury was considered in combination with environment, level of injury only affected imagery scores for patients with complete injuries in ICU, $\underline{F}$ (1, 45) = 37.03, $\underline{p} < .01$, and not for the other three groups, $\underline{F} < 1$. Likewise, the effect for degree was only in intensive care, $\underline{F}$ (1, 45) = 22.01, $\underline{p} < .01$, and not on the ward; $\underline{F} < 1$. Degree of injury influenced imagery scores for quadriplegics in ICU, $\underline{F}$ (1, 45) = 36.52, $\underline{p} < .01$, and not for the other three combinations of level and environment, $\underline{F} < 1$ for each. Finally, the interaction of level and degree affects recorded imagery in ICU, $F$ (1, 45) = 14.86, $p < .01$, and not on the ward, $F < 1$.

Stress. Hypothesis 1(c) also predicted that immobility would lead to increased stress. This prediction was not supported by the data from the charts of spinal cord injury patients (Table 12). There were no main effects for level, degree or environment, $F < 1$ in each case, and the covariate analysis for injectable narcotics was nonsignificant as well, $F < 1$. Mean stress scores over time are presented in Table 13. The subsequent analysis without the covariate (Appendix G.12) revealed the same pattern of nonsignificant findings. There were no significant interactions for either analysis.

Although there were no significant differences, the mean stress scores (Table 13) show a pattern of greater stress in ICU than the ward for all groups except the incomplete paraplegics, who had a slight increase in stress over time. The highest score for ICU stress was found in the incomplete quadriplegic group. On the ward, the greatest stress was evident for complete paraplegics.

Hypothesis 1(b), which predicted that immobility would lead to increased stress related to imagery, was not examined in Study 2 because there were too few notations recorded in the chart to merit analysis. Much of the record of stress, which was obtained from the charts, did not refer to a specific source of stress.

Noncompliance. Neither Hypothesis 1(d) nor Hypothesis 3(b) received support on the noncompliance variable. As shown in Table 14, there were no significant main effects for level or degree of injury

TABLE 12

SHAUGHNESSY HOSPITAL STUDY

ANALYSIS OF VARIANCE AND COVARIANCE: STRESS

| SOURCE | df | MS | F |
|---|---|---|---|
| LEVEL (L) | 1 | 38.17 | < 1 |
| DEGREE (D) | 1 | 8.61 | < 1 |
| L x D | 1 | 354.51 | 2.41 |
| COVARIATE | 1 | 41.91 | < 1 |
| ERROR | 45 | 147.13 | |
| | | | |
| ENVIRONMENT (E) | 1 | 39.39 | < 1 |
| E x L | 1 | 245.87 | 1.81 |
| E x D | 1 | .00 | < 1 |
| E x L x D | 1 | 7.94 | < 1 |
| COVARIATE | 1 | .42 | < 1 |
| ERROR | 45 | 135.82 | |

Note. Covariate = injectable narcotics.

TABLE 13

SHAUGHNESSY HOSPITAL STUDY

MEAN RECORDED STRESS OVER TIME

| Group | | ENVIRONMENT | |
|---|---|---|---|
| Level/Degree of Injury | n | INTENSIVE CARE | WARD |
| Quadriplegics/ Complete | 12 | | |
| M | | 11.92 | 6.92 |
| SD | | 10.79 | 5.78 |
| Quadriplegics/ Incomplete | 12 | | |
| M | | 16.08 | 10.00 |
| SD | | 19.13 | 14.38 |
| Paraplegics/ Complete | 18 | | |
| M | | 11.33 | 11.78 |
| SD | | 9.84 | 11.10 |
| Paraplegics/ Incomplete | 8 | | |
| M | | 6.25 | 8.00 |
| SD | | 9.77 | 7.73 |

Note. Means adjusted for covariate (injectable analgesics).

TABLE 14

SHAUGHNESSY HOSPITAL STUDY

ANALYSIS OF VARIANCE AND COVARIANCE: NONCOMPLIANCE

| SOURCE | df | MS | F |
|---|---|---|---|
| LEVEL (L) | 1 | 1.71 | < 1 |
| DEGREE (D) | 1 | .71 | < 1 |
| L x D | 1 | 25.76 | 1.39 |
| COVARIATE | 1 | 2.52 | < 1 |
| ERROR | 45 | 18.59 | |
| | | | |
| ENVIRONMENT (E) | 1 | 7.89 | 1.44 |
| E x L | 1 | 2.79 | < 1 |
| E x D | 1 | 2.77 | < 1 |
| E x L x D | 1 | .58 | < 1 |
| COVARIATE | 1 | 2.41 | < 1 |
| ERROR | 45 | 5.47 | |

Note. Covariate = injectable narcotics.

(variables which represent internal immobility), F < 1 in each case. This finding was contrary to Hypothesis 1(d) which predicted that immobility would lead to increased noncompliance. The Level x Degree interaction (L x D) was also nonsignificant, $F$ (1, 45) = 1.39. Hypothesis 3(b) predicted that restricted stimulation would lead to increased noncompliance. However, there was no main effect for environment, the variable which represented stimulation levels, $F$ (1, 45) = 1.44, NS. All of the other interactions and the analysis had an $F < 1$. The analysis without the covariate (Appendix G.13) was almost identical to the analysis with the covariate.

The adjusted means for noncompliance (Table 15) resembled the pattern for stress (Table 13) more closely than the pattern for imagery (Table 11). In the ICU environment, the incomplete quadriplegic group had the highest incidence of noncompliant behaviour and stress of the four groups, whereas complete quadriplegics had the highest incidence of imagery. The complete paraplegic group had a slight increment of both noncompliant behaviour and stress on the ward as compared to the ICU environment, while a decrement of imagery was recorded. By contrast, the incomplete paraplegics showed an increment of imagery and stress from ICU to the ward, and a corresponding decrement of noncompliant behaviour.

TABLE 15

SHAUGHNESSY HOSPITAL STUDY

MEAN RECORDED NONCOMPLIANT BEHAVIOUR OVER TIME

| Group Level/Degree of Injury | n | ENVIRONMENT INTENSIVE CARE | ENVIRONMENT WARD |
|---|---|---|---|
| Quadriplegics/ Complete | 12 | | |
| M | | 2.00 | 1.33 |
| SD | | 2.83 | 2.31 |
| Quadriplegics/ Incomplete | 12 | | |
| M | | 3.25 | 2.00 |
| SD | | 5.03 | 2.70 |
| Paraplegics/ Complete | 18 | | |
| M | | 2.06 | 2.61 |
| SD | | 3.67 | 4.00 |
| Paraplegics/ Incomplete | 8 | | |
| M | | 1.50 | 0.75 |
| SD | | 3.12 | 1.39 |

*Note*. Means adjusted for covariate (injectable analgesics).

**Summary: Analysis of Variance Results for Study 2**

The analysis of variance for Study 2 tested hypotheses related to immobility (category 1) and the environment (category 3). This analysis examined the effects of internal immobility, or paralysis, through the variables of level (quadriplegia vs. paraplegia) and degree (complete vs. incomplete) of injury. The environmental variable was the change from intensive care to ward environment, which occurred over time.

Hypothesis 1(a) was supported. Patients with the greatest internal immobility (high level and complete degree) had increased imagery recorded by staff in the charts.

Hypothesis 1(b) was not examined because charting on stress related to imagery was too rare to conduct an analysis.

Hypothesis 1(c) was not supported. Neither level nor degree of injury, which represented internal immobility, led to increased recorded stress.

Hypothesis 1(d) was not supported. Immobility (level and degree) did not lead to increased noncompliant behaviour recorded in the charts.

Hypothesis 3(a) was not clearly supported. Patients in the intensive care environment had greater recorded imagery than patients on the ward. However, the data do not address whether this finding was due to restricted or excessive environmental stimulation.

Hypothesis 3(b) was not supported. There was no difference in recorded noncompliant behaviour for patients in the intensive care environment as opposed to the ward environment.

## Stepwise Regression Analysis

The stepwise regression analysis for Study 2 tested the same hypotheses as did the analysis of variance. However, the immobility variable in this instance was the external type (immobilizing apparatus). To the extent possible, variables were defined so as to parallel those used for Study 1. For the regression analysis in Study 2, the predictors were sex, age, employment status, concussion, surgery, days in intensive care, sleep deprivation, days immobilized in a horizontal position, and immobilizing apparatus.

Imagery and Temperature Regulation. In support of Hypothesis 1(a) which predicted a direct relationship between immobility and imagery, the only variable which entered the equation for imagery was apparatus (Table 16). Patients with the greatest restriction of mobility (i.e., those in cervical tongs or halo ring apparatus) had the greatest frequency of imagery reported in the charts. The number of days immobilized in a horizontal position did not predict imagery frequency.

Hypothesis 3(a) predicted that restricted stimulation would lead to increased imagery. Two of the variables were indicators of environmental stimulation levels: days in intensive care and sleep deprivation. Contrary to hypothesis, the environmental stimulation variables did not predict imagery scores. However, sleep deprivation did predict 10% of the variance on a variable related to imagery: temperature regulation anomaly (Table 16). This perceptual alteration, which was frequently noted in the charts, resembled the unusual body sensations described in the literature.

TABLE 16

Shaughnessy Hospital Study

Stepwise Regression Analysis: General Predictors

| | IMAGERY (PATIENT CHARTS) | | |
|---|---|---|---|
| PREDICTOR | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
| * Apparatus | +.38 | .14 | 8.00 |

* Cervical tongs/halo ring versus other

[b]Multiple R = .38

| | TEMPERATURE REGULATION ANOMALY | | |
|---|---|---|---|
| PREDICTOR | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
| Sleep Deprivation | +.31 | .10 | 5.16 |

Note. Variables which did not enter the equation for either analysis above were: sex, age, concussion, surgery, days in ICU, days immobile, and employment status.

[b]Multiple R = .31

Stress and Noncompliance. Contrary to Hypothesis 1(c), there were no significant predictors of the stress recorded in the patient charts. On recorded noncompliance, the only variable to enter the equation was concussion, accounting for 26% of the variance (Table 17). Thus, patients who had a mild concussion demonstrated greater noncompliance than those with no concussion. Concussion refers to a blow to the head resulting in loss of consciousness. Only patients with mild concussion (unconscious for no more than a few minutes) were included in the study. The concussion variable may be important on its own merit or because of its relationship to the seriousness of an accident and consequent increased immobility. The intercorrelation matrix (Appendix G.14) of the 11 original variables (see method, p. 58) selected for this analysis shows that concussion was directly related to the number of fractures other than the spinal injury, $r = .40$, $p < .01$. Because external immobility is used to treat fractures, the greater the number of other fractures, the greater the immobility. Concussion was also correlated with both type of accident ($r = -.25$, $p < .05$) and age ($r = .29$, $p < .05$). The incidence of concussion was greater for young patients who had nonwork-type accidents, of which the majority were motor vehicle accidents.

Hypothesis 1(d) stated that immobility would lead to increased noncompliant behaviour. Neither days immobilized in a horizontal position nor immobilizing apparatus predicted noncompliance. The finding that concussion predicted noncompliance appears consistent with the hypothesis, given that concussion correlated with the number of

TABLE 17

Shaughnessy Hospital Study

Stepwise Regression Analysis: General Predictors of Noncompliance

| PREDICTOR | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT OF MULTIPLE $R^2$ | F-TO-ENTER |
|---|---|---|---|
| Concussion | +.51 | .26 | 16.40 |

Note. None of the predictors entered the equation for the measure of stress from the charts.

[b]Multiple R = .51

fractures. In general, the more fractures a patient has, the greater the degree of immobility.

Hypothesis 3(b) predicted that restricted stimulation would lead to increased noncompliant behaviour as recorded in the patient charts. Neither of the environmental stimulation variables were significant predictors of noncompliant behaviour in this analysis.

**Summary: Stepwise Regression Results for Study 2**

The regression analysis provided further examination of hypotheses related to immobility and the environment. Whereas the analysis of variance examined internal immobility, the regression analysis included two measures of external immobility: number of days immobilized in a horizontal position and type of immobilizing apparatus. Environmental variables were the number of days in intensive care and sleep deprivation.

Hypothesis 1(a) was supported for the apparatus predictor but was not supported by the number of days immobilized in a horizontal position. Patients who were immobilized by cervical traction (tongs or halo ring) had greater recorded imagery than patients with another type of external immobility (e.g., Stryker frame).

Hypothesis 1(c) was not supported. Neither of the immobility variables predicted stress scores.

Hypothesis 1(d) was not supported. Neither measure of external immobility predicted noncompliant behaviour. However, the finding that concussion predicted noncompliant behaviour could be interpreted as consistent with hypothesis 1(d). Concussion was correlated with the number of fractures other than the spinal injury. Since fractures are treated by immobilization, the greater the number of fractures, the greater the immobility. Thus, concussion is related to both immobility and noncompliance.

Hypothesis 3(a) was not supported. Neither days in intensive care nor sleep deprivation predicted recorded imagery. However, sleep deprivation did predict temperature regulation anomaly, a variable related to imagery.

Hypothesis 3(b) was also unsupported. The environmental stimulation variables - days in intensive care and sleep deprivation - did not predict noncompliant behaviour.

**Multivariate Analysis of Variance**

The MANOVA was used to examine the effects of immobility across three patient groups (general surgery, orthopedic and spinal cord injury) on the dimensions of imagery at the subscale level of the Modified Imaginal Processes Inventory (MIPI). The six subscales were: visual, auditory, hallucinatory vividness, kinesthetic, hypnagogic and change in dreams/daydreams in hospital. The first three subscales were taken directly from Singer and Antrobus (1972), while the latter subscales were developed for this study.

The total sample of 67 patients from the two hospitals included 24 general surgery patients, 24 orthopedic surgery patients and 19 spinal cord injury patients. The decision to conduct this MANOVA was prompted by an initial descriptive examination of means (Table 18) which showed a

TABLE 18

MEAN IMAGERY SCORES ON SUBSCALES OF THE MIPI

AS A FUNCTION OF IMMOBILITY

| Imagery Dimensions | LEVEL OF IMMOBILITY 1 | 2 | 3 |
|---|---|---|---|
| Visual | | | |
| M | 3.88 | 5.54 | 7.00 |
| SD | 3.28 | 3.11 | 3.83 |
| Auditory | | | |
| M | 3.17 | 4.63 | 5.37 |
| SD | 2.48 | 3.10 | 3.52 |
| Hallucinatory Vividness | | | |
| M | 1.38 | 2.58 | 4.11 |
| SD | 2.53 | 3.28 | 3.62 |
| Kinesthetic | | | |
| M | 2.46 | 2.75 | 3.16 |
| SD | 2.00 | 1.42 | 2.29 |
| Hypnagogic | | | |
| M | 0.50 | 0.63 | 1.11 |
| SD | 0.59 | 0.79 | 1.10 |
| Dreams/Daydreams | | | |
| M | 0.25 | 0.67 | 1.11 |
| SD | 0.44 | 0.82 | 0.81 |

Note. The MIPI has 50 items with the followiwng component items/subscale: visual = 12; auditory - 12; hallucinatory vividness = 12; kinesthetic = 9; hypnagogic = 3; and change in dreams/daydreams since hospitalization = 2. Maximum total score = 50.

[a]Mobile surgery patients, University Hospital, n = 24.

[b]Immobile orthopedic patients, University Hospital, n = 24.

[c]Immobile spinal cord injury patients, Shaughnessy Hospital, n = 19.

consistent increment in the mean score for each of the subscales as immobility increased from the general surgery group through the orthopedic group to the spinal cord injury group.

The MANOVA for the two extreme groups on the immobility continuum, general surgery versus spinal cord injury patients, revealed an immobility effect with Hotellings $F = 3.34$, $p < .01$. Univariate analyses of simple effects for each of the subscales appear on Table 19. With the exception of the kinesthetic subscale, there were significant differences between groups for each subscale so that spinal cord injury patients (i.e., high immobility) had greater imagery than general surgery patients on five of six dimensions on the imagery questionnaire. The results were as follows: visual imagery - $F$ (1, 41) = 8.32, $p < .01$; auditory imagery - $F$ (1, 41) = 5.79, $p < .05$; hallucinatory vividness - $F$ (1, 41) = 8.45, $p < .01$; kinesthetic imagery - $F$ (1, 41) = 1.14, NS; hypnagogic imagery - $F$ (1, 41) = 5.35, $p < .05$; dreams and daydreams - $F$ (1, 41) = 19.52, $p < .001$.

Neither MANOVA for the other two pairs of the three immobility groups was significant on the imagery questionnaire. The difference in immobility did not affect the incidence of imagery for either the general surgery versus orthopedic analysis, Hotellings $F = 1.23$, NS; or the orthopedic versus spinal cord injury analysis, Hotellings $F < 1$. Because no initial differences emerged, no simple effects were computed for the subscales.

## TABLE 19

Shaughnessy Hospital Study

Simple Effects: Dimensions of Imagery (MIPI) - Surgery vs Spinal Cord Injury Patients

| Variable | MS (Hypoth.) | MS (Error) | F |
|---|---|---|---|
| Visual imagery | 103.56 | 12.45 | 8.32** |
| Auditory imagery | 51.41 | 8.87 | 5.79* |
| Hallucinatory vividness | 79.05 | 9.35 | 8.45** |
| Kinesthetic imagery | 5.19 | 4.55 | 1.14 |
| Hypnagogic imagery | 3.89 | .73 | 5.35* |
| Dreams and daydreams | 7.76 | .40 | 19.52*** |

Note. The above univariate analyses (df = 1, 41) were conducted after a significant immobility effect was found on the MANOVA: Hotellings $\underline{F}$ = 3.34, $\underline{p}$ = .01.

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

In summary, the multivariate analysis of variance provided further support for hypothesis 1(a). Examination of imagery subscales (MIPI) for three patient samples, who differed in degree of immobility, revealed a consistent increment in means as immobility increased. The spinal cord injury group, which had the greatest immobility, reported significantly more imagery than the mobile, surgery group on five of six subscales.

## Correlation Analyses

In an attempt to explore the contribution of restricted versus excessive stimulation, sleep deprivation was examined in both studies. This variable emerged as important from both patient interviews and records in charts. Sleep deprivation, which presumably leads to stimulus overload (Suedfeld, 1980), can be studied as either an independent or dependent variable. In the present instance, it is analyzed as a dependent variable. However, the assumed relationship with overload, based on the increased attentional demands in a 24-hour period, also acknowledges that sleep deprivation has an independent effect.

Sleep Deprivation. For Study 1, sleep deprivation data were obtained from the change in sleep section of the interview (ESS). Sleep deprivation was examined as a dependent variable in the stepwise regression analysis with 10 general predictors. Table 20 shows that independence contributed to 19% of the variance, while a private room contributed 9%. That is, patients who were rated as independent by nurses and who were in a private room tended to have increased sleep disturbance.

## TABLE 20

### UNIVERSITY HOSPITAL STUDY

### STEPWISE REGRESSION ANALYSIS: GENERAL PREDICTORS OF SLEEP DEPRIVATION (ESS)

| PREDICTOR | STANDARDIZED REGRESSION COEFFIECIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
|---|---|---|---|
| INDEPENDENCE | + .44 | .19 | 8.01 |
| PRIVATE ROOM | - .32 | .10 | 4.66 |
| PREDICTORS COMBINED | | .29 | |

[b]Multiple R: Step 1 = .44; Step 2 = .54.

Study 2 included a time span of the first eight weeks of hospitalization. Intercorrelation matrices were developed weekly and as a composite eight-week matrix (Table 21) to show the relationship over time of sleep deprivation and the dependent variables: imagery, stress and noncompliant behaviour.

On the composite matrix, sleep deprivation was directly related to each of the dependent variables: imagery, $r = .30$, $p < .05$; stress, $r = .29$, $p < .05$; and noncompliance, $r = .23$, $p < .05$. The pattern of intercorrelations over time was generally positive up to week six and then moved in a negative direction, albeit nonsignificant, through week eight.

Imagery was directly related to sleep deprivation on week one, $r = .28$, $p < .05$; week three, $r = .52$, $p < .001$; week four, $r = .46$, $p < .001$; and week six, $r = .49$, $p < .001$. This suggests that sleep deprivation and associated stimulus overload may be an explanatory factor in the analysis of variance findings on imagery. Stress also correlated with sleep deprivation on week one, $r = .42$, $p < .001$; week four, $r = .45$, $p < .001$; week six, $r = .41$, $p < .01$; and week seven, $r = .44$, $p < .001$. Finally, noncompliance had a positive correlation with sleep deprivation on week three, $r = .54$, $p < .001$.

Imagery, Stress and Noncompliance. The original three dependent variables in this project were hypothesized as effects of immobility. As concomitant effects, these variables could be expected to be intercorrelated.

TABLE 21

SHAUGHNESSY HOSPITAL STUDY

INTERCORRELATION MATRIX: DEPENDENT VARIABLES AND SLEEP DEPRIVATION

| VARIABLE | 2 | 3 | 4 |
|---|---|---|---|
| | WEEK ONE OF HOSPITALIZATION (N = 50) | | |
| 1. IMAGERY | .17 | .27* | .28* |
| 2. STRESS | — | .44*** | .42*** |
| 3. NONCOMPLIANCE | | — | .20 |
| 4. SLEEP DEPRIVATION | | | — |
| | WEEK TWO OF HOSPITALIZATION (N = 50) | | |
| 1. IMAGERY | .23 | -.06 | -.04 |
| 2. STRESS | — | .44*** | .22 |
| 3. NONCOMPLIANCE | | — | .10 |
| 4. SLEEP DEPRIVATION | | | — |
| | WEEK THREE OF HOSPITALIZATION (N = 50) | | |
| 1. IMAGERY | .01 | .17 | .52*** |
| 2. STRESS | — | .57*** | .19 |
| 3. NONCOMPLIANCE | | — | .54*** |
| 4. SLEEP DEPRIVATION | | | — |

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

TABLE 21 (CONTINUED)

| VARIABLE | 2 | 3 | 4 |
|---|---|---|---|
| | WEEK FOUR OF HOSPITALIZATION ($N$ = 50) | | |
| 1. IMAGERY | .39** | .28* | .46*** |
| 2. STRESS | — | .54*** | .45*** |
| 3. NONCOMPLIANCE | | — | .53*** |
| 4. SLEEP DEPRIVATION | | | — |
| | WEEK FIVE OF HOSPITALIZATION ($N$ = 50) | | |
| 1. IMAGERY | .01 | -.01 | .10 |
| 2. STRESS | — | .27* | .16 |
| 3. NONCOMPLIANCE | | — | .04 |
| 4. SLEEP DEPRIVATION | | | — |
| | WEEK SIX OF HOSPITALIZATION ($N$ = 50) | | |
| 1. IMAGERY | .13 | .11 | .49*** |
| 2. STRESS | — | .62*** | .41** |
| 3. NONCOMPLIANCE | | — | .01 |
| 4. SLEEP DEPRIVATION | | | — |

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

TABLE 21 (CONTINUED)

| VARIABLE | 2 | 3 | 4 |
|---|---|---|---|
| | | WEEK SEVEN OF HOSPITALIZATION ($N$ = 50) | |
| 1. IMAGERY | .36** | -.06 | -.08 |
| 2. STRESS | — | -.03 | .44*** |
| 3. NONCOMPLIANCE | | — | -.11 |
| 4. SLEEP DEPRIVATION | | | — |
| | | WEEK EIGHT OF HOSPITALIZATION ($N$ = 50) | |
| 1. IMAGERY | .00 | -.06 | -.07 |
| 2. STRESS | — | .20 | -.15 |
| 3. NONCOMPLIANCE | | — | -.07 |
| 4. SLEEP DEPRIVATION | | | — |
| | TOTAL: FIRST EIGHT WEEKS IN HOSPITAL ($N$ = 50) | | |
| 1. IMAGERY | .17 | .16 | .30* |
| 2. STRESS | — | .66*** | .29* |
| 3. NONCOMPLIANCE | | — | .23* |
| 4. SLEEP DEPRIVATION | | | — |

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

Imagery and stress were positively correlated in week four, $r$ = .39, $p < .05$; and week seven ($r$ = .36, $p < .01$), but not in any of the other weeks or in the composite matrix. An irregular direct relationship also was evident between imagery and noncompliance, with significant correlations only on week one, $r$ = .27, $p < .05$; and week four, $r$ = .28, $p < .05$. There was no relationship on the composite matrix.

A more striking positive relationship was demonstrated between stress and noncompliance, with significant correlations in each of the first six weeks of hospitalization. These correlations ranged from $r$ = .27, $p < .05$ (week 5) to $r$ = .62, $p < .001$ (week 6) with 5 of 6 correlations being significant at the .001 level. Overall, the composite relationship, which was based on the total scores for the first eight weeks in hospital, was $r$ = .66, $p < .001$.

In summary, the correlational analyses showed that independence and a private room contributed to sleep deprivation in Study 1; and that sleep deprivation was correlated with all three dependent variables (Study 2) over an 8-week period. Overall, imagery in Study 2 was not significantly correlated with either stress or noncompliance, but the latter two variables were highly correlated with each other.

## Summary: Results from 2 Studies

The results from analyses of Study 1 (University Hospital) and Study 2 (Shaughnessy Hospital) will be summarized according to the hypotheses of this project. Study 1 examined external immobility (bedrest, traction) and Study 2 investigated both external and internal (paralysis) immobility.

### Category 1: Hypotheses Related to Immobility

Hypothesis 1(a) predicted that immobility would lead to increased imagery. This hypothesis received support from both studies on analyses of external and internal immobility.

In the analysis of variance for Study 1, there was a main effect for immobility. That is, patients who were immobilized for five days or more had greater self-reported imagery on the Modified Imaginal Processes Inventory (MIPI) than did patients who were mobilized within two days. A subsidiary analysis of imagery dimensions, as measured by MIPI subscales, included three patient groups which differed in degree of immobility: the two groups from Study 1 and a third group from Study 2. As immobility increased, there were consistent increments in mean imagery scores on each of the six dimensions. Multivariate analysis of variance revealed that the spinal cord injury patients, who had the greatest immobility, reported significantly more imagery on 5 of 6 subscales than did mobile patients.

The general regression analysis for Study 1 did not lend further support to hypothesis 1(a). Of the ten possible predictors, traction (the indicator of external immobility) did not emerge as a significant predictor of imagery on the MIPI. Fifteen of the 24 immobile patients (63%) were immobilized in traction.

The analysis of variance for Study 2 provided further support for hypothesis 1(a). There were main effects for level and degree of injury (which represented internal immobility) on imagery recorded in the charts. Patients with a high level (quadriplegia) and complete degree of injury had the greatest recorded imagery.

On the regression analysis for Study 2, hypothesis 1(a) was supported on one external immobility variable, type of apparatus, but not on the second variable, number of days immobilized in horizontal position. The apparatus variable had a binary categorization: cervical traction (tongs or halo ring) versus other. Patients immobilized in cervical tongs or a halo ring had greater imagery than those who had other types of external immobility, such as a Stryker frame. This finding does not contradict the regression results from Study 1, in which traction failed to predict imagery. In Study 1, of the 15 patients in traction, only four were immobilized in halo cervical traction. These results suggest that traction in general does not predict imagery, but cervical traction in particular is predictive of imagery.

Hypothesis 1(b) predicted that immobility would lead to increased stress related to imagery. This hypothesis was not supported.

In Study 1, contrary to hypothesis, immobile patients did not report greater stress related to imagery than did mobile patients on interview (subscale IV of the Environmental Stress Scale). However, immobility did lead to increased environmental stress related to personal control and response restriction (subscale III).

Study 2, which relied on data from the charts, did not provide sufficient notations on stress related to imagery to merit analysis. Charting tended to identify distress without indicating the specific source.

Hypothesis 1(c) predicted that immobility would lead to increased stress. This hypothesis was not supported on analysis of variance or regression analyses from either Study 1 or Study 2. Neither external immobilizing devices nor extent of paralysis predicted stress.

Hypothesis 1(d) predicted that immobility would lead to increased noncompliant behaviour. This hypothesis was not supported on the analysis of variance for Study 1 or Study 2. However, in the regression analysis for Study 2, concussion predicted noncompliance. This finding was consistent with the hypothesis in that concussion was also correlated with an indicator of degree of immobility: the number of fractures other than the spinal injury. The latter variable was not included in the regression analysis because it correlated with several of the predictors.

**Category 2: Hypothesis Related to the Intervention (Study 1)**

Hypothesis 2(a) predicted that the cognitive intervention would lead to decreased stress related to imagery. Contrary to hypothesis, the intervention group did not report decreased stress related to imagery on interview (subscale IV of the ESS).

Hypothesis 2(b), which predicted that the intervention would lead to decreased stress, was supported on the measure of Subjective Stress (SSS), but not on Environmental Stress Scale (ESS - total) nor on the nurse record in the patient charts (Distress Record).

The intervention was based on laboratory studies in which expectations for imagery in restricted stimulation environments neutralized negative reactions. To examine the relationship between expectations and reactions in Study 1, the interview (ESS) included questions on expectations and previous hospitalizations. An intercorrelation matrix showed that patients who had not been previously hospitalized had higher reaction (stress) scores than those with hospitalization experience. However, this measure did not correlate with the expectation scores. Neither were expectations correlated with occupation or rural-urban residence. On the other hand, the total expectation score was directly related to the total reaction score. That is, patients with high environmental stress tended to have unmet expectations. The expectation-reaction correlation was also found within subscale I (personal space and privacy) and subscale III (personal control and response restriction) of the ESS.

**Category 3: Hypotheses Related to the Environment**

Hypothesis 3(a) stated that restricted environmental stimulation would be predictive of increased imagery. In Study 1, the regression analysis for dimensions of social and nonsocial stimulation provided support for the converse of this hypothesis. That is, high rather than low levels of social stimulation predicted imagery (MIPI). The dimensions of stimulation which predicted imagery were: other-directed social stimulation, variety outside the observed patient's space and variety inside the patient space. Either the hypothesis as stated or the converse hypothesis are consistent with the theory of an optimal level of stimulation. A further predictor of imagery was low control options over nonsocial stimuli, as measured by the responsiveness (NSR) dimension. The latter finding was consistent with the theory of an optimal level of personal control.

Study 2 did not support hypothesis 3(a). The analysis of variance revealed a main effect for environment on the imagery variable. Intensive care patients had greater recorded imagery than patients in the ward environment. However, there was no direct evidence provided on whether the intensive care environment represented restricted or excessive stimulation.

The regression analysis did not support hypothesis 3(a). Neither of the indicators of environmental stimulation levels (days in intensive care or sleep deprivation) predicted the imagery record in the charts. Sleep deprivation, on the other hand, predicted a variable which appeared related to imagery: temperature regulation anomaly.

Hypothesis 3(b) predicted that restricted environmental stimulation would lead to increased noncompliant behaviour. This hypothesis received partial support from Study 1, but was unsupported in Study 2.

In support of hypothesis 3(b), the stimulation regression analysis in Study 1 showed that low variety of nonsocial stimulation was predictive of self-reported noncompliance (ESS). The converse of hypothesis 3(b), relating high rather than low levels of stimulation to noncompliance, would also be consistent with the optimal level of stimulation framework. In line with the converse of hypothesis 3(b), high levels of nonsocial noise predicted noncompliance recorded in the patient charts.

Study 2 did not support hypothesis 3(b) on either the analysis of variance or regression analysis. In the former analysis, there was no environment effect (intensive care vs. ward) on noncompliant behaviour. In the latter analysis, neither days of intensive care nor sleep deprivation predicted noncompliant behaviour. The intensive care variable differed in these two analyses because the former analysis reduced scores to a common metric by correction for time, whereas the second analysis examined the time duration specifically.

**Restricted Stimulation versus Overload**

To further explore the relative contribution of sensory restriction versus overload, the variable sleep deprivation was examined. Sleep deprivation contributes to overload because of the increased attentional demands required over time when one would otherwise be asleep. In Study 1, sleep deprivation was more prevalent for highly independent patients in a private room. In this instance, it appears that the low stimulation of a private room contributes to sleep deprivation. Over the first eight weeks of hospitalization in Study 2, each of the three dependent variables was directly correlated with sleep deprivation. Intercorrelations between the dependent variables showed that stress and noncompliant behaviour were highly correlated, but imagery was not related to either stress or noncompliant behaviour on the composite correlation matrix for eight weeks. On the weekly correlation matrices, imagery correlated with stress and noncompliance on two of eight weeks, whereas a direct relationship between imagery and sleep deprivation was found on four weeks. During the first week of hospitalization, when patients were in the intensive care unit, a significant correlation between imagery and sleep deprivation was found. This suggests that stimulus overload may contribute to imagery effects in intensive care more than stimulus restriction. Imagery during week one was also directly related to noncompliance but not to stress.

In an attempt to determine the stress potential of stimulus restriction versus overload, an exploratory stimulation regression analysis was done on stress measures for Study 1. The findings consistently pointed to high levels of stimulation as predictors of self-reported stress (ESS, SSS), which suggests that overload is a stressor in the hospital environment. On interview, stress related to personal space and privacy was predicted by high variety of nonsocial stimulation. High levels of social stimulation directed at the physical environment predicted stress related to imagery and dreams. Nonsocial noise and other-directed social stimulation (social "noise") predicted subjective stress on the questionnaire.

**Category 4: Hypotheses Related to Life Stress (Study 1)**

Hypothesis 4(a) predicted that previous life stress would lead to increased imagery. Consistent with the hypothesis, high negative change scores (life stress) on the LES predicted imagery (MIPI). Age also predicted imagery, with young patients having higher imagery scores.

Hypothesis 4(b), which predicted that previous life stress would be related to stress during and after hospitalization, was supported on the post-discharge measure but not on the measures taken in hospital. Patients who had high life stress during the year prior to hospitalization tended to have lower adjustment scores (i.e., high stress) two months after discharge from hospital. Previous life stress did not predict any of the three measures taken while in hospital (ESS, SSS, Distress Record).

**Category 5: Hypothesis Related to Personal Control (Study 1)**

Hypothesis 5 predicted that high personal control would lead to decreased stress. Consistent with the hypothesized inverse relationship, helplessness (low control) predicted environmental stress in general (ESS - total) and stress related to environmental stimulation levels (ESS - subscale II).

Further support for hypothesis 5 was found in that low independence (low control) predicted stress related to personal control and response restriction (subscale III of the ESS). There was no relationship between control and the other stress measures in hospital (SSS, Distress Record) or post-discharge (PAIS).

# DISCUSSION

The results from the two studies in this research project provide some support for hypotheses within each of the five categories of independent variables examined. In general, these findings suggest that the model of physical illness as crisis (Moos & Tsu, 1977) has applicability to emergency-admitted patients who differ in degree of immobility. The intervention tested here, which encouraged cognitive reappraisal, was effective in reducing subjective stress in patients. The crisis model of Moos and Tsu will form the organizational framework for the discussion of results.

## Illness-Related Factors

Immobility, which was the major variable in this section, does not necessarily result from an illness per se. Many of the patients in the present research project were trauma cases (see Appendix F). The "illness-related" factors, as defined here, included variables which related to some aspect of treatment during hospitalization for the illness or injury which precipitated admission. Immobility (Study 1) was defined as five or more days of complete bedrest which may or may not involve an external immobilizing device. For spinal cord injury patients in Study 2, the immobility variable included the level of injury to the spinal cord (cervical vs. lumbar) and the degree of neurological deficit (complete vs. incomplete) at that level. Other variables were: traction, type of apparatus, number of days immobilized, and surgery. The rationale for examining several immobility-related variables was to assist in the explanation of whether an immobility effect was due to the type or duration of immobility. The surgery variable was included to control for extraneous variance because it was impossible to obtain a homogenous sample in relation to surgery.

**External and Internal Immobility**

Examination of immobility as both external (traction) and internal (paralysis) restriction, revealed a similar pattern of imagery findings in the two types of immobility, but a difference in degree (incidence and vividness) of effect. The gradient of means (Table 18) for the three patient groups on the six subscales of the imagery questionnaire illustrates this point. Of the three groups, two were exclusively externally restricted, whereas the third had both external and internal restriction. However, the pattern of an increment in mean imagery scores across modality is similar between the two externally restricted groups as it is between the external and internal/external restriction groups.

Previous research has not made the comparison between the effects of internal and external immobility. The exploratory findings presented here suggest that this conceptualization and comparison may be useful for future research. The imagery effects of the two types of immobility fall on a continuum in which the greater the immobility (regardless of whether external or internal), the greater the incidence and vividness of visual, auditory, kinesthetic and hypnagogic imagery. This difference was statistically significant for five of six subscales when the extreme groups (surgery vs. spinal cord injury) were compared.

As shown in Table 19, the kinesthetic subscale was the only nonsignificant difference between surgery and spinal cord injury patients. This was surprising because it might be expected that movement illusions would have a stronger relationship to immobility than, for example, auditory imagery. However, the baseline of kinesthetic imagery in the mobile, control group was higher than expected. For example, one mobile patient, who had surgical removal of a ruptured spleen following an accident, experienced kinesthetic imagery in which she felt that she was floating up toward the ceiling from her bed. A spinal cord injury patient, who had no movement below the neck, reported an identical experience. In a search for alternative explanations for this phenomenon, it seemed feasible that bizarre kinesthetic imagery could result from anaesthetic used for surgery. Both of the above patients had had a general anaesthetic. However, on regression analysis, surgery was not a significant predictor of imagery in either study. In future research, it would be interesting to study kinesthetic imagery across a broader range of patient groups, such as short-term and long-term care, and to develop normative data for persons who are not hospitalized and who are ages which sample the life span.

## Immobility and Imagery

Hypothesis 1(a), which predicted that immobility would lead to increased imagery, was supported by both studies. This finding, which corroborates previous research, does not provide an explanation of why the imagery effect occurs. For this reason, several variables which were subsets of immobility, such as traction, were examined through regression analysis.

Traction in general did not predict imagery in Study 1, but cervical traction in particular (tongs or halo) was predictive of imagery in Study 2. These results must be viewed with caution because it was impossible to separate the effects of internal and external immobility in Study 2. However, it appears that patients with restriction of head movement, as is the case with cervical traction, are at greater risk for imagery effects than are patients with restriction of movement to a limb. Of the 15 patients in traction from Study 1, only five had tongs or halo traction. The other ten had traction to the lower body (leg, pelvis).

The imagery risk factor apparently associated with cervical traction may have a physiological explanation. It is possible that restriction of head movement increases the incidence of visual and kinesthetic changes due to the relationship of the visual and vestibular systems. Vestibular vertigo (Kornhuber, 1974) is a sensation of being turned or tilted to the side, which is often associated with apparent motion in the environment. This description of vertigo matches some of the reports of "kinesthetic imagery" from both orthopedic and spinal cord injury patients in cervical traction.

To determine the possible effect of immobility duration, the number of days immobile in a horizontal position was entered into the regression analysis for Study 2. Duration had no effect. Patients who were immobile for the longest time did not report greater imagery. Indeed, imagery reports in the charts tended to occur during the early hospitalization and to taper off after the first week in hospital. This suggests that an adaptation effect has occurred which has a time frame independent from the duration of immobility.

In Study 2, internal immobility predicted imagery in that complete quadriplegics (high level injury, complete degree) had greater imagery reports than any of the other three patient groups. Most quadriplegics were mobilized in a halothoracic brace at an earlier time than paraplegics. Incomplete paraplegics, who had the least neurological deficit of the four groups, were sometimes immobilized for the longest duration. Examination of mean imagery scores in Table 11 shows that incomplete paraplegics had a low incidence of imagery in spite of the long duration immobility. Therefore, degree of neurological deficit is a more potent predictor of imagery than duration of immobility. It is important to underscore the fact that all patients in Study 2 were in the acute phase of adjustment immediately following a trauma. Conomy (1973) found that trauma patients had greater imagery than patients with similar neurological deficit from congenital or degenerative problems.

The physiological explanation of imagery effects after spinal cord injury may be that spontaneous central neural activity results from loss of the inhibitory effect which was provided by sensory input prior to the injury, in a process analogous to that postulated for phantom limb pain (Melzack, 1974). Historically, the neurological literature has examined unusual sensations in spinal cord injury from the perspective of "phantom limb" (Riddoch, 1917; Riddoch, 1941; Bors, 1951). More recently, this analogy has been challenged (Pollock et al, 1957) and these findings have been reconceptualized as disturbances of body image

(Kolb, 1959; Evans, 1962). As Conomy (1973, p. 849) noted, the term "phantom" may be "an inappropriate term to describe the situation occurring after spinal cord injury. The limbs are actually present, and the qualities of pain, contracture, shrinkage and foreshortening so often present in postamputation phantom limbs are notably absent." In the present research the definition of imagery included unusual body experiences (called tactile and kinesthetic imagery here) as reported in the neurological literature, but also included unusual visual and auditory experiences which have not been emphasized in neurological research. Nonetheless, leaving definition aside, it is possible that Melzack's theory may have explanatory value for at least some imagery experiences in the present project (i.e., those directly related to loss of sensory input in the spinal cord injury sample).

Melzack and Loser (1978), who examined "phantom body pain" in paraplegics, proposed a central "pattern generating mechanism" explanation, consistent with the gate control theory of pain, whereby "<u>loss</u> of input to central structures by deafferation" (e.g., amputation, cord transection) ... "can trigger abnormal, prolonged firing and produce severe, persistent pains which are felt in discrete areas of the denervated limbs or other body parts (p. 208)." Although this explanation relates to pain experience, one could argue that a similar explanation might be relevant for other unusual sensations. In a study of 7 paraplegics, Evans (1962) found that while patients described sensations which the investigator could categorize as pain, "in fact no patient ever spontaneously complained of pain or behaved as though he was suffering in pain" (p. 692).

In the present research, the fact that imagery effects tended to occur predominantly in the first week of hospitalization could be explained as a physiological adaptation effect. It is possible that imagery accompanies a process of habituation to external or internal immobility. Because all of the patients with internal immobility in Study 2 also had some type of external immobilizing apparatus, the effects of internal and external immobility could not be completely separated. Future research might examine physiological indicators in matched pairs of patients with and without neurological deficit, keeping type of immobilizing apparatus constant. For example, one might examine the relationship of nystagmus and kinesthetic imagery for orthopedic and spinal cord injury patients in cervical traction.

In sum, patients with external immobility (bedrest with or without immobilizing apparatus) for five days or more (Study 1) had greater imagery on day eight of hospitalization than did patients who were mobile within two days of admission. Although the interaction effect (Immobility x Intervention) was nonsignificant, this study should be replicated, given the discrepant mean for the mobile-intervention group (Table 2) as compared to the other three groups. Traction alone did not predict imagery effects in this sample.

In Study 2, which had an eight week time frame, patients who had a high level injury (quadriplegics) of complete degree, with loss of all neurological function below the level of the injury, had greater imagery than quadriplegics with incomplete injuries or paraplegics with either complete or incomplete injuries. Thus, for internal immobility, the degree of neurological deficit predicted imagery. Since much of this imagery occurred during the first week of hospitalization, it is possible that a process of physiological adaptation has occurred. Initially, loss of sensory input could trigger spontaneous firing in the sensory projection area of the cortex leading to imagery effects. Over time, habituation might occur so that imagery experiences would decrease.

The type of immobilizing apparatus also had an imagery effect in Study 2. Patients in cervical traction (halo or tongs) had greater imagery recorded in the chart. As compared to Study 1, where most of the traction was attached to the lower body, it appears that restricted head movement may be a component of imagery induction. A physiological explanation here could be that interference to normal external inputs to the visual, and/or vestibular systems leads to imagery. The role of sensory inputs in imagery induction will be discussed further in the section on environmental stimulation levels. While degree of neurological deficit and type of apparatus predicted imagery, the duration of immobility (as indicated by the number of days horizontal) had no effect on imagery recorded in the chart. Surgery had no imagery effect in either study.

## Immobility and Stress

Hypothesis 1(b), which predicted that immobility would lead to increased stress related to imagery was not supported. Nevertheless, anecdotal data suggest that there may be merit in further exploration of this hypothesis in future research. For example, to return to the discussion of the two patients (mobile versus spinal cord injury) who reported identical sensations of floating to the ceiling, their reactions to the experience were extremely different because of the difference in degree of immobility. The mobile patient was able to get out of bed and go for a walk, which ended the floating sensation. For her, the experience was "weird" but only mildly distressing. By contrast, the spinal cord injury patient endured the floating sensation for approximately five minutes, which was extremely distressing because of the helplessness of quadriplegia and cervical traction. Although the latter patient knew that the experience was not real, and this was confirmed by reality testing with another person in the room, the apparent movement persisted. Finally, the sensation ended abruptly when he was turned onto his side.

The above two cases differed in their available options for control. In Baron and Rodin's (1978) terms, the mobile patient had the option for offset control to end contact with, or offset, the stressful situation, whereas the immobile patient did not. It is interesting to note from Study 1, that immobility led to stress related to personal control and response restriction. Immobility had a potent effect ($p$ < .001) which suggests that immobility leads to nonoptimal levels of personal control which produces stress.

Hypothesis 1(c) predicted that immobility would lead to increased stress. Contrary to hypothesis, results from the two studies did not show a relationship between immobility and stress. There was no statistical difference in stress reports from immobile patients as compared to mobile patients. Likewise, internal immobility was unrelated to stress. These results were in sharp contrast to the imagery findings and suggest that a different underlying process has occurred. Whereas degree of neurological deficit predicted imagery, there was no difference in stress levels of different levels and degree of spinal cord injury. The physiological explanations of imagery suggested earlier are not relevant to the stress results. Rather, it appears that the selection of emergency admissions for the samples of both studies meant that all patients studied were in the stress of a crisis situation. This interpretation concurs with the Moos and Tsu model of the crisis of physical illness (or injury, in the present extension of the model). In the initial eight weeks of hospitalization, the crisis experienced by the complete quadriplegic facing a lifetime of paralysis from the neck down was no greater than the crisis of the incomplete paraplegic who may walk out of the hospital. This finding may be explained in terms of adaptation level theory in which contrast and habituation lessen the extremes of affective reactions to events (Brickman, Coates & Janoff-Bulman, 1978).

The literature on spinal cord injuries is contradictory in regard to the issue of phases of psychological adaptation in the rehabilitation period. Stages of psychological reaction have been described (Guttmann, 1976; Rigoni, 1977) and have come to be accepted as given in much of the literature, but recent studies (e.g., Shadish, Hickman, & Arrick, 1981) have not found empirical evidence for a simple stage theory. Trieschmann (1980) emphasized that this issue must be resolved by future longitudinal studies.

Most of the stage theories appear to be derived from literature on grief or dying (Kubler-Ross, 1971). Stages such as shock, denial, anger, and acceptance have been identified. This suggests that there would be a change in stress over time. From Study 2, the mean stress scores (Table 15) show that stress may decrease, increase or remain constant over time for groups of patients, but the overall change was nonsignificant. These findings offer support to the research of Shadish et al., in contradiction to a simple stage theory. However, the eight week time frame of this study may be too short to adequately evaluate the stage theory approach.

In sum, immobility did not lead to increased stress related to imagery, although anecdotal evidence suggests that this hypothesis could be further studied. Contrary to hypothesis, immobile patients did not have greater stress than mobile patients in Study 1. However, immobile patients did report greater stress related to personal control and response restriction than did the mobile group. According to Baron and Rodin (1978) this effect could be explained by differences in offset control. For internal immobility in Study 2, there was no difference in stress according to level or degree of injury, nor was there a pattern of change or phases over time. The pattern of stress results differed from the imagery findings, which were explained physiologically. The lack of main effects for stress was interpreted within the Moos and Tsu (1977) framework of physical illness as crisis, because all patients in this project were emergency admissions.

Immobility and Noncompliance

Hypothesis 1(d), which predicted that immobility would lead to increased noncompliant behaviour, did not receive direct support from either study. However, correlational evidence suggests that this hypothesis merits further investigation. In Study 2, concussion, which predicted noncompliance, was also correlated with the number of fractures other than the spinal cord injury. Since the greater the number of fractures, the greater the immobility, as a consequence of treating the fractures, this finding is consistent with hypothesis 1(d).

The original conceptualization of noncompliance in this project was based on earlier research (Stewart, 1977; Ziskind et al, 1960) which suggested that imagery and noncompliance were related variables (e.g., noncompliance as a result of vivid hypnagogic imagery). Although some individual cases in both studies support this relationship, the data as a whole do not. In Study 1, imagery tended to occur in the first week of hospitalization while noncompliance occurred later. In Study 2, noncompliance over the total of the first eight weeks of hospitalization (Table 21) was correlated with stress, $r = +.66$ ($p < .001$), but not with imagery, $r = +.16$ (NS). There was a significant correlation between noncompliance and imagery on two of the eight weeks; week one: $r = +.27$ ($p < .05$) and week four: $r = +.28$ ($p < .05$). By contrast, the correlation between noncompliance and stress was at the .001 level for five of the eight weeks.

Noncompliance associated with imagery tends to be involuntary. The data from the present studies suggest that voluntary noncompliance, associated with stress, is more prevalent than involuntary noncompliance in immobile patients. One possible explanation of this is a reactance effect due to the loss of personal control associated with immobility. Wortman and Brehm (1975) proposed a change in response to loss of control from reactance to helplessness over time. If one defines the noncompliance in this project as reactance, the present findings do not support the temporal phasing suggested by Wortman and Brehm. From Study 2, the mean noncompliance scores (Table 15) either slightly decrease or increase across patient groups but there is no significant change over time. In Study 1, the most extreme case of noncompliance, in which a patient with a fractured femur repeatedly removed his traction and went for a walk, occurred after 18 days of immobility and compliance. According to Wortman and Brehm, one would expect the noncompliance to occur in the early hospitalization phase, rather than 18 days after admission.

In sum, the prediction that immobility would lead to noncompliance was not directly supported by either study. Correlational and anecdotal evidence suggest that further research needs to be done on this hypothesis. Concussion, which predicted noncompliance, also correlated with an immobility index (number of fractures). The evidence presented here support a voluntary, reactance (Brehm, 1966) explanation of noncompliance, as opposed to involuntary noncompliance associated with hypnagogic imagery. Similar to the stress results, there was no evidence for temporal phasing of reactance and helplessness (Wortman & Brehm, 1975).

## Cognitive Appraisal

According to the Moos and Tsu model, the intervention tested in Study 1 was aimed at the level of cognitive appraisal or the perceived meaning of the illness experience. This intervention was designed to counteract stress by providing information (expectancy for imagery, a positive set and an environmental explanation) on which to base reappraisal of imagery effects as a normal reaction to an emergency admission to hospital, in the event that the imagery could be perceived as a sign of mental illness.

### Cognitive Reappraisal and Stress Reduction

Hypothesis 2(a) predicted that the intervention (cognitive reappraisal) would lead to reduced stress related to imagery. This prediction was unsupported by the interview data (subscale IV of the Environmental Stress Scale). The interview, which was conducted on day eight, focused on the entire eight day span of hospitalization. Most of the reported imagery had occurred during the first few days of hospitalization. The retrospective reporting may have minimized the stress involved with the passage of time. Support for this possibility came from the pilot interviews conducted with longterm patients from the Acute Spinal Cord Injury Unit at Shaughnessy Hospital. In one case, a patient described bizarre imagery from several months earlier and reported that he found these experiences mildly stressful. He had attributed the imagery effect to valium and refused to take the medication afterwards. The content of the incident was recorded in the chart in a similar manner to the patient's report, but the striking difference was the chart record of extreme anxiety associated with the imagery. This suggests that the memory of negative affect relative to imagery may be attenuated once adaptation has occurred. A second example of this phenomenon occurred one morning when a patient reported on bizarre, multimodality imagery experiences which had happened during the night. Comparison of her report with nurse reports (verbal and written) of the same events were very similar in content except for the description of associated stress. According to the nurses, the patient had been extremely upset as evidenced by her affect, verbalization and behaviour, such as constant use of the call light. The patient, by contrast, described herself as mildly upset. Although this could also be interpreted as a social desirability effect, it seemed more probable that the experience was perceived differently by the patient once the bizzare imagery had ended and daylight had returned.

Given the possibility that retrospective reports of negative affect may be minimized once adaptation occurs over time, a concurrent measure of stress may be preferable to the retrospective approach. Hypothesis 2(b), which predicted that the intervention would lead to decreased stress, was supported on the concurrent measure of subjective stress. The Subjective Stress Scale, which was also administered on day eight, provided instructions for patients to indicate how they felt on that day, rather than retrospectively over the previous week. Patients who heard the intervention reported less subjective stress than those who were not exposed to this information.

Neither measures of environmental stress (ESS - total) nor the Distress Record from the patient charts supported hypothesis 2(b). As mentioned previously, the Environmental Stress Scale involves retrospective reporting on interview. On the other hand, the Distress Record is taken from the staff's concurrent record in the patient's chart. However, it is quite feasible that: (1) The patient's subjective experience of stress may not be transmitted to the nurse, or (2) The nurse may observe the stress but not make a notation in the chart. The method of problem-oriented charting used at the University Hospital, as compared to the ongoing progress notes at Shaughnessy Hospital, appears to have resulted in reduced psychological notations in the chart.

Many health professionals will argue that expectations, such as provided in this intervention, should be avoided because they could increase the probability of imagery occurrence. No basis for this avoidance was provided by the comparison of imagery scores in the intervention group with the group who did not hear the intervention. The intervention did not "produce" the imagery effect.

A criticism which may be raised concerning the present study is the lack of more objective indices of stress to measure the effectiveness of the intervention. However, Langer, Janis and Wolfer (1975), in a study of the effect of cognitive reappraisal on stress in surgical patients, did not find physiological measures (i.e., pulse, blood pressure) to be useful as dependent variables. The above study did find value in an objective measure of the "number of pain relievers and sedatives the patient requested" (p. 160). Previous research (cited in Stone, Cohen & Adler, 1979, p. 236) had shown that study of postoperative analgesic use cannot separate pain from anxiety. For this reason, numerous studies of stress in hospitalized patients have used analgesic administration as a stress indicator. The present research did not include this indicator for two reasons: (1) The sample was not homogeneous relative to the presence or absence of surgery, and (2) No valid method exists for the measurement of "requests" for analgesia using data from the charts. Analgesics are only given after a specified time regardless of the number of requests that are made by the patient. To be sure, they are ordered to be given "as needed", but often the staff have a good deal of control over their timing. Sometimes a patient who frequently requests analgesia will cause annoyance for the nursing staff and the "request" will be met more slowly than that of a less loquacious sufferer. However, the only information appearing in the chart, with the exception of the occasional behavioural entry in the progress notes, will be the time of administration of the medication.

Because the intervention had several components, which made it more realistic for application in a clinical setting, it is impossible to state definitely which component(s) was instrumental in reducing the subjective stress scores for the intervention group. Expectancy for sensory experiences enhances predictability (Johnson, 1975), whereas attributions to a less threatening cause should increase control (Pittman & Pittman, 1980). For example, the cognitive reappaisal may involve a transfer of attribution for the cause of imagery from a stable, internal cause (e.g., mental illness) to an unstable, external cause (e.g., change in environment). Predictability and control have been shown to have stress-reducing properties in laboratory research (Glass & Singer, 1972).

Another useful component may be the normalization process involved when patients hear that others have had experiences similar to their own. Such consensus information has not reduced negative affect in some research, such as a study of the effect of consensus information on stress and depression in first-year faculty members (Nisbett, Borgida, Crandall & Reed, 1976). However, the possibility remains that it might have potential in a situation where some stigma or taboo is involved e.g., mental illness, sexuality. The Sexual Health Counsellors on the Acute Spinal Cord Injury Unit at Shaughnessy Hospital (Anderson, 1980) have found that a large portion of their task is to help normalize sexual concerns in the paralyzed population. A method they used to do this is to provide consensus information (i.e., that other people with spinal cord injuries have these concerns as well). The consensus information apparently reduces anxieties about sexuality. Similarly, the intervention tested here could lessen anxiety regarding mental status.

All the components of the intervention could affect predictability or control. According to Baron and Rodin (1978, p. 148) predictability is necessary but not sufficient as a pre-condition for outcome control. Therefore, predictability will be viewed here as serving outcome control.

The type of outcome control that the intervention aimed to induce was predominantly offset control rather than onset control. The patient could use the information (e.g., environmental attribution) to end contact with the stressor (threatening thoughts regarding the meaning of imagery experiences) and hence control or offset the negative outcome. All of the 24 patients who heard the tape (the intervention group) responded positively or neutrally; none were negative. Some had already had imagery experiences, which they had not discussed with anyone, and they were both anxious to talk about the imagery and relieved to hear that these experiences were normal. For patients who had not experienced imagery prior to the intervention, the expectation for imagery could reduce unpredictability and therefore increase onset control (Baron & Rodin, p. 162). In future replication studies, it would be useful to administer the intervention earlier than day five because by this time much of the onset control potential was lost.

The data on psychological recovery in the two month follow-up questionnaire (PAIS) were not included in the analysis of variance because the sample was reduced by 25% leaving an n of seven in one cell. However, the pattern of results was consistent with hypotheses. The mean psychological distress scores for the immobile versus mobile groups were 5.07 and 3.10 respectively. This may be explained by the fact that many orthopedic patients would have a slower return to normal activities than patients who had general surgery. The correlational matrix for stimulation levels and dependent variables (Appendix G.6) showed a direct relationship between psychological distress on the PAIS and imagery on the Modified Imaginal Processes Inventory: *r* = .34 (*p* < .05). The PAIS was also correlated with the personal control and response restriction subscale of the Environmental Stress Scale: *r* = .38 (*p* = .01). Of interest to the present argument was the fact that the mean distress score for the intervention group was 3.80 as compared to 4.37 for the group who were not exposed to the intervention. This suggests support for previous research which relates control to long-term decreased stress (Averill, 1973). However, in the present case there appears to be short-term <u>and</u> long-term benefit, whereas Averill reported short-term increase and long-term decrease in stress.

In summary, manipulation of cognitive appraisal led to reduced subjective stress, rather than reduced imagery-specific stress, with no increase in imagery effects. There was no intervention effect for environmental stress or charted distress. Some evidence was provided for both short-term and long-term benefit from this intervention. While this effect could have been mediated by expectancy, attributional, consensus or sensory informational processes, the explanation offered here is that all of these mechanisms increase outcome control.

## Physical (Nonsocial) and Social Environmental Factors

The environmental factors of interest in this project were dimensions of social and nonsocial stimulation. In Study 1, these dimensions were examined by direct observation of the environment in patient rooms. Much of previous research has tended to make assumptions about aspects of the hospital environment as "sensory deprivation" or overload. While either extreme can theoretically predict the same effect, such as imagery, the lack of precision about the polarity of this relationship does not provide the necessary guidance for intervention in the clinical setting.

<u>**Stimulation Dimensions and Imagery**</u>

Hypothesis 3(a) stated that restricted environmental stimulation levels would lead to increased imagery. It was interesting to find that, in general, there was a direct relationship between stimulation dimensions and imagery, rather than the predicted inverse relationship. Most of the predictors were from the social environment, as opposed to the nonsocial environment.

High imagery, as measured by the imagery questionnaire (MIPI), was associated with high levels of social interaction which was directed at someone else in the room and outside the observed patient's space (area within bedside curtains). Imagery was also directly related to the variety of social stimulation. The most potent predictor was variety outside the patient space. These predictors all suggest an overload explanation. However, it is overload of a particular type of stimulation. The first two predictors represent the background noise of people talking in the room and the traffic of different people entering the room. These variables are similar in that the observed patient does not directly interact with the stimulus persons. It is possible that the social noise and traffic created by these two variables leads to increased imagery because of the arousal created by the noise or the ambiguity of partially heard dialogue. Zuckerman's theory of an optimal level of stimulation (1969, p. 431) suggests that visual, auditory, kinesthetic, and somesthetic (body illusion) sensations may result from high or low cortical arousal relative to the optimal level of stimulation for the individual. When someone is recovering from injury or illness, it is feasible that the optimal level of stimulation is lower than normal. Therefore, high stimulation could have more deleterious effects than it would under ordinary circumstances.

The third predictor of imagery, variety inside the patient's space, is more likely to be stimulation which is relevant to the patient. However, high variety, with a number of different people passing by the patient's bed, could lead to arousal in the patient because of inconsistency of contacts and lack of meaning in the social world. That is, this variety would lead to a larger number of superficial contacts rather than fewer, more meaningful interactions. One could argue from these data that there should be less division of labour in hospitals and more emphasis on primary nursing care, in which one nurse has total responsibility for a patient.

In addition to the three predictors discussed above, the dimension of responsiveness of nonsocial stimulation (NSR) predicted imagery scores on the MIPI in Study 1. Low responsiveness (which predicted high imagery) is relevant to personal control. Patients who were exposed to few nonsocial stimuli which had the dimension responsiveness, did not have the option of controlling the onset, offset or intensity of stimulation. For example, a radio which was out of reach, such as one belonging to the patient in the next bed, would lack responsiveness.

Again, an arousal explanation could account for the imagery induction. In this case, both nonoptimal stimulation and nonoptimal control would contribute to the arousal. The arousal may be related to anxiety or frustration with low control of the stimulation. However, no direct physiological measure of arousal was obtained in this study. The use of patient self-report, nurse report and observational data were considered preferable from an ethical viewpoint because all of the patients had endured the crisis of an emergency admission.

Hypothesis 3(a) was supported by Study 2 in that the environment variable predicted imagery. Patients in the intensive care environment, as opposed to the ward, had greater imagery recorded in the chart. This effect, however, was confounded by time because all patients were in the intensive care unit immediately after admission and then transferred to the ward at a later date. To the extent that the imagery effect can be attributed to the intensive care environment (which replicates previous research on intensive care syndrome), it is still not possible to ascertain from these data whether restricted or excessive stimulation contributed to the effect. The observational tool which was developed for Study 1 could be used in future research to obtain direct observational data on dimensions of social and nonsocial stimulation in intensive care as opposed to ward environments. The possible imagery-inducing effect of injectable analgesics, such as morphine and demerol, was ruled out here in the covariate analysis. However, future research should also examine the potential effect of a broader range of medications, including sedatives and oral analgesics.

Recent research suggests that excessive stimulation is a problem in intensive care units. MacKinnon-Kesler (1983) found that noise levels contribute to overload in intensive care settings. In a study of the decibel levels at the patient's head in ICU (Redding & Minsky, 1977), the findings were comparable to the noise levels in an office setting with typewriters and telephones in constant use. If these findings can be generalized to the intensive care unit of the present study, the data, which demonstrate an imagery effect in the intensive care environment, may best be explained in terms of excessive stimulation rather than restricted stimulation.

In Study 2, the regression analysis did not support hypothesis 3(a) on either indicator of environmental stimulation: number of days in the intensive care unit or sleep deprivation. The latter variable was used as an indicator of environmental stimulation because the greater the sleep deprivation, the more time the patient will be awake and exposed to environmental stimulation. Sleep deprivation did predict temperature regulation anomaly, a variable which may relate to imagery. This anomaly, which is an unusual somatic experience just as visual imagery is an unusual sensory experience, occurred when patients felt either hot or cold, independent of environmental temperature. The regression technique, which only provides correlational results, may erroneously create the impression that the predictor causes the outcome. In fact, it is more likely here that the temperature regulation anomaly, which is very aggravating for patients, interferes with sleep, rather than the other way around. Therefore, these data probably could better be explained by physiological mechanisms (e.g., adaptation to damage of the autonomic nervous system) rather than environmental stimulation.

Coding of the temperature regulation anomaly from the charts was prompted by discussion with a nurse who had observed, in her experience with acute spinal cord injury patients, that there seemed to be a two-stage process over time: (1) vivid dreams and bizarre imagery ("hallucinations"), followed by (2) temperature regulation anomaly. Graphs were made for each of the 50 spinal cord injury patients to show the changes in dependent variables over the entire length of hospitalization. Although the above temporal phasing was evident for some individual patients, there was no clear pattern of stages when the data were examined as a whole.

In sum, environmental stimulation was directly related to imagery in Study 1, contrary to the predicted inverse relationship. High levels of dimensions of social stimulation (i.e., overload) and low levels of nonsocial stimulation over which the patient had control, predicted imagery in Study 1. These findings were interpreted as consistent with theories of optimal levels of stimulation and control.

In Study 2, patients had greater imagery in intensive care than on the ward. This finding was also interpreted as most likely resulting from stimulus overload, in support of Study 1 and contrary to hypothesis 3(a). Either excessive or restricted stimulation, remain alternative explanations until more observational data of spinal cord injury patients in intensive care units are available.

Other environmental variables (i.e., number of days in intensive care and sleep deprivation) did not predict imagery. Sleep deprivation predicted (i.e., correlated with) temperature regulation anomaly, although the most probable causative link is that the temperature anomaly causes loss of sleep. The data on imagery and temperature regulation anomaly did not provide support for temporal phasing of these phenomena. The temperature regulation problem can be attributed to a deficit of the autonomic nervous system (Burke & Murray, 1975).

**Stimulation Dimensions and Stress**

The previous findings of imagery predictors from Study 1 led the investigator to examine the relationship between stimulation dimensions and stress, even though no prior hypotheses were developed. The imagery predictors included high levels of social stimulation dimensions (other-directed and variety) and low control options over nonsocial stimulation (responsiveness).

Baron and Rodin (1978) in their concept of "numerosity stress", outline features of social overload, unpredictability and lack of onset control. All four imagery predictors from Study 1 are consistent with these features. Therefore, the Baron and Rodin model suggests that these predictors would correlate with stress. The above findings form a pattern of high stimulation and low control which, in Cohen's (1978) terms, takes greater attentional effort than overload with control. Baron and Rodin (p. 154) suggest that crowding stress, of which numerosity stress is one type, arises when the stimulation is seen as a "threat to personal control". All four of the above predictors could be seen by the patient as such a threat. Cohen further maintains that prolonged demands (e.g., overload without control) can lead to cognitive fatigue in which the attentional capacity "shrinks" (p. 18) and fewer inputs can be processed than at rest.

The relationship between stimulation dimensions and stress in Study 1 was examined through an exploratory regression analysis. The pattern of results suggested that overload was a stressor in the hospital environment. Predictors of subjective stress (questionnaire) were nonsocial noise and other-directed social stimulation (social "noise"). On interview, two sources of environmental stress (i.e., two subscales of the ESS) were predicted by high stimulation. High variety of nonsocial stimulation predicted stress related to personal space and privacy (subscale I). In addition, high levels of social stimulation directed at the physical environment (e.g., housekeeping) predicted stress related to imagery and dreams (subscale IV).

The data on noise as an inducer of stress supports a numerosity stress explanation in accordance with Baron and Rodin. The observations in Study 1 were done on a given day for each patient and so it is not possible to say whether "prolonged exposure" to noise existed, consistent with Cohen (1978). However, it is probable that the day-to-day stimulation levels were more similar than different. Moreover, the finding that nonsocial noise and other-directed social stimulation were the only two variables that predicted subjective stress (SSS) lends support to the possibility that a prolonged effect was experienced. In a study of noise from highway traffic, Ward and

Suedfeld (1973) found that positive affect decreased over time. Although the decibel level of ward traffic undoubtedly differs from highway traffic, the general effect may be similar. In future research, it would be useful to include decibel ratings of the noise level on orthopedic and surgery wards in the hospital.

Another possible explanation for stress resulting from other-directed social stimulation could be due to patient concern about whether discussions (e.g., two staff talking at the doorway) are relevant to the patient but not under his or her control. On interview, this concern was rarely raised, whereas the annoyance of ward noise levels (social and nonsocial) was much more frequently expressed.

Baron and Rodin identify two types of crowding stress in their framework: numerosity stress (discussed above) and privacy stress (p. 178) in which there is "overstimulation due to lack of termination control" (i.e., offset control). Both of the interview findings of stimulation dimensions as predictors of environmental stress could be interpreted as privacy stress. Variety of nonsocial stimulation includes both responsive (with control options) and nonresponsive stimuli. High nonsocial variety could be viewed as intrusive (e.g., several radios and televisions on within earshot) and, therefore, could contribute to privacy stress, as evidenced by the prediction on personal space and privacy (ESS - subscale I). Likewise, high social stimulation directed at the physical environment could also be viewed as intrusive, which could contribute to stress related to imagery and dreams (ESS - subscale IV). Both of the above environmental factors interfered with offset control.

In sum, the observational data from Study 1 show that high stimulation (overload) and low control options are predictive of stress. These effects are explained in terms of the Baron and Rodin model of crowding stress, which includes numerosity stress and privacy stress.

Stimulation Dimensions and Noncompliance

Hypothesis 3(b), which predicted that restricted environmental stimulation would lead to greater noncompliant behaviour, was partly supported in Study 1 but unsupported by both analyses in Study 2.

In Study 1, as predicted, low variety of nonsocial stimulation predicted noncompliance reports on interview. However, contrary to hypothesis, high levels of nonsocial noise predicted noncompliance recorded in the chart. Both of these findings could be predicted from Zuckerman's optimal level of stimulation theory. Nonoptimal levels of high and low stimulation dimensions predicted noncompliance.

The direct relationship between noise and noncompliance, as evidenced above, can be further examined within Baron and Rodin's framework of crowding stress. In this framework, coping methods are predicted in relation to the type of crowding stress. Numerosity stress, such as that produced by noise, may predict "withdrawal from unpredictable setting" in order to "decrease environmental complexity" (Baron & Rodin, 1978, p. 179). Other suggested coping methods are deindividuation of self and others, and group formation. Reactance is not included as a probable result because "when overstimulation occurs, freedom of choice may even increase as outcome control decreases" (p. 179). According to Baron and Rodin, privacy stress, by contrast to numerosity stress, may arouse reactance and possibly helplessness, with coping through selective inattention, withdrawal or territorial buffers.

If the noncompliance data are viewed as indicative of reactance, the present data do not support the Baron and Rodin assessment of coping techniques. Noise, which produces numerosity stress, was predictive of noncompliance (reactance), contrary to the model. The Baron and Rodin framework is deficient at the level of coping techniques because it does not allow for either the range of possibilities within an individual's repertoire or the differences in coping styles between people.

In sum, both low and high stimulation levels may be predictive of noncompliance. Low nonsocial variety and high noise, which predicted noncompliant behaviour, are both consistent with Zuckerman's optimal level of stimulation theory. The relationship of noise to noncompliance is inconsistent with Baron and Rodin's analysis of coping styles. The Baron and Rodin framework of crowding stress fits the present data relative to types of stress, but not relative to coping techniques.

**Sleep Deprivation**

In order to further explore the restricted versus excessive stimulation explanations of the environmental effect in Study 2, sleep deprivation was correlated with the three dependent variables over time. The assumption here was that sleep deprivation contributed to overload, as previously discussed.

Over the initial eight weeks of hospitalization, sleep deprivation was directly related to each of the dependent variables. These data strengthen the case for an overload interpretation of the effect of environment in Study 2.

On the other hand, there are obviously multifactorial determinants of imagery, stress and noncompliance, in accordance with the Moos and Tsu model. In the case of imagery results in Study 2, for example, there are several possible contributors to imagery effects, such as internal immobility (neurological deficit), external immobility (apparatus) and sensory inputs (environment, sleep deprivation). It may be the case that a critical combination of these variables is necessary to reach a threshold of imagery effect. Complete quadriplegics in intensive care reach this threshold with considerably greater frequency than do incomplete quadriplegics, complete paraplegics or incomplete paraplegics.

One of the problems with overload models, according to Baron and Rodin (1978, p. 182), is their lack of ability to make a priori predictions about the occurrence of overload effects. There is a great deal of variability within and between individuals, with regard to tolerance for high stimulation levels. They assert that their model of personal control will improve predictability because it can be used to define dimensions of overload, which include both stimulus (stimulation) and response (attention) components. The present data suggest that the notion of multiple determinants reaching a critical threshold will also increase predictability, even though it is not possible at this time to make a definitive statement on the relative contribution of restricted or excessive stimulation.

In Study 1, a personal and an environmental variable (in Moos & Tsu terms) were predictors of sleep deprivation. Patients who were assessed as independent (high personal control) by nurses had greater sleep deprivation. A second predictor of sleep deprivation was a private room, which presumably has restricted stimulation relative to a nonprivate room. These data suggest that a number of combinations of nonoptimal stimulation and control may predict psychological effects in hospital. Although sleep deprivation was not included as a variable in this research, the data suggest that it is an important variable to include in further research on hospital environmental determinants of psychological effects.

A basic tenet of the present research is that imagery, environmental stress and noncompliant behaviour are normal responses to nonoptimal levels of stimulation and control, rather than pathological signs. In general, the data presented here appear supportive of this view. The type of intervention which follows from this perspective is one which alters the social or nonsocial environment, rather than psychotropic medication. Suedfeld (1974, p. 11) suggests that when a person confronts a novel environment there is a need "to identify informational anchor points and develop a set of adaptive responses". The more unfamiliar and potentially dangerous the environment, the greater the information need which may lead to attention, directed at internal stimuli (e.g., imagery) when external information flow is lacking. The intervention tested in Study 1 could be viewed as an anchor point of information.

The overload argument presented here appears to contradict earlier data concerning "sensory deprivation" in cervical spinal cord injury patients (Johnson, 1976). Trieschmann (1980) raised the possibility of "sensory deprivation" as a contributor to behavioural changes in the acute spinal cord injury patient, but noted the absence of data on the topic. The data provided by Johnson (1976, p. 21) assumed that observations such as nightmares, "seeing things", and confusion were indicative of sensory deprivation. This assumption was backed by the results of the study which showed a marked decrease in the above observations for patients in the intervention group. The intervention, which was derived from the sensory deprivation literature, included increased social contact, information, group counselling, access to time pieces, mirrors, glasses and hearing aids as needed. Volunteers spent time with patients and all staff addressed patients by name and requested permission before providing services.

In terms of the Baron and Rodin framework, this intervention counteracted problems of onset control (information, orienting devices) and problems of offset control (request permission before service) and thus could be beneficial from an overload perspective as well. The increase in social contact, as distinct from the other-directed social stimulation in Study 1, was designed to be meaningful (trained volunteers, counselling) and provision was made for the patient to terminate or refuse contact and thus use control to achieve his or her own optimal level of stimulation. In other words, this global intervention allowed for enough control options to be useful for either underload or overload. In the Johnson study, there was no direct check of the "sensory deprivation" hypothesis through environmental observation, so it would be more accurate to suggest that altered stimulation and low control led to cognitive fatigue (Cohen, 1978), with sensory and cognitive effects.

In sum, sleep deprivation was correlated with all three dependent variables in Study 1. Predictors of sleep deprivation from Study 2 were independence and a private room. Findings were discussed in relation to nonoptimal stimulation and control, threshold effects and implications for intervention. In general, the data provide more support for an overload argument than underload, although multiple determinants are evident in hospital settings.

## Background and Personal Factors

The criterion of an emergency admission for both studies precluded data collection before admission. However, in Study 1, patient self-reports were obtained during hospitalization on life experiences for the previous year and helplessness prior to admission. Nurse ratings of patient behaviour in hospital were obtained on independence and dependence. Other factors relevant to Moos and Tsu's background and personal category were age, sex, employment status and an accident as the reason for admission.

### Life Stress

Hypothesis 4(a), which predicted that life stress would lead to increased imagery, was supported in Study 1. Patients with high negative impact scores, measured by the degree of impact of negative events (Life Experiences Survey) during the year prior to hospitalization, had higher imagery scores on the Modified Imaginal Processes Inventory. The regression coefficient for this relationship was +.46, which is a relatively strong correlation as compared to much of the life stress literature in which correlations with dependent variables tend to be in the +.20 to +.30 range (Johnson & Sarason, 1979). This suggests that the use of negative change scores, as opposed to using both positive and negative changes scores (Holmes & Masuda, 1974), may increase the predictive potential for hospitalized patients. On the other hand, because the relationship between life stress and imagery has had little previous exploration, there are no comparative data using the Holmes and Masuda approach on which to base this conclusion.

Horowitz (1969, 1976) has examined the response to stressful events, as opposed to the life stress research emphasis on the precipitating events themselves. The "stress response syndrome" which Horowitz outlines (1976, p. 56) has the following temporal phasing: outcry, denial, intrusiveness, working through and completion. Horowitz observed that illusions, pseudohallucinations (see Fish, 1967, p. 17) and nightmares occurred in the "intrusive-repetitive phase" which followed the initial denial after a stressful event. Repeated intrusions of thoughts interrupt the numbing denial with re-enactments and ruminations of the event itself. Horowitz has described the recurrence of traumatic perceptions as "unbidden images" (1970, p. 215). This suggests that these images are outside the person's control.

Interview data from Study 1 provide some support for Horowitz' "intrusive-repetitive phase". A number of patients in Study 1 reported that their accident recurred to them in dreams or as vivid images on the wall of their rooms. For some, these experiences were auditory, tactile or kinesthetic as well. They lasted during the initial adjustment period, and some patients related the duration of the experiences to working through some aspect of the accident that was bothering them (e.g., the driver in a motor vehicle accident wondering how he could have done things differently). In these cases, the patients did not feel in control of the imagery and the imagery itself was sometimes upsetting. However, in one instance, a patient had control over the imagery in this initial period and used his ability to image vividly to "go back" to the setting just before the accident "to look around and see what I did wrong". In his detailed description of this process, it was clear that he was able to "look" at the scene critically, from many vantage points, until he was satisfied that he had learned what was necessary to prevent a similar work accident in the future. These anecdotal data suggest that the degree to which images are "unbidden" or out of the person's control will vary across individuals according to coping styles.

The explanation of imagery in Horowitz' framework does not necessarily contradict the earlier physiological explanation of imagery as spontaneous firing in the sensory projection area of the cortex. Trauma could lead to cortical activation, just as environmental stimulation could enhance such activation (Zuckerman, 1969). However, these explanations are at different levels of processing.

The content of the dreams and imagery reported by the nine spinal cord injury patients in the pilot study can also be examined within the formulation by Horowitz. Both memory images (trauma-related) and bizarre imagery (see Richardson, 1969, for classification), were reported by this group. Dreams often tended to be similar to memory imagery in that they were familiar in content, vivid, extremely realistic and the patient was rarely (i.e., only one case) paralyzed in the dream. This finding was similar to other data from paraplegics, the blind and amputees (cited in Bors, 1951). Bors found that the disability does enter the dream for paraplegics over time. One could interpret this absence of disability in the dream as denial according to Horowitz. On the other hand, the idea of injury-triggered memory imagery removes the implication of a maladaptive defense mechanism. Trieschmann (1980) has suggested that professionals may over-estimate the degree of pathology after spinal cord injury and thereby set up a "Catch 22" situation: "If you have a disability, you must have psychological problems; if you state that you have no psychological problems, then this is denial and that is a psychological problem". Paralyzed patients in the pilot study, who were not disabled in their dreams, were often very upset when they awoke. Any denial in dreams, therefore, tended to be offset by heightened awareness on waking.

Hypothesis 4(b) predicted that previous life stress would be predictive of the degree of stress experienced both during and after hospitalization. In this case, stress appears to be both an independent and dependent variable. The rationale for this approach comes from crisis theory (Aguilera & Messick, 1982) which predicts that previous stress has an impact on later psychological outcomes in the stress of a crisis situation.

It was found that, contrary to hypothesis, previous life stress did not predict any of the measures of stress taken while the patient was in hospital. The hospitalization may indeed have provided a respite for patients with prior stress. On the other hand, hypothesis 4(b) was supported on the measure of psychological stress (subscale of the PAIS) taken two months after discharge. That is, patients who had high life stress in the year prior to admission also tended to have high stress, or reduced adjustment, after discharge. This suggests that prior life events with a negative impact tend to decrease the effectiveness of longterm coping after an emergency admission to hospital, even though shortterm adjustment is unaffected. An alternative explanation is that the hospital provided refuge from an otherwise stress-producing environment outside the hospital.

The finding of reduced longterm adjustment (i.e, increased stress) may be explained in terms of personal control. High personal control has been found to be predictive of reduced longterm stress, even though shortterm stress may be increased (Averill, 1973). Here we have the reverse long-term findings. Low personal control, evidenced by prior traumatic life events (negative impact), predicts increased longterm stress, with no effect on shortterm stress.

In sum, as hypothesized, previous life stress predicted imagery during the first eight days of hospitalization in Study 1. The use of negative impact as an indicator of life stress, as opposed to the combination of positive and negative change, was found to be beneficial. Results were examined in relation to Horowitz' formulation of a stress response syndrome, in which traumatic perceptions tend to recur as "unbidden images" during the "intrusive-repetitive phase" prior to working through feelings related to a stressful event. Horowitz, who writes from a psychoanalytical perspective, views trauma as excessive stimulation (Horowitz, 1970).

As predicted, prior life stress leads to reduced post-discharge adjustment, in that patients who had a high incidence of negative impact events in the year before hospitalization tended to report greater distress two months after discharge. Contrary to hypothesis, there was no change in stress during hospitalization in relation to previous life stress. These results were interpreted in terms of an inverse relationship between personal control and stress.

## Other Background Factors

Regression analysis was used to determine the predictive effect of a number of background factors. This approach was included both to provide additional support for hypotheses and explore the possibilities of alternative explanations for data, given the complexity of variables which exist in a hospital context. Where possible confounding variables could not be controlled in the clinical situation, the regression analysis provided a degree of statistical control. The factors examined here were: age and sex (Study 1 and Study 2), accident (Study 1) and employment status (Study 2).

In study 2, none of the demographic variables (sex, age, employment) were significant predictors of dependent variables. However, in Study 1, several predictors emerged.

Age predicted one measure on each of the dependent variables in Study 1. Young patients had higher imagery scores (MIPI), greater stress related to environmental stimulation levels (ESS - subscale II) and had more noncompliance recorded in the chart, as opposed to older patients. These findings lend support to Putnam and Yager's (1978) observations that emotional and behavioural reactions in nine orthopedic patients, or "traction intolerance syndrome" in their terms, occurred exclusively in the 16 - 26 year age range, rather than in the 27 - 45 year range. The present data were coded to match the Putnam and Yager categories, but also included a 46 - 65 year range. These findings show that age predicts imagery, environmental stress and noncompliant behaviour in a larger sample of both orthopedic and surgery patients, rather than traction patients alone. Sex was also a predictor of stress related to environmental stimulation levels in Study 1. On interview, female patients reported greater environmental stress on subscale II. This finding has not appeared in previous literature. No other findings related to sex emerged.

In Study 1, an accident as the reason for hospitalization predicted environmental stress (ESS - total) and two sections within the ESS: subscale I, which related to personal space and privacy; and subscale III, which measured reaction to personal control and response restriction. Just as life stress could be conceptualized as decreased personal control, so could an accident be seen as yet another life event with a negative impact. Therefore, these findings all provide support for hypothesis 5 (to follow) which predicted an inverse relationship between personal control and stress. An accident and life stress events are also unpredictable. Both predictability and control have been related to stress effects (Glass & Singer, 1972).

<u>Personal Control</u>

Hypothesis 5 predicted that high personal control would lead to decreased stress. This inverse relationship was supported on measures of environmental stress, but not on other stress measures taken during or after hospitalization.

In support of this hypothesis, patient reports of subjective helplessness prior to hospitalization (low control) predicted environmental stress scores from the interview (ESS - total) and from subscale II on stress relative to environmental stimulation levels. Confirmation of this finding was provided by the nurse questionnaire assessment of patient behaviour, in which independent patients (high control) reported less environmental stress relative to personal control and response restriction (subscale III).

The finding of an inverse relationship between personal control and environmental stress, coupled with the previous finding that high levels of social stimulation predicted stress, gives support to the notion that personal control mediates crowding effects (Baron & Rodin, 1978). Insofar as a socially stimulating environment can be seen as crowding the fact that personal control does not predict any of the measures of general stress suggests that control, while relevant to environmental stress, does not affect general stress in hospital.

## Conclusion and Clinical Implications

In conclusion, this investigation examined factors related to the psychological outcome after the crisis of an emergency admission to hospital. The independent variables for study included immobility, cognitive reappraisal, environmental stimulation dimensions, life stress and personal control. Outcome variables for both studies of hospitalized patients were imagery, stress and noncompliant behaviour. The model of Moos and Tsu (1977), which proposed factors contributing to the crisis of physical illness, provided a useful framework for the variables of interest here. The data supported the model insofar as significant findings were reported under each of the five categories of hypotheses, which could be adapted to sections of the model.

From a clinical perspective, the findings from the two studies in the present project have implications for patient care on surgery, orthopedic and spinal cord injury units in acute care hospital settings. Although immobility was hypothesized to lead to increased imagery, stress and noncompliant behaviour; both studies supported the relationship with imagery, but not generally with stress or noncompliance. One exception to the latter results was found in Study 1, in which immobile patients did have increased stress related to lack of control options. Otherwise, stress effects were comparable across patient groups in both studies. Patients with extensive paralysis did not have significantly more stress than did those who were slightly paralyzed. However, imagery increased with greater immobility regardless of whether this immobility was external (apparatus) or internal (paralysis) in origin. Most imagery effects occurred during the early hospitalization period, usually during the first week of hospital stay, whereas noncompliance occurred later. Noncompliance and stress were correlated with each other, while unrelated to immobility. However, noncompliant behaviour was more frequent in patients with mild concussion. These patients also tended to have more fractures and, hence, greater immobility. Sleep deprivation was found to correlate with all three outcome variables: imagery, stress and noncompliant behaviour.

These data can assist hospital staff in the prediction of psychological reactions of patients admitted under emergency conditions. In relation to external immobility, the type of immobilizing apparatus (e.g., cervical traction) is more likely to determine imagery effects than duration of immobility. The cognitive reappraisal intervention tested here would be especially important for patients who are most likely to have imagery effects, such as those with cervical fractures with or without accompanying paralysis. All patients in this category could potentially benefit from exposure to this informational intervention as a preventative measure. Even though replication of the intervention effect would be desirable in future research, the present data suggest that providing an expectancy for imagery, a positive set and an environmental explanation can reduce stress without increasing the incidence of imagery. This information could be provided verbally (the tape was for research control only) to patients by nurses during caregiving activities in the early days of hospitalization.

Other interventions could be geared to monitor and improve sleep-wake patterns of patients in general, and to increase control options for immobilized patients in particular. For example, providing choice in matters related to personal care (such as time of bath) would be one way to increase control options. Correlational data also showed that patients with no previous hospital experience had greater environmental stress. This finding suggests the importance of providing a ward orientation to emergency patients in hospital for the first time so that they have some idea of what to expect during their hospital stay. Again, personal control could be increased through expectancy information.

With regard to environmental stimulation, the data show that imagery was predicted by high levels of social stimulation and of nonsocial stimulation over which the patient has little control, such as a radio which belongs to (and is controlled by) the patient in the next bed or across the hall. The high social stimulation was of two types: (1) other-directed which referred to verbalization by two or more people who are in the patient's room, outside the space surrounding the patient, and who do not include the patient in the discussion (social "noise"), and (2) variety which reflected the frequency that different people entered the room.

These data suggest that hospital staff need to monitor and reduce the traffic of people into patient rooms. Secondly, a greater proportion of existing social communication in rooms should be directed personally at each patient in a given room. One way that both of these objectives might be achieved would be through primary nursing in which one nurse is totally responsible for the care of a patient throughout the hospital stay. This would improve the degree of personalization of care and would reduce the number of caretakers. Instead of different nurses administering medications, taking vital signs and assisting with the bath, the same nurse would be responsible for all aspects of care.

Johnson (1976) produced a striking reduction of imagery in spinal cord injury patients through a series of interventions which altered the social and nonsocial hospital environment. The present research supports Johnson's approach to intervention but does not concur with his explanation of the mechanism for the change. Johnson suggests that his approach reduces "sensory deprivation" effects; the present interpretation would be that he has provided more personalized and individualized care which increases control options. For example, Johnson increased the amount of social stimulation through increased contact with other patients, volunteers and staff. Patients were addressed by name and the staff asked for patient permission before providing care. The staff also provided information to patients on spinal cord injuries in general and their own particular condition, treatment and prognosis. Group meetings were organized for patients to discuss their injuries and to support each other. This study, which was conducted in a California hospital, included interventions which were already being done in the two Canadian hospitals where the present project was conducted. For example, patients in both the University Hospital (UH) and Shaughnessy Hospital (SH) were addressed by name. However, other interventions (e.g., the use of volunteers, provision of detailed information and patient support groups) were either done inconsistently or not at all.

Johnson further altered the nonsocial environment by the provision of clocks, watches, eyeglasses, hearing aids and mirrors. With the exception of mirrors, nursing staff at UH and SH generally took steps (prior to the present project) to assure that patients had access to timepieces, sensory aids and other nonsocial stimulation such as pictures on the wall and bulletin boards for personal cards and momentos. The intensive care unit at SH had a multi-colored design on the ceiling. At individual patients' suggestions, nursing staff provided assistance with attaching pictures to leg traction (SH) or to the ceiling (UH). In the latter case, a woman in cervical traction could gaze at a blow-up photograph of her young child rather than the blank ceiling. These incidents were praised by the patients in question and suggest that application of this approach could be increased in future.

The question of mirrors is one that merits further investigation by hospital staff who work with immobile patients. In the early days of the Acute Spinal Cord Injury Unit (ASCIU) at SH, mirrors were attached to patient beds in order to increase the visual stimulation for patients. This practice was discontinued at the request of patients who found that the mirrors accentuated their limited privacy at times such as catheter change or being turned from side to side. Even without mirrors, the issue of privacy is a difficult one for spinal cord injury patients. One patient on the ASCIU suggested that the word privacy had lost all meaning: "privacy no longer exists". It is possible that mirrors could counteract kinesthetic imagery for immobile patients in a manner similar to the effect of going for a walk in the case of mobile patients. In both cases visual and positional inputs would be increased which could counter kinesthetic imagery due to the relationship between visual and vestibular systems. One way that the potential benefit of mirrors could be achieved without interference with privacy could be to design a mirror which had an opaque vizor attached to a device which the patient could control. In this manner, when the patient wanted to see through the mirror vizor could be lifted for vision and when there was a need to avoid intrusive eyes the vizor could be lowered to obstruct the mirror. This device could be adapted for use by quadriplegics who lack hand control by using a control operated by head movement. In the experience of nurses at the ASCIU, some patients are interested in control devices (e.g., head control of television) during the early hospitalization period and others are not. However, the option for a mirror with a vizor could be useful for at least some of the patients.

In the present research, imagery was greater in the presence of nonsocial stimulation over which the patient had low control options.

Both nonsocial noise and social "noise" (other-directed verbalization) also predicted stress. Clinicians could attempt to reduce these effects by such measures as the encouragement of patients to use earphones for their radios and televisions so that other patients will not have the frustration of listening to programs without control over volume, content or time of day for listening. To some degree this approach is already in effect but it is by no means universal.

The imagery-inducing effect of the intensive care environment was found, on subsidiary analysis, to be specific to the complete quadriplegic patients. It was suggested earlier that environmental factors may interact and when sufficient number of factors exist (e.g., complete quadriplegia in intensive care environment) a threshold may be reached so that most, if not all, patients in this group could be expected to have imagery effects. A limitation of this data was that it came exclusively from patient charts which tend to under-represent psychological effects such as imagery. Nevertheless, the interventions suggested in this section could be particularly important for complete, quadriplegics in intensive care who appear to reach this threshold for imagery effect.

From Study 2, the finding that sleep deprivation correlated with imagery (correlation matrices) but did not predict imagery (other than the temperature regulation anomaly) on the stepwise regression analysis suggests that other uncontrolled factors may be operating here. Data were obtained on psychological indices such as hypoxia, infections and other complications but no clear pattern of relationship to imagery emerged. However, again it is possible that physiological complications interact with environmental factors to reach a threshold of imagery effect. Confusion associated with imagery was negligible for the surgery and orthopedic patient groups, whereas it was more frequently noted for spinal cord injury patients. To the extent that these findings could be classified as the early stage of delirium, the data suggest that perceptual changes (imagery) precede cognitive effects such as disorientation. This finding does not fit the classical psychiatric picture of delirium with cognitive changes (clouding of consciousness, disorientation and memory impairment) which may or may not be accompanied by perceptual disturbance such as illusions or hallucinations. Regardless of definition, graphs of these data do not support the effectiveness of psychotropic medication in reducing imagery when it occurs.

Noncompliance was unrelated to environmental variables in Study 2 but was related to low variety of nonsocial stimulation and to high noise levels in Study 1. This suggests that interventions which provide nonsocial stimulation with relevance to the patient (as opposed to noise) may be useful to reduce noncompliance. Occupational therapy could be beneficial in this instance. The hospitals included in the present project did provide occupational therapy for immobile patients. However, this practice could be increased and nursing staff could also provide activities for patients when occupational therapists are not available. Reduction of noise by whatever means possible needs to be a priority as well.

During the first week of hospitalization in Study 2, imagery was directly related to sleep deprivation and to noncompliance. Most of these patients were in the intensive care unit at this time. Further research needs to be done on interventions to promote sleep, especially during the early hospitalization period. Nonoptimal environmental stimulation may be either low stimulation (independent patients in private rooms had greater sleep deprivation) or high stimulation (high levels of noise predicted subjective stress). Other overload factors were predictive of environmental stress: a high degree of variety of nonsocial stimulation and the presence of people who were involved with the environment (e.g., housekeeping) but did not interact with the patient.

In general, these results suggest that stimulus overload is more problematic for the patient groups studied than is restricted stimulation. Clinical application of these findings should take into account both stimulus (overload) factors and response factors, such as the patient's options for control. Personal control measures were inversely related to environmental stress in general as well as to subscales II and III of the Environmental Stress Scale. Subscale II, which measures stress related to environmental stimulation levels, has particular relevance here. The implication of these findings are that interventions which increase personal control should reduce stress triggered by environmental factors.

Life events with a negative impact on the patient during the year prior to admission led to greater imagery during hospitalization and reduced adjustment (i.e., high stress) two months after discharge. This suggests that the initial assessment of emergency patients on admission should include a notation of events in the previous year (e.g., death of a family member) which could complicate adjustment to the current emergency. In both hospitals these events were sometimes brought to the attention of a social worker or other counsellor after a patient became upset. However, the inclusion of "life stress in the previous year" as a heading on the admission form might serve a prevention function to alert staff to potential areas of concern which may impede the recovery process. The finding that younger patients had greater imagery provides an additional cue for staff to predict psychological effects after admission.

In summary, this project has provided data on the effects of immobility, environmental stimulation, previous life stress and personal control on imagery, stress and noncompliant behaviour in emergency-admitted patients. An intervention was tested to demonstrate that cognitive reappraisal of imagery effects had stress-reducing potential. These findings have clinical significance as well as implications for theories of crisis, personal control and an optimal level of stimulation.

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Code ____________

APPENDIX A

Date ____________

Unit ____________

**CONSENT FORM**

I, the undersigned, hereby agree to participate in a research project investigating the psychological effects of hospitalization under emergency conditions. The project is conducted by Norma Stewart, a doctoral student in psychology, under the supervision of Dr. P. Suedfeld, Head of the Psychology Department at the University of British Columbia. This research has been approved by the hospital medical and administrative staff.

I understand that I will be asked to answer questions and to fill out forms concerning my recent experiences before hospitalization and my reactions while in hospital. This procedure will take a total of about two hours of my time over three sessions and will involve no risk. I understand that the researcher will also sit in my room and make observations of the environment over four 15-minute periods on one day. During these observation periods, I understand that I can carry on my activities (e.g. sleeping, eating, talking to others) as if the researcher were not present. I also understand that I may be asked to listen to some tape-recorded material concerning the effects of hospitalization. I understand further that the researcher will review my medical record while I am in hospital. Three months after I am discharged, I understand that I will receive by mail a questionnaire concerning my reactions at that time. This final questionnaire will take about an hour of my time to complete and mail to the investigator.

I understand that my responses will remain confidential and anonymous and that no individuals will be identifiable in the results of this research. I also understand that I am free to discontinue my participation in the study at any time and for any reason. I understand that withdrawal from the study will have no effect whatsoever on my further treatment and care by hospital staff.

Finally, I appreciate that the results of this project may benefit future patients in circumstances similar to mine. To ensure the accuracy of results, I agree not to discuss the research with anyone else while I am in hospital.

APPENDIX A (continued)

Name (print) ______________________________________________

Signed ______________________________________________

On behalf of the project I do hereby agree to abide by the ethical principles in the conduct of research of the American Psychological Association.

______________________________________________

Norma Stewart, R.N., B.S.N., M.S., M.A.

CODE ___________

APPENDIX B.1

DATE ___________

UNIT ___________

## LIFE EXPERIENCES SURVEY

The purpose of this research project is to investigate the psychological effects of hospitalization under emergency conditions. The questionnaire below will provide background information on events you may have experienced during the year before this admission to hospital. These events may bring about changes in the lives of those who experience them.

Instructions: Rate each event that occurred in your life during the past year as **Good** or **Bad** (circle which one applies).

Show how much the event affected your life by circling the appropriate statement (**no effect - some effect - moderate effect - great effect**).

If you have not experienced a particular event in the past year, leave it blank.

Please go through the entire list before you begin to get an idea of the type of events you will be asked to rate. It will probably take you 10-15 minutes to complete the entire form. As I mentioned earlier, you are free to refuse to answer any questions or to withdraw from the project at any time without prejudice to your hospital care. If the questionnaire is completed, it will be assumed that consent has been given.

| EVENT | TYPE OF EVENT | | EFFECT OF EVENT ON YOUR LIFE | | | |
|---|---|---|---|---|---|---|
| 1. Marriage | Good | Bad | no effect | some effect | moderate effect | great effect |
| 2. Detention in jail or comparable institution | Good | Bad | no effect | some effect | moderate effect | great effect |
| 3. Death of spouse | Good | Bad | no effect | some effect | moderate effect | great effect |

| EVENT | TYPE OF EVENT | | EFFECT OF EVENT ON YOUR LIFE | | | |
|---|---|---|---|---|---|---|
| 4. Major change in sleep habits (much more or much less sleep) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 5. Death of close family | | | | | | |
| a. mother | Good | Bad | no effect | some effect | moderate effect | great effect |
| b. father | Good | Bad | no effect | some effect | moderate effect | great effect |
| c. brother | Good | Bad | no effect | some effect | moderate effect | great effect |
| d. sister | Good | Bad | no effect | some effect | moderate effect | great effect |
| e. grandmother | Good | Bad | no effect | some effect | moderate effect | great effect |
| f. grandfather | Good | Bad | no effect | some effect | moderate effect | great effect |
| g. other (specify) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 6. Major change in eating habits (much more or much less food intake). | Good | Bad | no effect | some effect | moderate effect | great effect |
| 7. Foreclosure on mortgage or loan | Good | Bad | no effect | some effect | moderate effect | great effect |
| 8. Death of close friend | Good | Bad | no effect | some effect | moderate effect | great effect |

| EVENT | TYPE OF EVENT | | EFFECT OF EVENT ON YOUR LIFE | | | |
|---|---|---|---|---|---|---|
| 9. Outstanding personal achievement | Good | Bad | no effect | some effect | moderate effect | great effect |
| 10. Minor law violations (traffic tickets, disturbing the peace, etc.) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 11. Male Wife's/girl-friend's pregnancy | Good | Bad | no effect | some effect | moderate effect | great effect |
| 12. Female Pregnancy | Good | Bad | no effect | some effect | moderate effect | great effect |
| 13. Changed work situation (different work respon-sibility, major change in working conditions, working hours, etc.) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 14. New job | Good | Bad | no effect | some effect | moderate effect | great effect |
| 15. Serious illness or injury of close family member | | | | | | |
| a. mother | Good | Bad | no effect | some effect | moderate effect | great effect |
| b. father | Good | Bad | no effect | some effect | moderate effect | great effect |
| c. brother | Good | Bad | no effect | some effect | moderate effect | great effect |
| d. sister | Good | Bad | no effect | some effect | moderate effect | great effect |

| EVENT | TYPE OF EVENT | | EFFECT OF EVENT ON YOUR LIFE | | | |
|---|---|---|---|---|---|---|
| e. grandmother | Good | Bad | no effect | some effect | moderate effect | great effect |
| f. grandfather | Good | Bad | no effect | some effect | moderate effect | great effect |
| g. other (specify) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 16. Sexual difficulties | Good | Bad | no effect | some effect | moderate effect | great effect |
| 17. Trouble with employer (in danger of losing job, being suspended, demoted, etc.) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 18. Trouble with in-laws | Good | Bad | no effect | some effect | moderate effect | great effect |
| 19. Major change in financialstatus (a lot better off or a lot worse off) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 20. Major change in closeness of family members | Good | Bad | no effect | some effect | moderate effect | great effect |
| 21. Gaining a new family member (through birth, adoption, family member moving in, etc.) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 22. Change of residence | Good | Bad | no effect | some effect | moderate effect | great effect |

| EVENT | TYPE OF EVENT | | EFFECT OF EVENT ON YOUR LIFE | | | |
|---|---|---|---|---|---|---|
| 23. Marital separation from mate (due to conflict) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 24. Major change in activities (increased or decreased attendance) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 25. Marital reconciliation with mate | Good | Bad | no effect | some effect | moderate effect | great effect |
| 26. Major change in number of arguments with spouse (a lot more or a lot less) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 27. Married male. Change in wife's work outside the home (beginning work, changing to new job, etc.) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 28. Married female. Change in husband's work (loss of job, beginning new job, retirement, etc.) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 29. Major change in usual type and/or amount of recreation | Good | Bad | no effect | some effect | moderate effect | great effect |
| 30. Borrowing more than $10,000 (buying home, business, etc.) | Good | Bad | no effect | some effect | moderate effect | great effect |

| EVENT | TYPE OF EVENT | | EFFECT OF EVENT ON YOUR LIFE | | | |
|---|---|---|---|---|---|---|
| 31. Borrowing less than $10,000 (buying car, TV, getting school loan, etc.) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 32. Being fired from job | Good | Bad | no effect | some effect | moderate effect | great effect |
| 33. Male Wife/girlfriend having abortion | Good | Bad | no effect | some effect | moderate effect | great effect |
| 34. Female Having abortion | Good | Bad | no effect | some effect | moderate effect | great effect |
| 35. Major personal illness or injury | Good | Bad | no effect | some effect | moderate effect | great effect |
| 36. Major change in social activities, e.g., parties, movies, visiting | Good | Bad | no effect | some effect | moderate effect | great effect |
| 37. Major change in living conditions of family (building new home, remodeling, deterioration of home, neighborhood, etc.) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 38. Divorce | Good | Bad | no effect | some effect | moderate effect | great effect |
| 39. Serious injury or illness of close friend | Good | Bad | no effect | some effect | moderate effect | great effect |

| EVENT | TYPE OF EVENT | | EFFECT OF EVENT ON YOUR LIFE | | | |
|---|---|---|---|---|---|---|
| 40. Retirement from work | Good | Bad | no effect | some effect | moderate effect | great effect |
| 41. Son or daughter leaving home (due to marriage, college, etc.) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 42. Ending of formal schooling | Good | Bad | no effect | some effect | moderate effect | great effect |
| 43. Separation from spouse (due to work, travel, etc.) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 44. Engagement | Good | Bad | no effect | some effect | moderate effect | great effect |
| 45. Breaking up with boyfriend/girlfriend | Good | Bad | no effect | some effect | moderate effect | great effect |
| 46. Leaving home for the first time | Good | Bad | no effect | some effect | moderate effect | great effect |
| 47. Reconciliation with girlfriend/boyfriend | Good | Bad | no effect | some effect | moderate effect | great effect |
| 48. Beginning a new schooling experience at a higher academic level (college, graduate school, professional school, etc.) | Good | Bad | no effect | some effect | moderate effect | great effect |

| EVENT | TYPE OF EVENT | | EFFECT OF EVENT ON YOUR LIFE | | | |
|---|---|---|---|---|---|---|
| 49. Changing to a new school at the same level (undergraduate, graduate, etc.) | Good | Bad | no effect | some effect | moderate effect | great effect |
| 50. Academic probation | Good | Bad | no effect | some effect | moderate effect | great effect |
| 51. Being dismissed from dormitory or other residence | Good | Bad | no effect | some effect | moderate effect | great effect |
| 52. Failing an important exam | Good | Bad | no effect | some effect | moderate effect | great effect |
| 53. Changing a major | Good | Bad | no effect | some effect | moderate effect | great effect |
| 54. Failing a course | Good | Bad | no effect | some effect | moderate effect | great effect |
| 55. Dropping a course | Good | Bad | no effect | some effect | moderate effect | great effect |
| 56. Joining a fraternity/ sorority | Good | Bad | no effect | some effect | moderate effect | great effect |
| 57. Financial problems concerning school (in danger of not having sufficient money to continue) | Good | Bad | no effect | some effect | moderate effect | great effect |

**Other recent experiences which have had an impact on your life.**

**List and Rate.**

| | | | | | | |
|---|---|---|---|---|---|---|
| 58. ________________ | Good | Bad | no effect | some effect | moderate effect | great effect |
| 59. ________________ | Good | Bad | no effect | some effect | moderate effect | great effect |
| 60. ________________ | Good | Bad | no effect | some effect | moderate effect | great effect |

APPENDIX B.2 (a)

Code: ____________

Date: ____________

Unit: ____________

**BEHAVIOUR ASSESSMENT**

The purpose of this study is to investigate the reactions that patients have to hospitalization after an emergency admission. We hope that this research may be useful to improve the hospital experience of future patients.

We are interested in your assessment of ________________'s behaviour today. Your responses will remain confidential and anonymous. If this questionnaire is completed, we will assume that consent has been given. You are free to withdraw from the study or to refuse to answer any questions without prejudice. Completion of this form should only take a couple of minutes of your time.

Instructions: On each of the 7-point scales below, place a check (✓) in the space which represents your assessment of this patient today.

For example, if you found the patient moderately aggressive today, you would place a check as follows:

Nonaggressive :__:__:__:✓:__:__:__: Aggressive

---

Friendly :__:__:__:__:__:__:__: Hostile

Authoritarian :__:__:__:__:__:__:__: Obedient

Cooperative :__:__:__:__:__:__:__: Complies resentfully

Critical :__:__:__:__:__:__:__: Full of praise

(gregarious) Affiliative :__:__:__:__:__:__:__: Disaffiliative (aloof)

Submissive :__:__:__:__:__:__:__: Dominant

APPENDIX B.2 (a) - continued

| | | |
|---|---|---|
| Seeks information | :__:__:__:__:__:__:__: | Does not seek information |
| Attacking | :__:__:__:__:__:__:__: | Supportive |
| Warm | :__:__:__:__:__:__:__: | Cold |
| Noncompliant | :__:__:__:__:__:__:__: | Compliant (obeys instructions) |
| Passive | :__:__:__:__:__:__:__: | Active |
| Trusting | :__:__:__:__:__:__:__: | Distrusting |

APPENDIX B.2 (a) - continued

Code: ____________

Date: ____________

Unit: ____________

**BEHAVIOUR ASSESSMENT (continued)**

The following questionnaire is also concerned with your assessment of this patient's behaviour today. Completion of this form should only take an additional few minutes of your time.

Instructions: Below are ten descriptions of patient behavior. On each of the 5-point scales below the descriptions, rate how well this patient fits the description based on your observation today.

For example, if the description stated "seeks information" and the patient has asked many questions today, you would place a check (✓) as follows:

seeks information

Not at all :__:__:✓:__:__: A great deal

(a moderate amount)

---

1. Seeks recognition, praise and approval

   Not at all :__:__:__:__:__: A great deal

2. Seeks activity; gets satisfaction from work

   Not at all :__:__:__:__:__: A great deal

3. Seeks physical contact

   Not at all :__:__:__:__:__: A great deal

4. Takes initiatives

   Not at all :__:__:__:__:__: A great deal

5. Seeks help (physical and psychological)

Not at all :__:__:__:__:__: A great deal

6. Persistence; trys to carry activities to completion in accordance with physical limitations and ability

Not at all :__:__:__:__:__: A great deal

7. Seeks proximity (nearness)

Not at all :__:__:__:__:__: A great deal

8. Wants to do things by oneself even when these things are beyond physical limitation or ability (tends to ignore or turn down help offered)

Not at all :__:__:__:__:__: A great deal

9. Overcomes obstacles

Not at all :__:__:__:__:__: A great deal

10. Seeks attention

Not at all :__:__:__:__:__: A great deal

Code: __________

APPENDIX B.2 (b)

Date: __________

Unit: __________

## HELPLESSNESS SCALE

For each of the following behaviors or activities, please answer the following question using the scale provided.

Before you came to hospital, to what extent did you feel able to influence or control the initation and outcome of this activity, or to succeed at this activity?

1........2........3........4........5........6........7

Totally able to influence or control these outcomes. — Totally unable to influence or control these outcomes.

---

Please write the number of your response in the space in front of the activity.

1. ______ Meeting people of the same sex
2. ______ Meeting people of the opposite sex
3. ______ Talking to people in one-to-one situations; making small talk
4. ______ Dating or socializing with people
5. ______ Talking or mixing at parties or gatherings
6. ______ Expressing myself (serious talk or important feelings)
7. ______ Completing work effectively, adequately or satisfactorily
8. ______ Getting people to like me, need me or appreciate me
9. ______ Getting signs of affection (hugging, kissing)
10. ______ Getting sexual satisfaction (necking, petting, intercourse)
11. ______ Doing well in school
12. ______ Going out to a restaurant, bar or club, etc.
13. ______ Starting or maintaining a serious love relationship
14. ______ Relaxing or getting peace of mind
15. ______ Doing hobbies or recreational activities
16. ______ Buying things for myself
17. ______ Taking care of or doing things for myself (shower, dress, fix hair)
18. ______ Fixing, getting or buying good meals
19. ______ Getting a good job
20. ______ Having a good relationship with parents or family
21. ______ Avoiding criticism from others or from self
22. ______ Having company or companionship
23. ______ Having enough energy, interest or excitement to do things
24. ______ Starting or maintaining close friendships
25. ______ Avoiding money worries

Code: ____________

APPENDIX B.3

Date: ____________

Unit: ____________

**MODIFIED IMAGINAL PROCESSES INVENTORY**

This research project is concerned with the psychological effects of hospitalization after an emergency admission. On the form below, we are interested in your inner experiences, your images and your daydreams while in hospital. Your reports will help us both to understand the experience of future patients and to provide better care during their hospitalization. You are free to withdraw from the study at any time or to refuse to answer questions without prejudice to your hospital care. If the questionnaire is completed we will assume that consent has been given.

Instructions: For each of the 50 statements below, decide whether it is true or false as it applies to your experience since this admission to hospital. If a statement is TRUE or MOSTLY TRUE, circle the T next to the statement. If a statement is FALSE or MOSTLY FALSE, circle the F. It will take about 10-15 minutes to complete this form.

T F 1. I sometimes seem to be able to hear the characters in my fantasies talking to one another.

T F 2. In my daydreams, the voices of people in my family are criticizing me.

T F 3. I do not really "see" the objects in a daydream.

T F 4. In my daydreams, both visual scenes and sounds are so clear and distinct that I almost have to pinch myself to make sure they are not real.

T F 5. I sometimes dream that I am doing something and then wake to find that I am trying to act out the dream.

T F 6. The people in my daydreams are so true to life, I often believe they are in the same room with me.

T F 7. I can often "see" a large number of things or people in my fantasies.

T F 8. I sometimes feel like my entire bed is tilting to the side.

T F 9. The scenes of my daydreams are never longer than brief flashes.

T F 10. I never feel dizzy as I lie in my bed.

T F 11. The visual images in my daydreams are so vivid I believe that they are actually happening.

T F 12. A piece of music sometimes runs through my head as clearly as if I were listening to it on a transistor radio.

T F 13. I have never experienced a sense of motion sickness while lying in my hospital bed.

T F 14. Voices in my daydreams seem so distinct and clear that I'm almost tempted to answer them.

T F 15. I can hear conversations between myself and other people very clearly in my mind during a daydream.

T F 16. I have found that when I "see" objects in a daydream, they vanish if I move my head.

T F 17. My fantasies often consist of black-and-white or color images.

T F 18. The "scenes" in my daydreams are so vivid and clear to me that my eyes seem actually to follow them.

T F 19. When I do hear voices in my thoughts, they are not really very clear or recognizable.

T F 20. Since my admission to hospital, I have had no more dreams than usual in the "twilight" period between wakefulness and sleep.

T F 21. Some of the voices in my thoughts are threatening or frightening.

T F 22. I can hear music with shades of both softness and loudness in my daydreams.

T F 23. It is hard for me to distinguish my daydreams from what is actually happening in real life.

T F 24. The voices and sounds in my daydreams seem real.

T F 25. I believe I actually see visions of people I know even though it seems impossible for them to be there at the time.

T F 26. My daydreams are usually accompanied by the sounds of the subjects of my daydreams.

T F 27. My daydreams have become more vivid since I have been in hospital.

T F 28. I can still remember scenes from recent daydreams.

T F 29. Sometimes sounds I've heard in the past come into my mind during a daydream as if I could almost hear them again.

T F 30. In a daydream, I can hear a tune almost as clearly as if I were actually listening to it.

T F 31. My daydreams are so clear that I often believe the people in them are in the room.

T F 32. The "scenes" in my daydreams are sort of fuzzy and unclear.

T F 33. As I am falling asleep, my imagination becomes so vivid that it sometimes wakes me up.

T F 34. I sometimes have a very clear, lifelike picture of what I am imagining.

T F 35. In my fantasies, voices of people important in my life are telling me what to do.

T F 36. My daydreams are mostly made up of thoughts and feelings rather than visual images.

T F 37. I have never had the sensation that I am standing on my head in bed.

T F 38. There has been no change in my dreams since I have been in hospital.

T F 39. The voices of people who are important to me sound very clear when I daydream about them.

T F 40. When I feel a sensation of movement while lying in bed, I find that I can "right myself" by looking out the window.

T F 41. I can see the people or things in my daydreams as if they were moving around.

T F 42. During a daydream, voices seem to come in loudly and clearly and then fade away.

T F 43. I have experienced a pull of motion so strong that I wondered whether I was going to fall over the foot of my bed.

T F 44. The sounds I hear in my daydreams are clear and distinct.

T F 45. Visual scenes are an important part of my daydreams.

T F 46. I have not experienced a sensation of movement as I lie in bed.

T F 47. The "pictures in my mind" seem as clear as photographs.

T F 48. I often wake up with a sudden movement of my entire body.

T F 49. When people speak in my daydreams, I cannot really hear their voices.

T F 50. My thoughts seem as real as actual events in my life.

Code: ___________

APPENDIX B.4

Date: ___________

Unit: ___________

## SUBJECTIVE STRESS SCALE

This research is concerned with the psychological effects of hospitalization, particularly after an emergency admission. We are interested in how you feel about this experience in hospital. Below you will find a list of words that describe moods or feelings.

Instructions: Place a check (✓) next to the one word which best describes your feelings today.

Nervous ___________

Comfortable ___________

Fine ___________

Panicky ___________

Scared stiff ___________

Wonderful ___________

Steady ___________

Unsafe ___________

Doesn't bother me ___________

Indifferent ___________

Frightened ___________

Timid ___________

Worried ___________

Unsteady ___________

APPENDIX B.5

**Letter mailed with Psychosocial Adjustment to Illness Scale**

Dear

Thank you so much for agreeing to be part of my research project while you were in hospital. I appreciated our discussions and hope that the results of this study will be beneficial for future patients.

Enclosed is the final questionnaire that I would like you to fill out. It contains questions about the effect that your recent medical problem has had on you. We are interested in knowing what effects it has had on your performance around the house, on your job, as well as on family and personal relationships. Other questions deal with its effects on your social and leisure time activities, and how you have felt psychologically.

In answering each question, please put a check mark in the small box alongside the answer that best describes what your experience has been. Please answer all the questions and try not to skip any. If none of the answers to a question match your experience exactly, please choose the answer that comes closest to what your experience has been.

The time we would like you to report on is the last 30 days, including today. Answer each question in terms of what your experience has been during this time unless the question specifically refers to the time since hospitalization.

We appreciate the time you have given us in doing this form. Please check again to make sure you have completed all the items. If you have any questions about the form, please write them on the back of this letter and send it back with the completed questionnaire in the enclosed return envelope.

Again, thank you for your time and interest. I hope this finds you in good health. When my thesis is finished I will send you a summary of the results of the study.

All the best,

Norma J. Stewart

APPENDIX B.5 (b)

## PSYCHOSOCIAL ADJUSTMENT TO ILLNESS SCALE (PAIS)

### SECTION I. Health Care Orientation

(1) Which of the following statements best describes your usual attitude about taking care of your health?

[ ] a) I am very concerned and pay close attention to my personal health.
[ ] b) Most of the time I pay attention to my health care needs.
[ ] c) Usually, I try to take care of health matters but sometimes I just don't get around to it.
[ ] d) Health care is something that I just don't worry too much about.

(2) Your present medical condition probably requires some special attention and care on your part. Would you please select the statement below that best describes your reaction.

[ ] a) I do things pretty much the way I always have done them and I don't worry or take any special considerations for my medical condition.
[ ] b) I try to do all the things I am supposed to do to take care of myself, but lots of times I forget or I am too tired or busy.
[ ] c) I do a pretty good job taking care of my present medical condition.
[ ] d) I pay close attention to all the needs of my present medical condition and do everything I can to take care of myself.

(3) In general, how do you feel about the quality of medical care available today and the doctors who provide it.

[ ] a) Medical care has never been better, and the doctors who give it are doing an excellent job.
[ ] b) The quality of medical care available is very good, but there are some areas that could stand improvement.
[ ] c) Medical care and doctors are just not of the same quality they once were.
[ ] d) I don't have much faith in doctors and medical care today.

(4) During your recent hospitalization you have received treatment from both doctors and medical staff. How do you feel about them and the treatment you have received from them?

[ ] a) I am very unhappy with the treatment I have received and don't think the staff has done all they could have for me.
[ ] b) I have not been impressed with the treatment I have received, but I think it is probably the best they can do.
[ ] c) The treatment has been pretty good on the whole, although there have been a few problems.
[ ] d) The treatment and the treatment staff have been excellent.

(5) During your recent hospitalization you have received care from nursing staff. How do you feel about the nurses and the care that you have received from them?

[ ] a) I am very unhappy with the care I have received and don't think the nursing staff has done all they could have for me.
[ ] b) I have not been impressed with the care I have received, but I think it is probably the best they can do.
[ ] c) The nursing care has been pretty good on the whole, although there have been a few problems.
[ ] d) The care and the nursing staff have been excellent.

(6) When they have a medical problem, different people expect different things and have different attitudes. Could you please check the statement below which comes closest to describing your feelings.

[ ] a) I am sure that I am going to overcome this medical problem quickly and get back to being my old self.
[ ] b) My medical condition has caused some problems for me, but I feel I will overcome them fairly soon, and get back to the way I was before.
[ ] c) My medical condition has really put a great strain on me, both physically and mentally, but I am trying very hard to overcome it, and feel sure that I will be back to my old self one of these days.
[ ] d) I feel worn out and very weak from my medical condition and there are times when I don't know if I am really ever going to be able to overcome it.

(7) Being a patient can be a confusing experience, and some patients feel that they do not receive enough information and detail from their doctors and the medical staff about their illnesses. Please select a statement below which best describes your feelings about this matter.

[ ] a) My doctor and the medical staff have told me very little about my medical condition even though I have asked more than one.

[ ] b) I do have some information about my medical condition but I feel I would like to know more.

[ ] c) I have a pretty fair understanding about my medical condition and feel that if I want to know more I can always get the information.

[ ] d) I have been given a very complete picture of my medical condition and my doctor and the medical staff have given me all the details I wish to have.

(8) In circumstances such as yours, people have different ideas about their treatment and what to expect from it. Please select one of the statements below which best describes what you expect about your treatment.

[ ] a) I believe my doctors and medical staff are quite able to direct my treatment and feel it is the best treatment I could receive.

[ ] b) I have trust in my doctor's direction of my treatment; however, sometimes I have doubts about it.

[ ] c) I don't like certain parts of my treatment which are very unpleasant but my doctors tell me I should go through it anyway.

[ ] d) In many ways I think my treatment is worse than the illness and I am not sure it is worth going through it.

(9) Patients with a medical condition such as yours are given different amounts of information about their treatment. Please select a statement from those below which best describes information you have been given about your treatment.

[ ] a) I have been told almost nothing about my treatment and feel left out about it.

[ ] b) I have some information about my treatment but not as much as I would like to have.

[ ] c) My information concerning treatment is pretty complete, but there are one or two things I still want to know.

[ ] d) I feel my information concerning treatment is very complete and up-to-date.

(10) Insofar as you were given instructions to follow at home after you were discharged from hospital, how well have you followed these instructions?

[ ] a) I was given no instructions.
[ ] b) I cannot remember the instructions I was given.
[ ] c) I have not followed the instructions given me.
[ ] d) I have followed the instructions as well as possible.

**SECTION II. Vocational Environment**

(11) Has your medical condition interfered with your ability to do your job (schoolwork)?

[ ] a) No problems with my job.
[ ] b) Some problems, but only minor ones.
[ ] c) Some serious problems.
[ ] d) Illness has totally prevented me from doing my job.

(12) How well do you physically perform your job (studies) now?

[ ] a) Poorly.
[ ] b) Not too well.
[ ] c) Adequately.
[ ] d) Very well.

(13) During the past 30 days, have you lost any time at work (school) due to your medical condition?

[ ] a) 3 days or less.
[ ] b) 1 week.
[ ] c) 2 weeks.
[ ] d) More than 2 weeks.

(14) Is your job (school) as important to you now as it was before your hospitalization?

[ ] a) Little or no importance to me now.
[ ] b) A lot less important.
[ ] c) Slightly less important.
[ ] d) Equal or greater importance than before.

(15) Have you had to change your goals concerning your job (education) as a result of your medical condition?

[ ] a) My goals are unchanged.
[ ] b) There has been a slight change in my goals.
[ ] c) My goals have changed quite a bit.
[ ] d) I have changed my goals completely.

(16) Have you noticed any increase in arguments or problems in getting along with your co-workers since your hospitalization?

[ ] a) A great increase in problems.
[ ] b) A moderate increase in problems.
[ ] c) A slight increase in problems.
[ ] d) None.

**SECTION III. Domestic Environment**

(17) How would you describe your relationship with your husband or wife (partner, if not married) since your hospitalization?

[ ] a) Good.
[ ] b) Fair.
[ ] c) Poor.
[ ] d) Very poor.

(18) How would you describe your general relationships with the other people you live with (e.g. children, parents, aunts, etc.)?

[ ] a) Good.
[ ] b) Fair.
[ ] c) Poor.
[ ] d) Very poor.

(19) How much has your medical problem interfered with your work and duties around the house?

[ ] a) Not at all.
[ ] b) Slight problems, easily overcome.
[ ] c) Moderate problems, not all of which can be overcome.
[ ] d) Severe difficulties with household duties.

(20) In those areas where your medical condition has caused problems with your household work how has the family shifted duties to help you out?

[ ] a) The family has not been able to help out at all.
[ ] b) The family has tried to help but many things are left undone.
[ ] c) The family has done well except for a few minor things.
[ ] d) No problems.

(21) Has your medical condition resulted in a decrease in communication between you and members of your family?

[ ] a) No decrease in communication.
[ ] b) A slight decrease in communication.
[ ] c) Communication has decreased and I feel somewhat withdrawn from them.
[ ] d) Communication has decreased a lot and I feel very alone.

(22) Some people with a medical condition like yours feel they need help from other people (friends, neighbors, family, etc.) to get things done from day-to-day. Do you feel you need such help and is there anyone to provide it?

[ ] a) I really need help but seldom is anyone around to help.
[ ] b) I get some help, but I can't count on it all the time.
[ ] c) I don't get all the help I need all of the time, but most of the time help is there when I need it.
[ ] d) I don't feel I need such help, or the help I need is available from my family or friends.

(23) How much physical disability have you experienced?

[ ] a) No physical disability.
[ ] b) A slight physical disability.
[ ] c) A moderate physical disability.
[ ] d) A severe physical disability.

(24) A medical problem such as yours can sometimes cause a drain on the family's finances; are you having any difficulties meeting the financial demands of your condition?

[ ] a) Severe financial hardship.
[ ] b) Moderate financial problems.
[ ] c) A slight financial strain.
[ ] d) No money problems.

## SECTION IV. Sexual Relationships

(25) Sometimes having a medical problem can cause problems in a relationship. Has your illness led to any problems with your husband or wife (partner, if not married)?

[ ] a) There has been no change in our relationship.
[ ] b) We are a little less close since my illness.
[ ] c) We are definitely less close since my illness.
[ ] d) We have had serious problems or a break in our relationship since my illness.

(26) Sometimes when people have a medical condition they report a loss of interest in sexual activities. Have you experienced less sexual interest since your illness?

[ ] a) Absolutely no sexual interest since illness.
[ ] b) A marked loss of sexual interest.
[ ] c) A slight loss of sexual interest.
[ ] d) No loss of sexual interest.

(27) A medical condition sometimes causes a decrease in sexual activity. Have you experienced any decrease in the frequency of your sexual activities?

[ ] a) No decrease in sexual activities.
[ ] b) Slight decrease in sexual activities.
[ ] c) Marked decrease in sexual activities.
[ ] d) Sexual activities have stopped.

(28) Has there been any change in the pleasure or satisfaction you normally experience from sex?

[ ] a) Sexual pleasure and satisfaction have stopped.
[ ] b) A marked loss of sexual pleasure or satisfaction.
[ ] c) A slight loss of sexual pleasure or satisfaction.
[ ] d) No change in sexual satisfaction.

(29) Sometimes a medical condition will cause an interference in a person's ability to perform sexual activities even though they are still interested in sex. Has this happened to you, and if so, to what degree?

[ ] a) No change in my ability to have sex.
[ ] b) Slight problems with sexual performance.
[ ] c) Constant sexual performance problems.
[ ] d) Totally unable to perform sexually.

(30) Sometimes a medical problem will interfere with a couple's normal sexual relationship and cause arguments or problems between them. Have you and your partner had any arguments like this, and if so, to what degree?

[ ] a) Constant arguments.
[ ] b) Frequent arguments.
[ ] c) Some arguments.
[ ] d) No arguments.

**SECTION V. Extended Family Relationships**

(31) Have you had as much contact (either personally or by telephone) with members of your family outside your household since your hospitalization?

[ ] a) Contact is the same or greater since illness.
[ ] b) Contact is slightly less.
[ ] c) Contact is markedly less.
[ ] d) No contact since illness.

(32) Have you remained as interested in getting together with these members of your family since your hospitalization?

[ ] a) Little or no interest in getting together with them.
[ ] b) Interest is a lot less than before.
[ ] c) Interest is slightly less than before.
[ ] d) Interest is the same as before.

(33) Sometimes, when people have a medical condition they are forced to depend on those members of the family outside their household for help. Do you need help from them, and do they supply the help you need?

[ ] a) I need no help or they give me all the help I need.
[ ] b) Their help is enough, except for some minor things.
[ ] c) They give me some help, but not nearly enough.
[ ] d) They give me little or no help even though I need a great deal.

(34) In general, how have you been getting along with these members of your family recently?

[ ] a) Good.
[ ] b) Fair.
[ ] c) Poor.
[ ] d) Very poor.

**SECTION VI. Social Environment**

(35) Are you still as interested in your leisure time activities and hobbies as you were prior to your hospitalization? (e.g., watching T.V., sewing, bicycling, etc.)

[ ] a) Same level of interest as previously.
[ ] b) Slightly less interest than before.
[ ] c) Significantly less interest than before.
[ ] d) Little or no interest remaining.

(36) How about actual participation? Are you still actively involved in doing those activities?

[ ] a) Little or no participation at present.
[ ] b) Participation reduced significantly.
[ ] c) Participation reduced slightly.
[ ] d) Participation remains unchanged.

(37) Are you as interested in leisure time activities with your family (e.g., playing cards and games, taking trips, going swimming, etc.) as you were prior to your hospitalization?

[ ] a) Same level of interest as previously.
[ ] b) Slightly less interest than before.
[ ] c) Significantly less interest than before.
[ ] d) Little or no interest remaining.

(38) Do you still participate in those activities to the same degree you once did?

[ ] a) Little or no participation at present.
[ ] b) Participation reduced significantly.
[ ] c) Participation reduced slightly.
[ ] d) Participation remains unchanged.

(39) Have you maintained your interest in social activities since your hospitalization? (e.g., social clubs, church groups, going to the movies, etc.).

[ ] a) Same level of interest as previously.
[ ] b) Slightly less interest than before.
[ ] c) Significantly less interest than before.
[ ] d) Little or no interest remaining.

(40) How about participation? Do you still go out with your friends and do those things?

[ ] a) Little or no participation at present.
[ ] b) Participation reduced significantly.
[ ] c) Participation reduced slightly.
[ ] d) Participation remains unchanged.

**SECTION VII. Psychological Distress**

(41) Recently, have you felt afraid, tense, nervous, or anxious?

[ ] a) Not at all.
[ ] b) A little bit.
[ ] c) Quite a bit.
[ ] d) Extremely.

(42) Recently, have you felt sad, depressed, lost interest in things, or felt hopeless?

[ ] a) Extremely.
[ ] b) Quite a bit.
[ ] c) A little bit.
[ ] d) Not at all.

(43) Recently, have you felt angry, irritable, or had difficulty controlling your temper?

[ ] a) Not at all.
[ ] b) A little bit.
[ ] c) Quite a bit.
[ ] d) Extremely.

(44) Recently, have you blamed yourself for things, felt guilty, or felt like you have let people down?

[ ] a) Extremely.
[ ] b) Quite a bit.
[ ] c) A little bit.
[ ] d) Not at all.

(45) Recently, have you worried much about your medical condition or other matters?

[ ] a) Not at all.
[ ] b) A little bit.
[ ] c) Quite a bit.
[ ] d) Extremely.

(46) Recently, have been feeling down on yourself or less valuable as a person?

[ ] a) Extremely.
[ ] b) Quite a bit.
[ ] c) A little bit.
[ ] d) Not at all.

(47) Recently, have you been concerned that your medical condition has caused changes in your appearance that make you less attractive?

[ ] a) Not at all.
[ ] b) A little bit.
[ ] c) Quite a bit.
[ ] d) Extremely.

APPENDIX C.1

CODE ____________
DATE ____________
TIME ____________
UNIT ____________

**NONPARTICIPANT OBSERVATION OF SOCIAL AND NONSOCIAL ENVIRONMENT IN PATIENT'S ROOM**

- 15 minute observations at four time periods throughout one day of hospital stay.
- Check if type of stimulation occurred once (or more) during each one-minute interval.

---

Minutes

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PATIENT AWARENESS | | | | | | | | | | | | | | | |

People in room – other patients ☐
– staff, visitors ☐

NONSOCIAL STIMULATION

Minutes

| | 1 | 2 | 3 | 4 | 5 | Score |
|---|---|---|---|---|---|---|
| 1. Variety | | | | | | |
| 2. Responsiveness | | | | | | |
| 3. Complexity | | | | | | |
| a) Visual | | | | | | |
| b) Auditory | | | | | | |
| c) Tactile | | | | | | |
| d) Olfactory | | | | | | |
| e) Gustatory | | | | | | |
| f) Kinesthetic | | | | | | |
| 4. Noise | | | | | | |
| a) inside room | | | | | | |
| b) outside room | | | | | | |

APPENDIX C.1 (continued)

SOCIAL STIMULATION

| | Minutes | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 1. Frequency and Variety | | | | | | | | | | |
| a) Inside patient space | | | | | | | | | | |
| b) Outside space | | | | | | | | | | |
| 2. Type of caretaker/other behavior | | | | | | | | | | |
| a) Verbalization to patient | | | | | | | | | | |
| b) Nonverbal (sit by patient) | | | | | | | | | | |
| c) Treatment/care to patient | | | | | | | | | | |
| d) Other - directed | | | | | | | | | | |
| e) Directed at physical environment | | | | | | | | | | |
| 3. Contingency responses | | | | | | | | | | |
| a) Eye contact | | | | | | | | | | |
| b) Verbalization | | | | | | | | | | |
| c) Assistance | | | | | | | | | | |
| 4. Modality of stimulation | | | | | | | | | | |
| a) Visual | | | | | | | | | | |
| b) Auditory | | | | | | | | | | |
| c) Tactile | | | | | | | | | | |
| d) Kinesthetic | | | | | | | | | | |

Reg. # __________

Code # __________

Ward __________

Doctor __________

APPENDIX C.2 (a)

[i] University Hospital

## DEMOGRAPHIC DATA

Age -

Marital status -

Sex -

Family -

Address -

Occupation -

Education -

Date of emergency -

Location of emergency -

Type -

Date of admission -

Days in hospital -

Days flat in bed -

Diagnosis -

Surgery -

Complications -

Apparatus (days for each) -

Moves within hospital -

Relevant history -

Prognosis at discharge -

Data incomplete at discharge -

Reg. # __________

Code # __________

APPENDIX C.2 (a)

[ii] Shaughnessy Hospital

## DEMOGRAPHIC DATA

Age - Sex - Marital status -

Home - Family -

Occupation - Education -

Date of emergency - Type -

Date of admission - Days in hospital -

Diagnosis - Para (level) Quad (high/low) - Complete

Incomplete

Other fractures/injuries

Complications -

Surgery -

Apparatus -

Level of function at discharge -

Discharge plan -

APPENDIX C.2 (b)

CODE # ____________

| MEDICATIONS | | | DATES | | | |
|---|---|---|---|---|---|---|
| NAME | DOSE & MODE | FREQUENCY | FROM | TO | REACTIONS | RATIONALE FOR ADMIN. OR DISCONTINUTION |
| | | | | | | |
| | | | | | | |
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APPENDIX C.2 (c)

[i] University Hospital

CODE #          DATE

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DAY IN HOSPITAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SHIFT | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| * PRN MEDS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MOBILITY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PROCEDURES | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

NOTES:

* PRN medications (e.g., analgesics) are given within specified time periods as the patient needs them.

APPENDIX C.2 (c)

[ii] Shaughnessy Hospital

CODE # DATE

| DAY IN HOSPITAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SHIFT | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| DREAMS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Visual Imagery: Auditory, Kinesthetic, Tactile, Temperature, Anomaly | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Stress: Reaction to imagery, General | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Non-Compliance: Anger, Interference with care | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Room Changes: Mobility, Procedures | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cognition (e.g., confusion, sleep deprivation) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Complications (e.g., $PO_2$ below 60; elevated temperature) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| PRN MEDICATIONS (given as needed) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

APPENDIX D

CODE ____________

DATE ____________

## ENVIRONMENTAL STRESS SCALE

### SECTION I of ESS - Personal Space and Privacy

1. Do you prefer a private room, a room with one room-mate, or a room with more than one room-mate?

   [ ] 0 = private
   [ ] 1 = one room-mate
   [ ] 2 = 2-3 room-mates (e.g., 4-bed ward)
   [ ] 3 = more than 3 room-mates (e.g., 20-bed ward)

2. In your present room, how much privacy do you have?

   [ ] 0 = a great deal
   [ ] 1 = a moderate amount
   [ ] 2 = a small amount
   [ ] 3 = none

3. How do you feel about this?

   [ ] 0 = positive
   [ ] 1 = neutral
   [ ] 2 = somewhat negative
   [ ] 3 = extremely negative

4. Do you expect either more or less privacy in hospital?

   [ ] 0 = more
   [ ] 1 = less
   [ ] 2 = no expectations
   [ ] 3 = expectations met

5. Are there places in this room that you consider "your space?"

   [ ] 0 = none
   [ ] 1 = the bed
   [ ] 2 = bed and immediate surroundings (e.g., locker, overbed table)
   [ ] 3 = entire room

6. Do other people consider this "your space" as well?

[ ] 0 = all of the time
[ ] 1 = most of the time
[ ] 2 = some of the time
[ ] 3 = none of the time

7. Do the staff and other patients ask your permission to enter your bed area (or room) when the curtains (or door) are closed?

[ ] 0 = all of the time
[ ] 1 = most of the time
[ ] 2 = some of the time
[ ] 3 = none of the time

8. If not, how do you react to this?

[ ] 0 = positive
[ ] 1 = neutral
[ ] 2 = somewhat negative
[ ] 3 = extremely negative

9. Do people ever move your belongings around here in your hospital room?

[ ] 0 = all of the time
[ ] 1 = most of the time
[ ] 2 = some of the time
[ ] 3 = none of the time

10. How do you feel about this?

[ ] 0 = positive
[ ] 1 = neutral
[ ] 2 = somewhat negative
[ ] 3 = extremely negative

11. Would you expect either more or less space to call your own in hospital?

[ ] 0 = more
[ ] 1 = less
[ ] 2 = no expectations
[ ] 3 = expectations met

12. Do you ever feel crowded here?

[ ] 0 = all of the time
[ ] 1 = most of the time
[ ] 2 = some of the time
[ ] 3 = none of the time

13. If so, is this because of the number of people or the physical aspects of the room (e.g. size, furniture, equipment)?

[ ] 0 = people
[ ] 1 = physical aspects (elaborate)

**Section II of ESS - <u>Environmental stimulation levels</u>**

14. How many visitors from outside the hospital do you have on an average day?

[ ] 0 = none
[ ] 1 = one
[ ] 2 = two to four
[ ] 3 = five or more

15. Do you find this number of visitors satisfactory?

[ ] 0 = too many
[ ] 1 = just about right
[ ] 2 = would like a few more
[ ] 3 = would like many more

16. Does the amount of time you spend with visitors meet your expectations?

[ ] 0 = yes
[ ] 1 = no, I expected less
[ ] 2 = no, I expected somewhat more
[ ] 3 = no, I expected much more

17. How do you pass your time otherwise here?

[ ] 0 = T.V., radio, tapes, read (visual/auditory)
[ ] 1 = write, handiwork, crafts (manual)
[ ] 2 = thought, reflection
[ ] 3 = talk with other patients, staff, visitors

18. How much time did you spend yesterday with these activities overall?

[ ] 0 = under 2 hours
[ ] 1 = two to five hours
[ ] 2 = five to ten hours
[ ] 3 = over ten hours

19. Do you have enough to do in hospital?

[ ] 0 = yes
[ ] 1 = no (elaborate: not enough/too much)

20. Do you ever feel bored here in hospital?

[ ] 0 = all the time
[ ] 1 = often
[ ] 2 = occasionally
[ ] 3 = not at all

21. The routines or procedures on this ward may require movement of people and equipment in and out of your room. In general, how much activity of this sort happens in your room during the day?

[ ] 0 = a great deal
[ ] 1 = a moderate amount
[ ] 2 = very little
[ ] 3 = extremely variable

22. How do you feel about this?

[ ] 0 = positive
[ ] 1 = neutral
[ ] 2 = somewhat negative
[ ] 3 = extremely negative

23. Does this differ, in any way, from what you expected to happen here?

[ ] 0 = no
[ ] 1 = yes, I expected more activity
[ ] 2 = yes, I expected less activity
[ ] 3 = no expectations

24. Do you ever feel isolated here?

[ ] 0 = all of the time
[ ] 1 = most of the time
[ ] 2 = some of the time
[ ] 3 = none of the time

25. If so, do you feel this way because you are separate from your family and friends or because of the hospital situation itself (e.g., nobody to talk to here)?

[ ] 0 = separation
[ ] 1 = hospital situation
[ ] 2 = other (elaborate)

26. How many times have you been in hospital before this admission?

[ ] 0 = none
[ ] 1 = one or two
[ ] 2 = three or four
[ ] 3 = five or more

27. Have you ever been admitted as an emergency before?

[ ] 0 = yes
[ ] 1 = no

**Section III of ESS - <u>Personal Control and Response Restriction</u>**

28. Do the staff on this ward identify themselves to you?

[ ] 0 = all of the time
[ ] 1 = most of the time
[ ] 2 = some of the time
[ ] 3 = none of the time

29. Do they explain their role in your care?

[ ] 0 = all of the time
[ ] 1 = most of the time
[ ] 2 = some of the time
[ ] 3 = none of the time

30. How much do you know about the nature of your injury (or illness) and its treatment?

[ ] 0 = a substantial amount
[ ] 1 = a moderate amount
[ ] 2 = a small amount (Rate ambiguity, if possible)
[ ] 3 = no knowledge at all

31. Do you ask many questions of your doctor during a visit?

[ ] 0 = asks many (5 or more) questions
[ ] 1 = asks several (3-4) questions
[ ] 2 = asks one or two questions
[ ] 3 = none at all

32. During the day, do you ask many questions of the nurses about your condition or your care?

[ ] 0 = asks many (5 or more) questions
[ ] 1 = asks several (3-4) questions
[ ] 2 = asks one or two questions
[ ] 3 = none at all

33. Are you satisfied with the answers that you get?

[ ] 0 = extremely satisfied
[ ] 1 = moderately satisfied
[ ] 2 = slightly satisfied
[ ] 3 = not at all satisfied

34. If not, with whom are you dissatisfied?

[ ] 0 = self
[ ] 1 = doctors only
[ ] 2 = nurses only
[ ] 3 = doctors and nurses

35. Do the staff seem to be willing to spend as much time speaking to you as <u>you</u> think is necessary?

[ ] 0 = yes
[ ] 1 = no, feels somewhat neglected
[ ] 2 = no, feels moderately neglected
[ ] 3 = no, feels extremely neglected

36. Do the staff speak in language you can understand?

[ ] 0 = all of the time
[ ] 1 = most of the time
[ ] 2 = some of the time (If not, give examples)
[ ] 3 = none of the time

37. What caused your accident (illness)?

[ ] 0 = sees self as cause
[ ] 1 = sees other people as cause
[ ] 2 = sees physical environment as cause
[ ] 3 = sees luck or chance as cause

38. When somebody becomes ill or has an accident he/she often thinks, "If only I hadn't done such and such I would have avoided this." Have you had any thoughts like this?

[ ] 0 = yes
[ ] 1 = no

39. Do you think you could have avoided becoming ill (the accident)?

[ ] 0 = could easily have avoided
[ ] 1 = probably could have avoided
[ ] 2 = little could have been done to avoid
[ ] 3 = nothing could have been done to avoid

40. How do you feel about being in bed in hospital?

[ ] 0 = positive (e.g., chance for a rest)
[ ] 1 = neutral
[ ] 2 = somewhat negative (e.g., tied down)
[ ] 3 = extremely negative

41. Have any positive consequences resulted from your hospitalization?

[ ] 0 = many things have changed for the better
[ ] 1 = a few things have improved somewhat
[ ] 2 = one or two minor things have improved
[ ] 3 = none at all

42. How do you wake up in the morning here in hospital?

[ ] 0 = nurses wake me up (vital signs, breakfast)
[ ] 1 = other patients wake me up
[ ] 2 = wake up due to discomfort
[ ] 3 = wake up as I do at home

43. In general, do you see yourself or other people in control of <u>when</u> you do things here (e.g., bath, go to sleep, have visitors)?

[ ] 0 = self
[ ] 1 = other people

44. Are you satisfied or unsatisfied with this?

[ ] 0 = satisfied
[ ] 1 = unsatisfied

45. Do you see yourself or other people in control of what you do here (e.g., what you wear, what you do to pass the time)?

[ ] 0 = self
[ ] 1 = other people

46. How do you feel about this?

[ ] 0 = positive
[ ] 1 = neutral (as expected)
[ ] 2 = somewhat negative
[ ] 3 = extremely negative

47. In general, when you use your call light (bell), how quickly do you get help?

[ ] 0 = almost immediately (under 5 minutes)
[ ] 1 = 5-10 minutes
[ ] 2 = 10-15 minutes
[ ] 3 = too long, so that I have to use other means to get help (e.g. call out, contact other patient)

48. How do you feel about this?

[ ] 0 = positive
[ ] 1 = neutral
[ ] 2 = somewhat negative
[ ] 3 = extremely negative

49. Do you ever expect assistance more quickly than you receive it?

[ ] 0 = no, I get assistance as quickly as I expect it
[ ] 1 = no, when delay I know the staff are busy
[ ] 2 = yes, occasionally
[ ] 3 = yes, frequently

50. Some medications, such as sleeping pills and pain killers, may be given on request as you need them. When you ask for medication, do you receive it?

[ ] 0 = never requests medication
[ ] 1 = always receives it when the proper time has passed
[ ] 2 = always receives it but may be much delayed
[ ] 3 = sometimes does not receive it at all

51. How do you feel about this?

[ ] 0 = positive
[ ] 1 = neutral
[ ] 2 = somewhat negative
[ ] 3 = extremely negative

52. Have you ever received medication that you didn't want since your admission to this Unit?

[ ] 0 = yes
[ ] 1 = no

53. If yes, did you tell the nurses that you didn't want the medication?

[ ] 0 = yes
[ ] 1 = no

54. Have the nurses ever withheld medication on your request?

[ ] 0 = yes
[ ] 1 = no

55. Do you discuss your medications with your doctor or other staff?

[ ] 0 = yes, doctors and nurses
[ ] 1 = yes, doctors only
[ ] 2 = yes, nurses only
[ ] 3 = no

56. Are medications dealt with on this ward as you would expect?

[ ] 0 = yes
[ ] 1 = no

57. In general, how do you feel about the routines and procedures on this Unit?

[ ] 0 = positive
[ ] 1 = neutral
[ ] 2 = somewhat negative
[ ] 3 = extremely negative

58. Have you ever broken any of the regulations on this Unit?

[ ] 0 = yes
[ ] 1 = probably
[ ] 2 = not to my knowledge
[ ] 3 = no

**Section IV of ESS - Imagery and Dreams**

59. Since you have been in hospital, do you sleep as well as you usually do?

[ ] 0 = better than usual
[ ] 1 = no change
[ ] 2 = somewhat worse
[ ] 3 = much worse

60. Have your dreams changed in any way?

[ ] 0 = yes
[ ] 1 = no

61. If yes, in what way have they changed?

[ ] 0 = less frequent
[ ] 1 = more frequent
[ ] 2 = more vivid
[ ] 3 = dreams about different things than at home (e.g., accident)

62. If yes, how do you account for any change in your sleep or dreams?

[ ] 0 = no explanation
[ ] 1 = concern with injury/illness (self-concern)
[ ] 2 = hospital environment
[ ] 3 = external concerns (e.g., family, job)

63. If yes, how do you feel about this change?

[ ] 0 = positive
[ ] 1 = neutral
[ ] 2 = somewhat negative
[ ] 3 = extremely negative

64. Have your daydreams changed in any way?

[ ] 0 = yes
[ ] 1 = no

65. If yes, in what way have they changed?

[ ] 0 = less frequent
[ ] 1 = more frequent
[ ] 2 = more vivid
[ ] 3 = daydream about different things than at home

66. If yes, how do you account for this change?

[ ] 0 = no explanation
[ ] 1 = concern with injury/illness (self-concern)
[ ] 2 = hospital environment
[ ] 3 = external concerns
[ ] 4 = other

67. If yes, how do you feel about this change?

[ ] 0 = positive
[ ] 1 = neutral
[ ] 2 = somewhat negative
[ ] 3 = extremely negative

68. Since you have been here in hospital, have you had any unusual or peculiar sensations or experiences of any kind?

[ ] 0 = yes
[ ] 1 = no

69. If yes, would you tell me about this?

[ ] 0 = vivid dreams
[ ] 1 = visual imagery
[ ] 2 = auditory imagery
[ ] 3 = kinesthetic imagery

70. What time of day did it happen?

[ ] 0 = morning
[ ] 1 = afternoon
[ ] 2 = evening
[ ] 3 = night

71. How long did it last?

[ ] 0 = seconds
[ ] 1 = minutes
[ ] 2 = hours
[ ] 3 = days

72. Did this happen more than once?

[ ] 0 = no
[ ] 1 = yes, 2-3 times
[ ] 2 = yes, 3-10 times
[ ] 3 = yes, over 10 times

73. Do you remember how many days you had been in hospital when you Had this experience (these experiences)?

[ ] 0 = first 48 hours
[ ] 1 = day 3 or 4
[ ] 2 = day 5 to 7
[ ] 3 = more than a week after admission

74. Did you tell anyone about the experienced?

[ ] 0 = yes, the doctors
[ ] 1 = yes, the nurses
[ ] 2 = yes, my family or friends
[ ] 3 = no

75. If not, why didn't you tell anyone about it?

[ ] 0 = staff busy
[ ] 1 = fear or anxiety
[ ] 2 = dealt with it myself, thought it would pass
[ ] 3 = other

76. If yes, what was done about it?

[ ] 0 = nothing
[ ] 1 = someone talked with me
[ ] 2 = explanation given
[ ] 3 = medication given

77. How did you feel about this experience?

[ ] 0 = positive
[ ] 1 = neutral
[ ] 2 = somewhat negative
[ ] 3 = extremely negative

78. How did you explain this experience to yourself at the time?

[ ] 0 = no explanation
[ ] 1 = external attribution
[ ] 2 = internal attribution

79. The reason I have been asking you these questions is that sometimes people who have to spend time in bed in the hospital <u>do</u> have thoughts, feelings, and experiences which they wonder about; for example, they see things, such as objects or patterns, and wonder if they are real.

Has anything like this happened to you (other than what you have already told me)?

80. Sometimes people who have to spend time in bed in hospital hear sounds and wonder if they are real. Has anything like this happened to you?

81. Some people tell us, after they have spent time in bed in hospital, that they feel a sensation of movement of themselves or of some part of their room. Have you had any sensations like this?

82. Have you ever wakened to find that, while half asleep, you were doing something that was against the instructions given to you by the medical or nursing staff?

83. Do you have any other comments about your experience since you've been here in hospital?

APPENDIX E

## COGNITIVE INTERVENTION

The intervention used for Study I will be a 3-minute cassette recording of information aimed to provide:

(1) An expectancy for imagery and vivid dreams while in hospital.

(2) A positive set.

(3) An environmental explanation for these effects.

Verbal instructions to patient:

This cassette recording was made by a nurse who has had experience with many patients in circumstances similar to your own. She tells of some of the possible effects of hospitalization, particularly with the sudden changes of environment following an emergency admission to hospital.

(Places cassette in recorder). All I want you to do is to listen and think about your own experiences in hospital. The tape will only take a few minutes and then I will be available to answer any questions you might have. (Play recorded material). Do you have any questions or comments?

Transcript of tape:

Because you were admitted to hospital on an emergency basis, you have probably had very little time to prepare yourself for becoming a patient in hospital. The purpose of this recording is to tell you about certain experiences that you may have while you are here. We have found that it is often helpful to know in advance what to expect while in hospital. That is not to say that the experiences discussed here will necessarily happen to you. On the other hand, you may have already had such experiences since your admission to hospital and this will give you an opportunity to talk about them, if you wish, after you have listened to this tape.

The experiences I am referring to are sensations such as vivid dreams, daydreams, and changes in perception of one's immediate environment. Some people find that they do not sleep as well in hospital as they do at home. This is quite understandable given the change from familiar home surroundings to the relative unfamiliarity of hospital. People who must stay in bed for a time in hospital often tell us they they notice a change in their dreams. For some this means that their dreams are more frequent or that they experience the same dream over and over again, such as a dream about the accident which led to hospitalization. Other patients tell us that occasionally their dreams become so vivid that it is hard to tell them from reality. These vivid dreams may occur at night, while half-asleep, or during the day as part of daydreams. For example, some people will think that they hear sounds, such as music playing, but realize that the sounds are not real. Other people have visual experiences, such as seeing geometric designs or scenes of the countryside, and realize that they are not real even though these sensations may be as vivid as real life. Still others tell us of experiencing apparent movement either of themselves in their beds or of objects such as pictures on the wall of their rooms.

Whether or not you have had any of these experiences, it is important to realize that these are perfectly normal reactions which happen to some people as they adjust to being in hospital. These experiences tend to last for a short time and generally do not happen again after the person is discharged from hospital. The reason that vivid dreams and daydreams occur during hospitalization may be due to the change in environment from home to hospital, the reduction of physical activity, lack of sleep, the side effects of a drug, or the shock of an accident or other emergency situation. Dreams and daydreams may indeed have a useful purpose in helping one to adjust to a new situation.

If you happen to experience vivid dreams or daydreams while in hospital try to respond in as positive a way as possible. These experiences need not be unpleasant; in fact they may be quite enjoyable. If you do find these experiences unpleasant, on the other hand, it is no reflection on you. Just remember that these effects will be short-lived and that they are a normal part of the adjustment to the hospital environment.

# APPENDIX F.1 (SUBJECT CHARACTERISTICS)

STUDY 1 (N = 48): UNIVERSITY HOSPITAL

## GROUP 1 - IMMOBILE / INTERVENTION (n = 12)

| CODE | AGE | SEX | OCCUPATION | RESIDENCE | PROBLEM | IMMOBILIZATION |
|---|---|---|---|---|---|---|
| 01 | 30 | M | Mechanic (6) | Urban | Fractured ribs, humerus, femur | Steinman pin and traction; Cast (arm) |
| 02 | 44 | M | Farmer (3) | Rural | Fractured lumbar (L3) vertebra | Bedrest |
| 03 | 21 | M | Mineworker (6) | Urban | Fractured thoracic (T12) vertebra | Bedrest |
| 04 | 29 | F | Homemaker (7) | Rural | Compound fracture of tibia & fibula | External fixator leg |
| 05 | 18 | M | Construction worker (6) | Rural | Fractured femur | Thomas splint and traction |
| 06 | 17 | M | Student (7) | Rural | Fractured femur | Steinman pin and traction |
| 07 | 20 | F | Clerk (4) | Rural | Fractured cervical (C1, C6) vertebrae | Halo traction |
| 08 | 47 | M | Farmer (3) | Rural | Fractured femur | Traction |
| 09 | 61 | F | Store manager (2) | Rural | Fractured pelvis | Bedrest |
| 10 | 31 | M | Labourer (6) | Rural | Fractured lumbar (L3-4) vertebrae | Bedrest |

OCCUPATION KEY:
(1) professionals, executives
(2) business managers - semi-professionals
(3) farm owners, small business
(4) clerical and salespeople
(5) skilled manual employees
(6) semi-skilled
(7) unskilled

**GROUP 1 - continued**

| CODE | AGE | SEX | OCCUPATION | RESIDENCE | PROBLEM | IMMOBILIZATION |
|---|---|---|---|---|---|---|
| 11 | 18 | M | Clerk (4) | Rural | Fractured cervical (C6) vertebra | Halo traction |
| 12 | 22 | F | Nurse (2) | Rural | Dislocated hip<br>Fractured clavicle | Boot traction |

**APPENDIX F.1 (SUBJECT CHARACTERISTICS) (Continued)**

STUDY 1 (N = 48): UNIVERSITY HOSPITAL

**GROUP 2: IMMOBILE / NO INTERVENTION - (n = 12)**

| CODE | AGE | SEX | OCCUPATION | RESIDENCE | PROBLEM | IMMOBILIZATION |
|---|---|---|---|---|---|---|
| 13 | 25 | M | Foreman (3) | Rural | Fractured lumbar vertebra (L3) | Body cast |
| 14 | 20 | M | Pipeline worker (6) | Rural | Fractured thoracic vertebra (T12) | Bedrest |
| 15 | 25 | M | Steelworker (6) | Rural | Fractured cervical vertebra (C1) | Bodycast |
| 16 | 25 | M | Farmer (6) | Rural | Compound fracture of tibia & fibula | Balkan Frame |
| 17 | 21 | M | Labourer (6) | Urban | Fractured cervical (C2) & thoracic (T4) vertebrae | Halo traction |
| 18 | 20 | M | Labourer (6) | Urban | Fractured femur and radius | Steinman pin and traction; Cast (arm) |
| 19 | 40 | M | Contractor (3) | Rural | Fractured femur | Steinman pin and traction |
| 20 | 43 | M | Mechanic (5) | Urban | Fractured pelvis ankle | Pelvic and traction |
| 21 | 46 | F | Office nurse (2) | Rural | Back injury (Lumbar 5 - Sacral 1) | Gravity traction |
| 22 | 16 | M | Student (7) | Urban | Fractured thoracic (T7-9) vertebrae | Bedrest |
| 23 | 17 | M | Student (7) | Urban | Fractured femur | Steinman pin and traction |
| 24 | 19 | M | Unemployed (7) | Rural | Fractures of cervical (C5) vertebra, clavicle, femur and foot | Cervical traction (tongs); Femoral traction |

**APPENDIX F.1 (SUBJECT CHARACTERISTICS) (Continued)**

STUDY 1 (N = 48): UNIVERSITY HOSPITAL

**GROUP 3: MOBILE / INTERVENTION - (n = 12)**

| CODE | AGE | SEX | OCCUPATION | RESIDENCE | PROBLEM | IMMOBILIZATION |
|---|---|---|---|---|---|---|
| 25 | 48 | M | Self-employed in Machine shop (3) | Rural | Gastrointestinal bleeding | ------ |
| 26 | 54 | M | Truck Driver (5) | Rural | Multiple injuries | ------ |
| 27 | 21 | M | Farmer (6) | Urban | Laceration of liver Retroperitoneal hematoma | ------ |
| 28 | 30 | F | Receptionist (4) | Rural | Acute abdomen (gall stones) | ------ |
| 29 | 54 | F | Homemaker (7) | Urban | Infected leg cellulitis | ------ |
| 30 | 38 | F | Bookkeeper (4) | Rural | Gall stones | ------ |
| 31 | 52 | F | Salesperson (4) | Urban | Acute abdomen (gall stones) | ------ |
| 32 | 27 | F | Babysitter (7) | Rural | Acute abdomen (gall stones) | ------ |
| 33 | 31 | M | Physician (1) | Urban | Perforated gastric ulcer | ------ |
| 34 | 31 | F | Manager (3) | Rural | Nonfunctioning kidney | ------ |
| 35 | 18 | M | Labourer (6) | Urban | Fractured radius | ------ |
| 36 | 57 | F | Homemaker (7) | Urban | Fractured ribs | ------ |

**APPENDIX F.1 (SUBJECT CHARACTERISTICS) (Continued)**

STUDY 1 (N = 48): UNIVERSITY HOSPITAL

**GROUP 4: MOBILE / NO INTERVENTION**

| CODE | AGE | SEX | OCCUPATION | RESIDENCE | PROBLEM | IMMOBILIZATION |
|---|---|---|---|---|---|---|
| 37 | 44 | M | Electrical contractor (3) | Rural | Bowel obstruction | ------ |
| 38 | 25 | F | Homemaker (7) | Rural | Bowel obstruction | ------- |
| 39 | 65 | F | Homemaker (7) | Rural | Fractured femur (head) | ------- |
| 40 | 18 | F | Student (7) | Rural | Abdominal hemmorhage Fractured thoracic (T12) vertebra | ------- |
| 41 | 47 | M | Newspaper editor and owner (2) | Rural | Acute abdomen (gall stones) | ------ |
| 42 | 39 | M | Architect (1) | Urban | Gastroenteritis Hiatus hernia | ------ |
| 43 | 64 | M | Farmer (3) | Rural | Perforated gall bladder | ------ |
| 44 | 54 | F | Homemaker (7) | Urban | Fractured clavicle, ribs and pelvis | ------ |
| 45 | 46 | F | Homemaker (7) | Rural | Paraesophageal hernia | ------ |
| 46 | 33 | F | Homemaker (7) | Rural | Ruptured spleen | ------ |
| 47 | 42 | M | Supervisor (3) | Rural | Foreign body in small bowel | ------ |
| 48 | 44 | M | Teacher (2) | Urban | Fractured ribs and clavicle | ------ |

## APPENDIX F.2 (SUBJECT CHARACTERISTICS)

## STUDY 2 (N = 50): SHAUGHNESSY HOSPITAL

Group 1 - Complete Quadriplegics (n = 12)

| CODE | AGE | SEX | TYPE OF ACCIDENT | LEVEL OF INJURY | IMMOBILIZING APPARATUS |
|---|---|---|---|---|---|
| 01 | 33 | M | Fall | C6 | Tongs |
| 02 | 23 | M | MVA | C5-6 | Tongs |
| 03 | 16 | F | MVA | C6 | Tongs |
| 04 | 41 | M | Fall | C4-5 | Tongs |
| 05 | 49 | M | Fall | C4 | Tongs |
| 06 | 34 | M | Diving | C5-6 | Halo Ring |
| 07 | 43 | M | MVA | C6 | Tongs |
| 08 | 27 | M | MVA | C6 | Tongs |
| 09 | 17 | M | Diving | C6 | Halo Ring |
| 10 | 21 | M | Fall | C5 | Tongs |
| 11 | 18 | M | MVA | C6 | Tongs |
| 12 | 30 | M | MVA | C6-7 | Tongs |

Note. MVA = motor vehicle accident
C6 = 6th cervical vertebra.

**APPENDIX F.2 (Continuted)**

**STUDY 2 (N = 50): SHAUGHNESSY HOSPITAL**

Group 2 - Incomplete Quadriplegics (n = 12)

| CODE | AGE | SEX | TYPE OF ACCIDENT | LEVEL OF INJURY | IMMOBILIZING APPARATUS |
|---|---|---|---|---|---|
| 13 | 28 | M | MVA | C4-5 | Halo Ring |
| 14 | 15 | M | Fall | C4-5 | Tongs |
| 15 | 50 | M | MVA | C7 | Tongs |
| 16 | 27 | M | MVA | C6-7, T1 | Tongs |
| 17 | 45 | F | Hit by car | C6-7 | Tongs |
| 18 | 49 | M | Logging | C5 | Bedrest |
| 19 | 23 | M | Diving | C5-6 | Bedrest |
| 20 | 19 | F | MVA | C6 | Tongs |
| 21 | 37 | M | Fall | C6 | Tongs |
| 22 | 40 | M | MVA | C4 | Tongs |
| 23 | 29 | M | MVA | C6 | Halo Ring |
| 24 | 48 | M | Fall | C5 | Tongs |

_Note_. T1 = 1st thoracic vertebra.

## APPENDIX F.2 (Continuted)

## STUDY 2 (N = 50): SHAUGHNESSY HOSPITAL

Group 3 - Complete Paraplegics (n = 18)

| CODE | AGE | SEX | TYPE OF ACCIDENT | LEVEL OF INJURY | IMMOBILIZING APPARATUS |
|---|---|---|---|---|---|
| 25 | 29 | M | MVA | L1 | Stryker Frame |
| 26 | 25 | M | Fall | T10 | Bedrest |
| 27 | 26 | M | MVA | T6 | Bedrest |
| 28 | 34 | M | Hit by car | T6 | Stryker Frame |
| 29 | 19 | M | MVA | T12 | Stryker Frame |
| 30 | 22 | F | MVA | T12-L1 | Bedrest |
| 31 | 20 | M | Logging | T12-L1 | Stryker Frame |
| 32 | 52 | M | Fall | T12 | Stryker Frame |
| 33 | 21 | M | MVA | T12-L1 | Bedrest |
| 34 | 48 | F | MVA | T9 | Stryker Frame |
| 35 | 24 | M | MVA | T8 | Stryker Frame |
| 36 | 23 | M | MVA | T8 | Stryker Frame |
| 37 | 52 | M | MVA | T8 | Stryker Frame |
| 38 | 20 | M | MVA | T8 | Stryker Frame |
| 39 | 34 | M | Hit at work | L3-4 | Stryker Frame |
| 40 | 18 | M | Fall | T6-8 | Stryker Frame |
| 41 | 38 | M | Fall | T11-12 | Stryker Frame |
| 42 | 18 | M | MVA | T12 | Stryker Frame |

<u>Note</u>. L1 = 1st lumbar vertebra.

## APPENDIX F.2 (continued)

## STUDY 2 (N = 50): SHAUGHNESSY HOSPITAL

### Group 4 - Incomplete Paraplegics (n = 8)

| CODE | AGE | SEX | TYPE OF ACCIDENT | LEVEL OF INJURY | IMMOBILIZING APPARATUS |
|---|---|---|---|---|---|
| 43 | 23 | M | Hit by tree | L1-T12 | Stryker Frame |
| 44 | 35 | M | Fall | T12-L1 | Stryker Frame |
| 45 | 23 | M | Fall | L2 | Stryker Frame |
| 46 | 42 | M | Fall | T12 | Stryker Frame |
| 47 | 16 | F | MVA | T8-9 | Stryker Frame |
| 48 | 20 | M | MVA | L2 | Stryker Frame |
| 49 | 29 | M | Helicopter crash | T12-L1 | Stryker Frame |
| 50 | 23 | F | Parachute accident | T11-12 | Stryker Frame |

## APPENDIX F.3 (SUBJECT CHARACTERISTICS)

SHAUGHNESSY HOSPITAL: ADDITIONAL GROUP (N = 19)

IMAGERY DATA (MIPI) FOR MULTIVARIATE ANALYSIS OF VARIANCE

| CODE | AGE | SEX | TYPE OF ACCIDENT | LEVEL OF INJURY | IMMOBILIZING APPARATUS |
|---|---|---|---|---|---|
| 01 | 17 | M | Diving | Complete Quadriplegic (C5) | Tongs |
| 02 | 29 | M | Hit by tree | Complete Quadriplegic (C4-5) | Tongs |
| 03 | 33 | M | Fall | Complete Quadriplegic (C3-4) | Tongs |
| 04 | 13 | F | Fall | Complete Quadriplegic (C4) | Tongs |
| 05 | 18 | M | MVA | Complete Quadriplegic (C6) | Tongs |
| 06 | 19 | M | MVA | Complete Quadriplegic (C5-6) | Tongs |
| 07 | 20 | M | MVA | Incomplete Quadriplegic (C2-3) Complete Paraplegic (T9) | Tongs |
| 08 | 19 | M | MVA | Incomplete Quadriplegic (C7) | Tongs |
| 09 | 23 | M | MVA | Incomplete Quadriplegic (C6-7) | Tongs |
| 10 | 19 | M | MVA | Incomplete Quadriplegic (C4-5) | Tongs |
| 11 | 24 | M | MVA | Incomplete Quadriplegic (C7) | Tongs |

## APPENDIX F.3 (Continued)

SHAUGHNESSY HOSPITAL: ADDITIONAL GROUP (N = 19)

IMAGERY DATA (MIPI) FOR MULTIVARIATE ANALYSIS OF VARIANCE

| CODE | AGE | SEX | TYPE OF ACCIDENT | LEVEL OF INJURY | IMMOBILIZING APPARATUS |
|---|---|---|---|---|---|
| 12 | 25 | M | MVA | Complete Paraplegic (L1) | Stryker Frame |
| 13 | 20 | M | Hit by scaffold | Complete Paraplegic (T12) | Stryker Frame |
| 14 | 24 | M | MVA | Incomplete Paraplegic (L4) | Stryker Frame |
| 15 | 26 | M | MVA | Incomplete Paraplegic (T10) | Stryker Frame |
| 16 | 27 | M | Hit by tree | Incomplete Paraplegic (T8) | Stryker Frame |
| 17 | 39 | M | MVA | Incomplete Paraplegic (T12-L1) | Stryker Frame |
| 18 | 18 | M | MVA | Incomplete Paraplegic (L1) | Stryker Frame |
| 19 | 17 | F | Hit tree (toboggan) | Incomplete Paraplegic (T12-L1) | Stryker Frame |

# APPENDIX G.1

## UNIVERSITY HOSPITAL STUDY

## RELIABILITY DATA ON PERSONAL CONTROL

## AFFILIATION-DOMINANCE SCALE AND DEPENDENCE-INDEPENDENCE SCALE

ITEM-SUBSCALE CORRELATIONS

| AFFILIATION | DOMINANCE |
|---|---|
| A1 = .83 | D1 = .59 |
| A2 = .74 | D2 = .53 |
| A3 = .51 | D3 = .55 |
| A4 = .83 | D4 = .13 |
| A5 = .83 | D5 = .36 |
| A6 = .77 | D6 = .04 |
| Subscale alpha = .91 | Subscale alpha = .61 |

| DEPENDENCE | INDEPENDENCE |
|---|---|
| DEP1 = .54 | IND1 = .65 |
| DEP2 = .58 | IND2 = .64 |
| DEP3 = .44 | IND3 = .60 |
| DEP4 = .70 | IND4 = .25 |
| DEP5 = .50 | IND5 = .81 |
| Subscale alpha = .78 | Subscale alpha = .80 |

_Note_. N = 88 for each subscale.

## APPENDIX G.1 (Continued)

RELIABILITY DATA ON PERSONAL CONTROL

| ITEM - SCALE CORRELATIONS | |
|---|---|
| AFFILIATION - DOMINANCE | DEPENDENCE - INDEPENDENCE |
| A1 = .83 | DEP1 = .51 |
| A2 = .72 | DEP2 = .56 |
| A3 = .34 | DEP3 = .26 |
| A4 = .74 | DEP4 = .56 |
| A5 = .79 | DEP5 = .11 |
| A6 = .71 | IND1 = .33 |
| D1 = .72 | IND2 = .48 |
| D2 = .78 | IND3 = .53 |
| D3 = .50 | IND4 = .24 |
| D4 = -.08 | IND5 = .48 |
| D5 = .62 | Scale alpha = .74 |
| D6 = -.21 | |
| Scale alpha = .85 | |

## APPENDIX G.2

### UNIVERSITY HOSPITAL STUDY

### ANALYSIS OF VARIANCE FOR NONCOMPLIANT BEHAVIOUR SCORES

| | | PATIENT RECORDS | | SELF REPORT (ESS) | |
|---|---|---|---|---|---|
| SOURCE | df | MS | F | MS | F |
| IM | 1 | .52 | < 1 | .02 | < 1 |
| CI | 1 | 1.69 | 2.35 | .02 | < 1 |
| IM X CI | 1 | .02 | < 1 | .27 | 2.62 |
| ERROR | 44 | .72 | | .10 | |

*Note*. All of the above results were NS.

## APPENDIX G.3

UNIVERSITY HOSPITAL STUDY

INTERCORRELATION MATRIX OF EXPECTANCY VS REACTION SCORES

(ENVIRONMENTAL STRESS SCALE)

| | PH | R1 | E1 | R2 | E2 | R3 | E3 | RT | ET |
|---|---|---|---|---|---|---|---|---|---|
| PH | — | | | | | | | | |
| R1 | -.08 | — | | | | | | | |
| E1 | .13 | .32** | — | | | | | | |
| R2 | -.36** | .24* | -.08 | — | | | | | |
| E2 | -.07 | .11 | .12 | .21 | — | | | | |
| R3 | -.26* | .44** | .15 | .33* | .23 | — | | | |
| E3 | -.21 | .27* | .26* | .20 | .16 | .72*** | — | | |
| RT | -.29 | .56*** | .08 | .63*** | .29* | .67*** | .49*** | — | |
| ET | -.03 | .36** | .78*** | .12 | .51*** | .47*** | .67*** | .35** | — |

KEY:

PH = Previous Hospitalizations
R = Reactions
E = Expectations
1, 2, 3 = Sections of Environmental Stress Scale
T = Total

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

## APPENDIX G.4

STEPWISE REGRESSION ANALYSIS: DIMENSIONS OF STIMULATION AS PREDICTORS OF STRESS (SSS)

| PREDICTOR | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
|---|---|---|---|
| NONSOCIAL NOISE (NSN) | +.37 | .14 | 7.35 |
| OTHER-DIRECTED SOCIAL (ODII) | +.27 | .07 | 4.10 |
| PREDICTORS COMBINED | | .21 | |

*Note*. None of the ten stimulation level variables predicted the measures of:
1) Distress from the patient record.
2) Sleep deprivation from the interview.

[b]Multiple R: Step 1 = .37; Step 2 = .46.

# APPENDIX G.5

## UNIVERSITY HOSPITAL STUDY

## STEPWISE REGRESSION ANALYSIS: DIMENSIONS OF STIMULATION AS PREDICTORS OF THE ENVIRONMENTAL STRESS SCALE (ESS)

| PREDICTOR | SUBSCALE I: PERSONAL SPACE AND PRIVACY | | |
|---|---|---|---|
| | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
| Nonsocial Variety (NSV) | + .31 | .10 | 4.74 |

[b]Multiple R = .31

| PREDICTOR | SUBSCALE IV: IMAGERY AND DREAMS | | |
|---|---|---|---|
| | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
| Social - Directed at the Physical Environment (DPEII) | + .33 | .11 | 5.53 |

Note. None of the stimulation predictors entered the equation for Subscales II and III or for the total ESS.

[b]Multiple R = .33

## APPENDIX G.6 (a)

## INTERCORRELATION MATRIX: DIMENSIONS OF STIMULATION AND DEPENDENT VARIABLES (Study 1)

| | VNS | RNS | CNS | NRN | SVI | PD | IIV | IIOD | IIDPR | COMPS | MIPI | SSS | NCPC | FIDD | DPGR | SLEEP | RONE | TWO | THREE | FOUR | TOTAL | NCB | NCC | DIS | PAIS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VNS | — | | | | | | | | | | | | | | | | | | | | | | | | |
| RNS | [a].56 | — | | | | | | | | | | | | | | | | | | | | | | | |
| CNS | [a].70 | [a].53 | — | | | | | | | | | | | | | | | | | | | | | | |
| NSN | -.10 | .03 | .13 | — | | | | | | | | | | | | | | | | | | | | | |
| SVI | -.01 | -.13 | [c].34 | -.15 | — | | | | | | | | | | | | | | | | | | | | |
| PD | .01 | -.17 | .24 | -.12 | [a].69 | — | | | | | | | | | | | | | | | | | | | |
| IIV | .06 | .10 | .05 | .01 | .11 | -.06 | — | | | | | | | | | | | | | | | | | | |
| IIOD | .13 | .14 | .07 | .01 | -.01 | -.10 | [a].81 | — | | | | | | | | | | | | | | | | | |
| IIDPR | -.06 | -.06 | .15 | [c].30 | .13 | .06 | [a].61 | [a].62 | — | | | | | | | | | | | | | | | | |
| COMPS | .12 | -.09 | .21 | -.04 | [a].55 | [a].76 | [b].39 | [b].41 | [a].48 | — | | | | | | | | | | | | | | | |
| MIPI | .02 | -.22 | .08 | -.13 | .21 | .10 | .14 | [b].40 | .13 | .21 | — | | | | | | | | | | | | | | |
| SSS | -.05 | .23 | .10 | [b].37 | .04 | -.08 | .15 | .27 | .26 | .12 | .16 | — | | | | | | | | | | | | | |
| NCIC | -.23 | -.21 | -.17 | .04 | -.03 | -.19 | -.22 | -.17 | -.09 | [c]-.28 | .21 | .02 | — | | | | | | | | | | | | |
| FIDD | .11 | -.07 | .08 | .01 | -.03 | -.13 | .11 | .18 | -.07 | -.10 | [a].49 | -.05 | .01 | — | | | | | | | | | | | |
| DPG | .15 | .01 | .09 | .01 | -.09 | -.18 | .18 | .17 | -.09 | -.10 | [b].38 | -.07 | -.01 | [a].94 | — | | | | | | | | | | |
| SLEEP | .21 | .15 | .15 | -.05 | .02 | .10 | -.11 | -.22 | -.16 | -.03 | -.11 | -.05 | [c]-.34 | .00 | .08 | — | | | | | | | | | |
| RONE | [c].28 | .11 | .18 | -.01 | -.00 | .07 | .02 | .02 | -.09 | .00 | .01 | .06 | .08 | -.06 | -.07 | .14 | — | | | | | | | | |
| TWO | .04 | .06 | -.01 | .11 | .05 | -.02 | -.06 | -.02 | -.09 | -.07 | .19 | [c].34 | -.09 | .07 | -.01 | .23 | .19 | — | | | | | | | |
| THREE | -.11 | -.23 | -.16 | .01 | -.04 | -.09 | -.25 | -.15 | -.23 | -.10 | .25 | .02 | [b].39 | .11 | .05 | .11 | [b].37 | [c].31 | — | | | | | | |
| FOUR | .01 | .12 | .02 | -.01 | .02 | -.14 | .13 | .17 | .25 | .01 | -.20 | -.09 | .00 | -.23 | -.19 | -.18 | .02 | -.18 | -.17 | — | | | | | |
| TOTAL | .01 | -.09 | -.03 | .01 | .11 | .03 | .02 | .07 | -.01 | .05 | [c].28 | .18 | .01 | .03 | -.03 | [c].28 | [a].60 | [a].61 | [a].65 | -.18 | — | | | | |
| NCB | [c]-.29 | -.10 | -.23 | .13 | -.12 | -.07 | -.13 | -.13 | -.18 | -.11 | -.09 | -.02 | -.11 | -.13 | -.16 | -.02 | -.20 | -.09 | -.05 | -.14 | -.10 | — | | | |
| NCC | -.09 | -.03 | .05 | [c].30 | .01 | .10 | -.04 | .03 | .27 | .09 | .22 | [c].30 | .26 | -.04 | -.09 | -.21 | [c].30 | .16 | .26 | -.13 | .21 | .01 | — | | |
| DIS | -.15 | -.18 | -.13 | .17 | -.09 | -.21 | -.15 | -.13 | -.14 | -.21 | .23 | .06 | [a].64 | .19 | .24 | -.18 | -.05 | -.18 | [c].28 | -.18 | -.09 | -.19 | .24 | — | |
| PAIS | .00 | -.25 | -.11 | -.16 | -.12 | .12 | -.03 | .08 | -.24 | .12 | [c].34 | -.08 | -.01 | [c].30 | .27 | .13 | .05 | .13 | [b].38 | -.25 | .26 | .23 | .13 | -.02 | — |

a = $p < .001$ b = $p < .01$ c = $p < .05$



Note. Variable key on p. 274.

# APPENDIX G.6 (b)

## KEY TO VARIABLES FOR APPENDIX G.6 (a)

## INTERCORRELATION MATRIX: DIMENSIONS OF STIMULATION AND DEPENDENT VARIABLES

| | |
|---|---|
| VNS | Variety nonsocial |
| RNS | Responsiveness nonsocial |
| CNS | Complexity nonsocial |
| NSN | Nonsocial noise |
| SVI | Social variety (inside patient space) |
| PD | Patient directed |
| IIV | Social variety II (outside patient space) |
| IIOD | Other directed II (outside patient space) |
| IIDPE | Directed at physical environment II (outside patient space) |
| COMPS | Complexity |
| MIPI | Modified Imaginal Process Inventory |
| SSS | Subjective Stress Scale |
| NCPC | Noncompliant behaviour (personal control questionnaire) |
| FIDD | Frequency (dreams and daydreams) |
| IMAG | Frequency of imagery |
| SLEEP | Sleep deprivation |
| RONE | Subscale I: Environmental Stress Scale |
| TWO | Subscale II: Environmental Stress Scale |
| THREE | Subscale III: Environmental Stress Scale |
| FOUR | Subscale IV: Environmental Stress Scale |
| TOTAL | Total: Environmental Stress Scale (ESS) |
| NCB | Noncompliant behaviour (ESS) |
| NCC | Noncompliance in the chart |
| DIS | Distress in the chart |
| PAIS | Psychosocial Adjustment to Illness Scale |

# APPENDIX G.7

UNIVERSITY HOSPITAL STUDY

STEPWISE REGRESSION ANALYSIS: 10 GENERAL PREDICTORS OF NONCOMPLIANCE

(PATIENT CHART)

| PREDICTOR | STANDARDIZED REGRESSION COEFFICIENT | INCREMENT IN MULTIPLE $R^2$ | F-TO-ENTER |
|---|---|---|---|
| Age | -.33 | .11 | 4.02 |

[b]Multiple R = .33

## APPENDIX G.8 (a)

## INTERCORRELATION MATRIX: GENERAL PREDICTORS AND DEPENDENT VARIABLES (Study 1)

| | LES | HELP | DEP | INDEP | AGE | SEX | PROOM | ACCID | SURG | TRAC | MIPI | SSS | DIS | NCB | NAC | RONE | TWO | THREE | FOUR | TOTAL | SLEEP | PAIS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LES | — | | | | | | | | | | | | | | | | | | | | | |
| HELP | -.04 | — | | | | | | | | | | | | | | | | | | | | |
| DEP | .09 | [b]-.38 | — | | | | | | | | | | | | | | | | | | | |
| INDEP | [b]-.35 | -.05 | .16 | — | | | | | | | | | | | | | | | | | | |
| AGE | [b]-.29 | .20 | -.07 | .21 | — | | | | | | | | | | | | | | | | | |
| SEX | -.03 | -.03 | .03 | .23 | [b].37 | — | | | | | | | | | | | | | | | | |
| PROOM | -.04 | .02 | -.08 | .13 | [b].40 | .24 | — | | | | | | | | | | | | | | | |
| ACCID | .15 | [c]-.29 | .43 | .01 | [b]-.38 | -.17 | -.34 | — | | | | | | | | | | | | | | |
| SURG | -.22 | -.12 | -.14 | .17 | -.11 | -.01 | -.08 | -.13 | — | | | | | | | | | | | | | |
| TRAC | .02 | -.17 | [a].57 | .15 | [b]-.46 | [c]-.28 | [c]-.33 | [a].50 | -.27 | — | | | | | | | | | | | | |
| MIPI | [a].56 | -.08 | .16 | -.22 | [b]-.45 | -.24 | -.12 | [b].36 | -.06 | .09 | — | | | | | | | | | | | |
| SSS | -.04 | .19 | .01 | -.23 | .07 | -.06 | -.05 | -.14 | -.18 | -.01 | .18 | — | | | | | | | | | | |
| DIS | -.10 | -.18 | .09 | [a]-.49 | [c]-.30 | -.24 | -.27 | .19 | -.15 | .07 | [c].29 | .17 | — | | | | | | | | | |
| NCB | .07 | .16 | -.11 | .08 | .22 | -.03 | .07 | .03 | .08 | .02 | -.19 | -.10 | -.25 | — | | | | | | | | |
| NAC | .01 | -.03 | .13 | -.25 | [c]-.33 | [c]-.32 | [c]-.29 | [c].29 | [c].29 | .08 | [c].32 | .18 | [b].41 | -.26 | — | | | | | | | |
| RONE | -.12 | .00 | .03 | .04 | -.17 | -.06 | -.13 | [b].40 | .14 | .19 | -.10 | -.07 | .03 | -.03 | [c].35 | — | | | | | | |
| TWO | [c].28 | .23 | .13 | .15 | [b]-.45 | .09 | [c]-.30 | .22 | -.10 | [b].36 | .26 | .19 | -.12 | -.08 | .22 | .27 | — | | | | | |
| THREE | [c].33 | .01 | .26 | [c]-.28 | [a]-.49 | -.07 | [b]-.38 | [a].61 | -.19 | [b].42 | [c].30 | -.15 | [b].41 | -.04 | .24 | [b].41 | [c].35 | — | | | | |
| FOUR | .23 | .23 | .05 | -.04 | -.06 | .15 | .01 | .22 | -.27 | .14 | .26 | .24 | -.16 | .10 | -.08 | .06 | [b].37 | .17 | — | | | |
| TOTAL | .27 | .19 | .16 | -.06 | [b]-.36 | .06 | -.23 | [a].52 | -.20 | [b].37 | .27 | .11 | .02 | .01 | .21 | [a].59 | [a].67 | [a].65 | [a].74 | — | | |
| SLEEP | [c]-.31 | .17 | .17 | [b].44 | .08 | .11 | .26 | .13 | -.01 | [b].37 | -.20 | -.10 | -.19 | .09 | -.14 | .08 | .27 | .10 | [c].30 | [c].29 | — | |
| PAIS | [b].46 | .17 | .10 | -.25 | -.05 | .09 | -.03 | .26 | .19 | -.01 | [c].34 | -.08 | -.02 | .23 | .18 | .03 | .13 | [b].41 | .15 | .25 | .13 | — |

a = $p < .001$ b = $p < .01$ c = $p < .05$

_Note_. Variable key on p. 277.

## APPENDIX G.8 (b)

## KEY TO VARIABLES FOR APPENDIX G.8 (a)

## INTERCORRELATION MATRIX: GENERAL PREDICTORS AND DEPENDENT VARIABLES

| | |
|---|---|
| LES | Life Experiences Survey |
| HELP | Subjective Helplessness Scale |
| DEP | Dependence scale |
| INDEP | Independence scale |
| AGE | Age |
| SEX | Sex |
| PROOM | Room (private vs. other) |
| ACCID | Accident |
| SURG | Surgery |
| TRAC | Traction (cervical vs. other) |
| MIPI | Modified Imaginal Process Inventory |
| SSS | Subjective Stress Scale |
| DIS | Distress (chart) |
| NCB | Noncompliant behaviour (interview) |
| NAC | Noncompliant behaviour (chart) |
| RONE | Subscale I: Environmental Stress Scale |
| TWO | Subscale II: Environmental Stress Scale |
| THREE | Subscale III: Environmental Stress Scale |
| FOUR | Subscale IV: Environmental Stress Scale |
| TOTAL | Total: Environmental Stress Scale |
| SLEEP | Sleep deprivation (interview) |
| PAIS | Psychosocial Adjustment to Illness Scale |

# APPENDIX G.9

## SHAUGHNESSY HOSPITAL STUDY

## ANALYSIS OF VARIANCE OF SIMPLE EFFECTS (IMAGERY)

FACTORS: L = Level ($L_1$ = paraplegic; $L_2$ = quadriplegic)
D = Degree ($D_1$ = incomplete; $D_2$ = complete)
E = Environment ($E_1$ = intensive care; $E_2$ = ward)

| Source | df | MS | F |
|---|---|---|---|
| D for $L_1$ | 1 | .81 | < 1 |
| D for $L_2$ | 1 | 172.24 | 18.60** |
| L for $D_1$ | 1 | .66 | < 1 |
| L for $D_2$ | 1 | 170.02 | 18.36** |
| Error (between) | 45 | 9.26 | |
| E for $L_1$ | 1 | .15 | < 1 |
| E for $L_2$ | 1 | 183.10 | 26.61** |
| E for $D_1$ | 1 | .42 | < 1 |
| E for $D_2$ | 1 | 175.82 | 25.56** |
| E for $L_1D_1$ | 1 | .59 | < 1 |
| E for $L_1D_2$ | 1 | 1.74 | < 1 |
| E for $L_2D_1$ | 1 | 2.82 | < 1 |
| E for $L_2D_2$ | 1 | 304.70 | 44.29** |
| Error (within) | 45 | 6.88 | |

** = $p < .01$

Note. Environment was the repeated measures variable.

**APPENDIX G.9 (Continued)**

SIMPLE EFFECTS (IMAGERY)

FACTORS: L = Level ($L_1$ = paraplegic; $L_2$ = quadriplegic)
D = Degree ($D_1$ = incomplete; $D_2$ = complete)
E = Environment ($E_1$ = intensive care; $E_2$ = ward)

| Source | df | MS | F |
|---|---|---|---|
| L for $E_1$ | 1 | 182.18 | 22.58** |
| L for $E_2$ | 1 | .13 | < 1 |
| L for $D_1E_1$ | 1 | 3.24 | < 1 |
| L for $D_1E_2$ | 1 | .42 | < 1 |
| L for $D_2E_1$ | 1 | 298.86 | 37.03** |
| L for $D_2E_2$ | 1 | 1.33 | < 1 |
| D for $E_1$ | 1 | 177.63 | 22.01** |
| D for $E_2$ | 1 | .51 | < 1 |
| D for $L_1E_1$ | 1 | 2.83 | < 1 |
| D for $L_1E_2$ | 1 | .17 | < 1 |
| D for $L_2E_2$ | 1 | 294.72 | 36.52** |
| D for $L_2E_2$ | 1 | 1.94 | < 1 |
| LD for $E_1$ | 1 | 119.92 | 14.86** |
| LD for $E_2$ | 1 | 2.88 | < 1 |
| Error (within cell) | 96 | 8.07 | |

** = $\underline{p}$ < .01

Note. The analysis of simple effects was based on mean values for imagery reports which had been adjusted for the covariate, injectable narcotics.

## APPENDIX G.10

### SHAUGHNESSY HOSPITAL STUDY

### UNWEIGHTED MEANS ANALYSIS OF VARIANCE: IMAGERY

| | | | | Adjustment | | |
|---|---|---|---|---|---|---|
| SOURCE | df | MS | F | df | MS | F |
| Level (L) | 1 | 140.46 | 22.67 | 1 | 90.04 | 9.83** |
| Degree (E) | 1 | 156.63 | 25.27 | 1 | 100.40 | 10.96** |
| L x D | 1 | 120.60 | 19.46 | 1 | 77.30 | 8.44** |
| Error | 68 | 6.20 | | 46 | 9.16 | |
| Environment (T) | 1 | 188.56 | 41.60 | 1 | 120.87 | 18.04**** |
| E x L | 1 | 129.90 | 27.99 | 1 | 81.34 | 12.14** |
| E x D | 1 | 134.60 | 29.69 | 1 | 86.28 | 12.88*** |
| E x L x D | 1 | 70.59 | 15.57 | 1 | 45.25 | 6.75* |
| Error | 68 | 4.53 | | 46 | 6.70 | |

Note. Adjustment = effect x $\left\{\frac{\tilde{N}}{N} = \frac{11.53}{72}\right\}$

* $p < .05$ ** $p < .01$ *** $p < .001$ **** $p < .0001$

## APPENDIX G.11

### SHAUGNESSY HOSPITAL STUDY

### ANALYSIS OF VARIANCE (WITHOUT COVARIATE): IMAGERY

| Source | | df | MSF |
|---|---|---|---|
| LEVEL (L) | 1 | 88.67 | 9.70** |
| DEGREE (D) | 1 | 101.67 | 11.12*** |
| L x D | 1 | 75.98 | 8.31** |
| ERROR | 46 | 9.14 | |
| | | | |
| ENVIRONMENT (E) | 1 | 119.17 | 17.70**** |
| E x L | 1 | 82.51 | 12.26*** |
| E x D | 1 | 84.95 | 12.62*** |
| E x L x D | 1 | 46.01 | 6.84** |
| ERROR | 46 | 6.73 | |

* $p < .05$    ** $p < .01$    *** $p < .001$    **** $p < .0001$

# APPENDIX G.12

## SHAUGHNESSY HOSPITAL STUDY

## ANALYSIS OF VARIANCE (WITHOUT COVARIATE): STRESS

| SOURCE | df | MS | F |
|---|---|---|---|
| LEVEL (L) | 1 | 82.20 | < 1 |
| DEGREE (D) | 1 | 3.74 | < 1 |
| L x D | 1 | 373.78 | 2.58 |
| ERROR | 46 | 144.85 | |
| | | | |
| ENVIRONMENT (E) | 1 | 113.78 | < 1 |
| E x L | 1 | 253.87 | 1.91 |
| E x D | 1 | .07 | < 1 |
| E x L x D | 1 | 8.22 | < 1 |
| ERROR | 46 | 132.88 | |

# APPENDIX G.13

## SHAUGHNESSY HOSPITAL STUDY

## ANALYSIS OF VARIANCE (WITHOUT COVARIATE): NONCOMPLIANCE

| SOURCE | df | MS | F |
|---|---|---|---|
| LEVEL (L) | 1 | 4.00 | < 1 |
| DEGREE (D) | 1 | .36 | < 1 |
| L x D | 1 | 27.04 | 1.48 |
| ERROR | 46 | 18.24 | |
| | | | |
| ENVIRONMENT (E) | 1 | 6.42 | 1.19 |
| E x L | 1 | 4.27 | < 1 |
| E x D | 1 | 5.14 | < 1 |
| E x L x D | 1 | .75 | < 1 |
| ERROR | 46 | 5.40 | |

## APPENDIX G.14 (a)

## INTERCORRELATION MATRIX: SHAUGHNESSY HOSPITAL (STUDY 2)

| | ACCID | SEX | AGE | OF | CONC | SURG | ICU | IMMOB | EMP | SLEDEP | APP |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ACCID | — | | | | | | | | | | |
| SEX | -.21 | — | | | | | | | | | |
| AGE | [b].39 | -.13 | — | | | | | | | | |
| OF | .10 | -.12 | -.08 | — | | | | | | | |
| CONC | -.25 | .11 | [c]-.29 | [b].40 | — | | | | | | |
| SURG | -.06 | .02 | -.07 | .23 | -.14 | — | | | | | |
| ICU | -.08 | -.02 | .03 | [c].28 | .12 | .21 | — | | | | |
| IMMOB | -.15 | -.04 | .02 | .05 | -.16 | .18 | .04 | — | | | |
| EMP | .21 | .16 | .21 | -.13 | -.11 | -.22 | -.02 | -.26 | — | | |
| SLEDEP | -.11 | .15 | -.02 | -.10 | .03 | .20 | .23 | -.05 | .07 | — | |
| APP | -.20 | -.03 | .16 | -.13 | -.02 | -.09 | [b].37 | [c]-.28 | .26 | .26 | — |

a = $p$ < .001 b = $p$ < .01 c = $p$ < .05

Note. Variable key on p. 285

# APPENDIX G.14 (b)

## SHAUGHNESSY HOSPITAL INTERCORRELATION MATRIX

### KEY

| | |
|---|---|
| ACCID | Accident |
| SEX | Sex |
| AGE | Age |
| OF | Other Fractures (number) |
| CONC | Concussion |
| SURG | Surgery (frequency) |
| ICU | Days in Intensive Care Unit |
| IMMOB | Days immobilized (in horizontal position) |
| EMP | Employment (unemployed vs. other) |
| SLEDEP | Sleep deprivation |
| APP | Apparatus (halo/tongs vs. other) |