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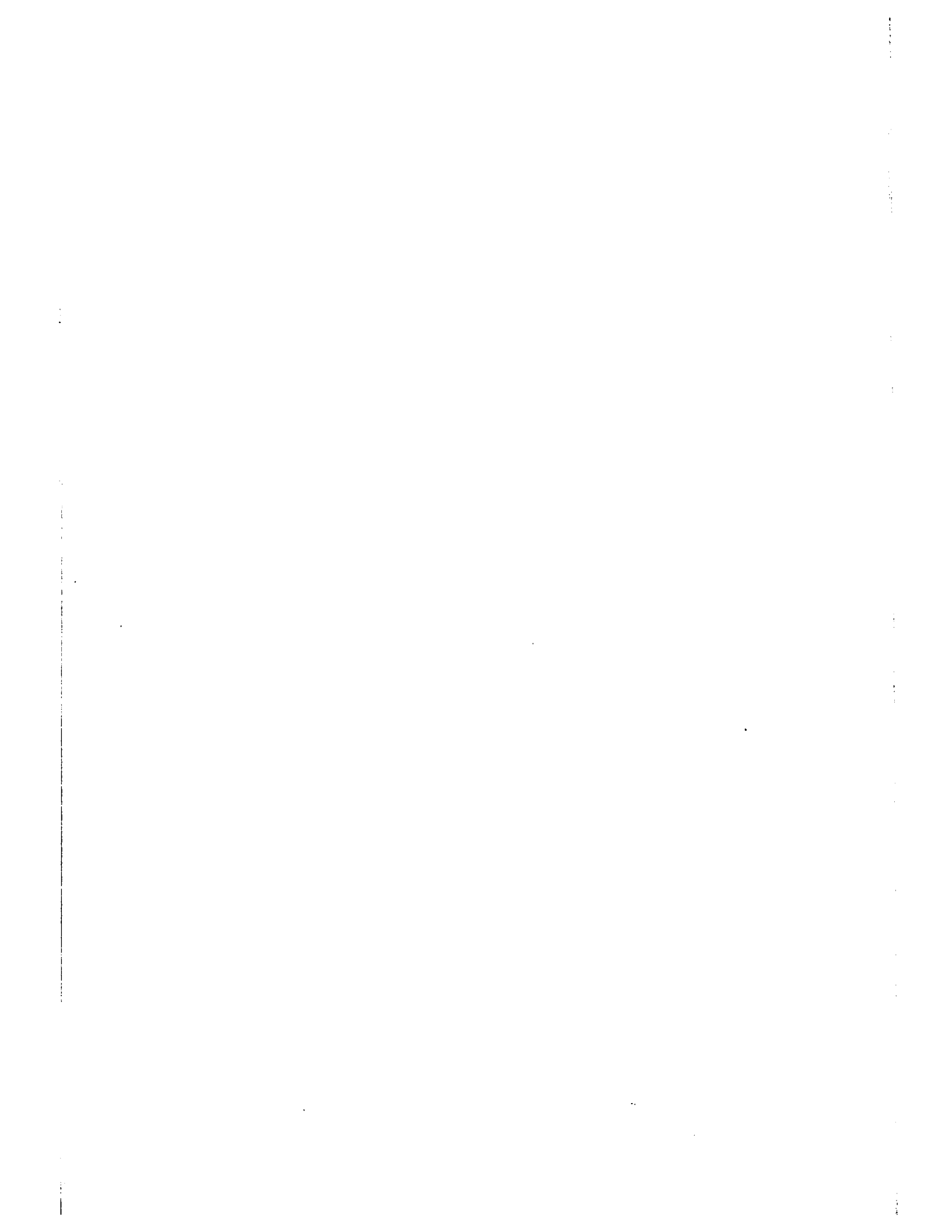
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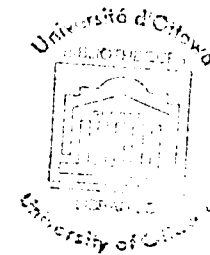


ARCS-THESIS

A Comparison of Irritable Bowel Syndrome and Crohn's Disease:  
Mechanisms Underlying Symptom Processing and Sickness Impact

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A dissertation submitted in partial fulfillment  
of the requirements for the Doctor of Philosophy degree.



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**Dedication**

To my daughter Rebecca  
whose laughter reminds me  
to strive for that important balance  
between work and play

### **Acknowledgement**

I would like to acknowledge those individuals, who each in their unique way, contributed to the successful completion of this thesis. My thesis supervisor, Dr. Pat McGrath, who challenged my ideas, offered suggestions and support, and respected my autonomy. Pat's contributions throughout graduate school were invaluable and greatly appreciated.

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I owe much thanks to my mother, father, and grandmother who have been a continued source of emotional and financial support throughout graduate school.

A very special thank you belongs to my husband, Ken, whose support and counsel were invaluable for the completion of this thesis. Ken successfully took on the dual role of understanding husband and critical reviewer. He fulfilled this role with ease and unending patience.

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### **Abstract**

Previous research suggests an association between psychological dysfunction and Irritable Bowel Syndrome (IBS). We sought to confirm this relationship and examine the mechanisms by which psychosocial factors may amplify or maintain IBS complaints, and influence disability. One hundred and thirteen female participants, (45 IBS; 34 Crohn's; 34 healthy controls) were evaluated by psychological assessment which measured: symptom reporting, anxiety, depression, and impact of physical symptoms on daily activities. The assessment also evaluated the ways in which patients interpreted, understood and coped with unpleasant symptoms as well as the support and reactions from significant others to their symptoms. Subjects also participated in an experimental task designed to elicit physical sensations. Following the task, subjects were interviewed regarding cognitions and symptoms associated with the task. Results indicated that both patient groups had significantly greater physical and emotional symptomatology than healthy controls. The IBS patients were largely indistinguishable from the Crohn's patients, except that IBS patients were more likely to perceive their condition as more serious than Crohn's patients, and reported less personal control and responsibility in managing their symptoms. IBS patients also perceived far less social support from individuals close to them than did the Crohn's patients. Both IBS and Crohn's patients engaged in greater dysfunctional cognitive activity than did the controls during the experimental task. While anxiety, depression and coping attempts did not distinguish between patient groups, they were significantly associated with the amount of disability in daily activities regardless of diagnosis. These results suggest that the uncertain etiology of IBS may create additional sources of stress for the IBS patient. Consequently IBS patients may be more prone to misinterpret their IBS as a serious health threat and feel less able to control their symptoms. Furthermore, because of

the uncertain etiology, the IBS patient may receive less support from significant others, thereby compounding stress and further taxing coping efforts. Our findings suggest that rather than a psychologic/psychiatric problem the IBS is better viewed as a medical problem within a biopsychosocial context. Psychosocial factors play a crucial role in the manifestation of disability regardless of the nature of the disease. However, the IBS is a unique medical problem in that the patient is placed at risk for stressors related to the uncertainty of the symptoms and the reactions of others.

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## **Comparison of Irritable Bowel Syndrome and Crohn's Disease: Mechanisms Underlying Symptom Processing and Sickness Impact**

### **Definition and Description of IBS**

In recent years the Irritable Bowel Syndrome (IBS) has come under increasing empirical scrutiny by both medical and psychological investigators. The syndrome is considered a functional disorder of the gut in the sense that no structural or biochemical etiologies have been identified to account for bowel complaints. Symptoms typically include abdominal pain and/or an alteration of bowel habit (with constipation or diarrhea, or both). Additional symptoms include: pain relieved with defecation, looser and more frequent stools with pain onset, distension, presence of mucus, and a feeling of incomplete evacuation (Manning, Thompson, Heaton, & Morris, 1978).

In general clinical practice, a diagnosis of IBS depends on the patient's self-report and the absence of organic disease at particular sites throughout the gut. The syndrome is typically associated with other non-gastrointestinal complaints such as headache and backache (Whitehead, Winget, Fedoravicius, Wooley, & Blackwell, 1982).

The majority of IBS patients are between thirty and forty years of age (Ford, 1986). Twice as many females as males present to their doctor with the disorder (Langeluddecke, 1985). It is estimated that the average patient experiences symptoms for at least five years prior to hospital referral (Ford, 1986).

Epidemiological surveys indicate that a significant number of healthy individuals experience symptoms comparable to those of IBS (Thompson & Heaton, 1980; Drossman, Sandler, McKee, & Lovits, 1982). Thompson and Heaton (1980) report that although one third of healthy individuals surveyed reported IBS like symptoms,

only 20% of these individuals had consulted a physician for their symptoms. However, as noted by Harvey, Salith, and Read (1983) those individuals who do seek medical care for IBS symptoms make up to half of outpatient referrals to gastroenterologists. Mendeloff (1983) reports that IBS accounts for over 100,000 hospital discharges per year in the United States annually.

Early research in the area of IBS emphasized the absence of physical disease and focused on the presence of psychological distress suggesting that IBS was merely an expression of psychological dysfunction (Hislop, 1971; Latimer, Sarna, Campbell, Latimer, Waterfall, & Daniel, 1981). A uniquely psychological model of IBS suggests that one has made the often erroneous "leap to the head" assumption, (Wall, 1984). In other words, if the symptoms are of unknown physical origin then there is a tendency to leap to psychological explanations. However, as noted by McGrath and Unruh (1987) a psychogenic diagnosis can be both inaccurate and destructive. It is inaccurate in the sense that it is based typically on exclusionary criteria, in other words no physical alterations can account for the symptom. However, as Barr and Feurstein (1983) have argued, a symptom such as pain may be neither of known organic nor psychogenic cause, but rather of unknown cause. Thus, a psychogenic diagnosis may more accurately reflect our own confusion and lack of understanding about a disorder than the psychological state of the presenting patient. Furthermore a psychogenic diagnosis does little to foster acceptance and coping with symptoms. In fact, as noted by McGrath and Unruh (1987) it has been used to blame and punish patients who fail to respond or to comply with treatment. In view of these observations, it is not surprising that a diagnosis of psychogenic pain disorder was discarded from the most recent edition of the Diagnostic and Statistical Manual of the American Psychiatric Association (DSM III-R, American Psychiatric Association, 1987).

Although DSM III-R no longer recognizes a diagnosis of psychogenic pain, disorders of unknown origin such as IBS are typically referred to as functional as opposed to organic disorders. IBS is considered a functional disorder of the gut in the sense that known structural or biochemical changes cannot explain IBS symptoms. The physiological studies investigating gut motility in the IBS patient reflect a model of "disordered function" in IBS. Rather than attempting to identify pathophysiological markers for the IBS, they have focused on abnormalities in gut motility (Snape, Carlson, Matarazzo, & Cohen, 1976) leading some to speculate about alterations in intestinal function that might be brought upon by or exacerbated by psychological disturbance (Whitehead & Schuster, 1985).

Recent studies have pointed to the psychological differences between those individuals who consult a physician for IBS symptoms and those who do not seek medical attention for IBS symptoms (Drossman, McKee, Sandler, et al., 1988). These studies suggest that individuals who seek medical care for IBS symptoms are those who are less able to cope with symptoms and are more disabled by symptoms. Current thinking about IBS recognizes that the disorder is not simply a gut or psychological disorder but rather an expression of the complex relationship between cognitive, emotional, central nervous system processes and gut activity. As noted by Thompson, (1990) "research into the mechanisms of IBS now shifts from seemingly futile attempts to demonstrate motility abnormalities characteristic of IBS to how events in the gut are handled in the enteric nervous system and perceived in the brain" (p. 238). In other words, how might the processing of life events and affective states at the level of the central nervous system interact and impact on processes at the level of the gut and in turn influence symptom perception. These are complex reciprocal processes mediated by efferent and afferent transmission.

### **Focus of the Study**

This study attempted to further explore the relationship between IBS symptoms, psychological functioning and coping among IBS patients. Specifically, this thesis proposes that psychological processes may be mechanisms or determinants of distress and disability (any limitation or impairment of physical, social or occupational functioning) in IBS. This thesis examines how people perceive and evaluate physiological change in terms of its potential threat to their health. It suggests that individuals assess bodily changes according to dimensions such as seriousness, uncertainty, and personal responsibility and that these form the "template" for how they react to and cope with symptoms. The study proposed here argues that the implicit models that people have of their illness determines their attentional focus on symptoms, interpretations of bodily events, effective or dysfunctional coping efforts, and the presence or absence of depression and anxiety. As this model postulates that beliefs and implicit models of illness interact with attentional focusing, coping and emotional distress, the dominant theoretical perspective appears to be most consistent with that taken by the self-regulation model of coping with health threats (Leventhal, Nerenz, & Steele, 1984).

The following sections will review the physiological and psychological literature relevant to IBS as well as the self-regulation model of coping with health threats.

### **Physiological Mechanisms of IBS**

A report by an international working team of gastroenterologists (Drossman, Funck-Jensen, Janssens, et al., 1990) defines IBS as a functional gastrointestinal disorder manifested by: abdominal pain or discomfort relieved with defecation or associated with a change in frequency or consistency of stool, and three or more of

the following: 1) altered stool frequency; 2) altered stool form (hard or loose/watery); 3) altered stool passage (straining or urgency, feeling of incomplete evacuation); 4) passage of mucus; and 5) bloating or a feeling of abdominal distension.

As noted by Lind (1991) research in the pathogenesis of IBS has attempted to ascertain whether IBS patients have a "basic physiologic abnormality of the gastrointestinal tract or whether they have an enhanced but qualitatively normal response to stress, meals or drugs" (p. 279).

Original research in this area proposed that a basic myoelectric rhythm abnormality of the colon was responsible for IBS symptoms. For example, Snape et al. (1976) examined the resting or basal electrical rhythm of the colon and observed an increased frequency of slow waves at 3 cycle per minute activity in IBS patients in comparison to controls who have a dominant frequency of approximately 6 cycles per minute.

Others have examined colonic motor activity in terms of the pattern of contractions that occurs as a result of spike potentials superimposed on the basal rhythm. Bueno, Fioramonti, Ruckebusch, Frexinos, and Coulom (1980) investigated colonic electrical activity in terms of two types of action potentials: long spike bursts and short spike bursts. Short spike action potentials coincided with abdominal pain and were more frequent in those experiencing painful constipation than controls. Short spike action potentials were also reduced in patients with painless diarrhoea. Similarly, Latimer et al. (1981) identified patterns of disordered motility in IBS patients, however, such patterns were also found in normal healthy subjects under stress, as well as "psychoneurotic" patients who were not experiencing gastrointestinal symptoms.

Several studies have shown alterations in colonic motor activity in IBS in response to specific stimuli. For example, a prolonged increase in colonic spike and

3-cycles per minute colonic motor activity has been observed in IBS patients following a meal (Sullivan, Cohen, & Snape, 1978) as well as an exaggerated increase in 3-cycles/min rectosigmoid motor activity in response to anger (Welgan, Meshkinpour, & Hoehler, 1988) and psychological stress (Narducci, Snape, Battle, et al., 1985).

Similar attention has been focused on the motility patterns of the small bowel. Kellow and Phillips (1987) identified bursts of irregular contractile activity of the jejunum and ileum coinciding with crampy abdominal pain.

Although the research suggests a motility disorder in IBS, as noted by Thompson and Pigeon-Reesor (1990), it has been difficult to consistently link specific motor abnormalities of the colon with IBS symptoms. Furthermore such abnormalities have been observed in healthy control subjects who do not complain of bowel symptoms (Latimer et al., 1981; Kellow & Phillips, 1987). These findings suggest that IBS patients may have alterations in visceral pain perception and that altered afferent neural input may be central to the abnormal motility disorders of the IBS.

Several studies have shown that the threshold for pain in response to rectosigmoid balloon distention is lower in patients with IBS than in control subjects (Ritchie, 1973; Whitehead, Engel, & Schuster, 1980). These findings as well as those reporting the increased number of non-gastrointestinal symptoms among IBS patients (Whorwell, McCallum, Creed, et al., 1986) support the idea of a generalized sensitivity to painful stimuli in the IBS patient. This sensitivity may however be influenced by the chronicity of the pain, as studies indicate that IBS patients have higher or similar thresholds for pain as normal subjects in response to acute pain (Cook, van Eeden, & Collins, 1987; Whitehead, 1989).

Overall, the physiological data suggests that altered visceral sensation and changes in afferent reflex mechanisms may underlie the observed motility disorders.

Mitchell and Drossman (1987) emphasize that IBS patients respond with increased motility to a variety of stimuli suggesting a general, biologically based, hyperreactivity of the gut. Whether or not this biological predisposition is manifested in terms of the IBS depends on environmental and psychological factors.

### **Psychological/Psychiatric Mechanisms of IBS**

The lack of consensus with respect to the pathophysiological markers of IBS, the absence of organic disease and the small percentage of individuals with IBS symptoms who report such symptoms to a physician, have led investigators to speculate on the role of psychological mechanisms in the IBS. In their review of psychological factors relevant to IBS, Creed and Guthrie (1987) noted that among recently diagnosed patients with functional abdominal pain, 40-50% had demonstrable psychiatric disorders. The role of psychological factors in the development of IBS remains controversial. Several conceptual models have been put forth to explain how psychological mechanisms might "work" in the IBS.

**IBS: A Psychiatric Disorder.** Initially investigators focused on the presence of psychological distress and psychiatric symptoms suggesting that IBS was perhaps a manifestation of a psychiatric condition. For example, early research by Hislop (1971) revealed that IBS patients report more affective symptoms such as: fatigue, depression, insomnia, emotional lability, anorexia, suicidal ideation, and somatic symptoms of anxiety than healthy controls. Although the study concluded that the IBS group experienced significant psychological stress in comparison to healthy controls, the conclusions must be treated cautiously as no comparisons with groups experiencing chronic illness and organic gastrointestinal illness were included. Therefore one cannot conclude whether these psychological symptoms were specific to IBS or a reaction to the experience of a chronic illness.

Similarly Dally and Gomez (1977), using clinical judgement alone, diagnosed 100% of their sample of IBS patients as "psychologically abnormal". Such clinical judgments bore no relationship to research criteria and may have been biased as the diagnoses were made with the knowledge that no detectable organic pathology was present. Furthermore, given that a control group was not included in the study, psychological distress could not be reliably demonstrated to be specific to the IBS group. As noted by Creed and Guthrie (1987) these findings falsely support the belief that functional disorders are synonymous with underlying psychopathology. In other words, these studies perpetuate the assumption that if one cannot identify a physical cause for a given symptom, then the symptom in question must be psychological in nature.

Latimer et al. (1981) compared IBS patients with a group of "psychoneurotic" patients (without bowel symptoms) and normal controls. All subjects were given the Beck Depression Inventory (Beck, 1967) and the Spielberger State-Trait Anxiety Inventory (Spielberger, Gorus, & Lushene, 1970). Both patient groups experienced significantly greater distress than controls, however, the IBS and psychoneurotic groups were substantially alike on all psychological measures. Latimer suggests that IBS are highly neurotic and that it is this increased psychopathology which leads the IBS patient to focus on bowel symptoms. However as noted by Whitehead and Schuster (1985) this study is limited in that the psychoneurotic control group included only 8 patients with mixed diagnoses. Furthermore, without an organic disease control group one cannot conclude that this reaction is specific to IBS patients.

Others (Liss, Alpers, & Woodruff, 1973; Young, Alpers, & Norland, 1976) have tried to demonstrate that 'hysteria' is the most common diagnosis among IBS patients. However, as noted by Creed and Guthrie (1987), these diagnoses were based on Feighner's criteria, which requires that 25 or more medically unexplained

symptoms develop in 9 different bodily systems before the age of thirty. Given that IBS patients have many somatic complaints where the lack of a pathophysiological mechanism cannot be confirmed, the use of Feighner's criteria with this group is inappropriate. Symptom complaint may reflect internal physiological dysfunction rather than 'hysterical' process. Further, it should be noted that the use of the term 'hysteria' as a diagnostic entity has been replaced in current psychiatric classification systems (American Psychiatric Association, 1987). While there are a number of studies which indicate a tendency among IBS patients to report a greater number and severity of physical symptoms (Welch, Hillman, & Pomare, 1985; Sandler, Drossman, Nathan, & Mckee, 1984), which might be sufficient for a diagnosis of somatoform disorder, given the existing uncertainty about the presence of pathophysiological mechanisms it cannot be concluded on the basis of this data alone that a psychiatric etiology could account for the IBS.

Whitehead et al. (1980) examined the psychological differences within subgroups of IBS. Diarrhea-predominant patients, constipation-predominant patients and normal controls were compared on the Hopkins Symptom Checklist. Results indicated no significant trait differences between patients with diarrhea and those with constipation. However as a whole, IBS patients compared to controls demonstrated significantly more elevated levels on psychological traits including: anxiety, interpersonal sensitivity, depression, hostility and somatization of affect. Given the weak factorial structure of the Hopkins Symptom Checklist (Hoffman & Overall, 1978) these findings may reflect general psychological distress as opposed to specific psychological traits. Of interest, however, was the fact that neither colonic motility, nor severity of symptoms were correlated with psychopathology. These findings lead us to question the assumption that it is this increase in psychopathology which leads the IBS patient to focus on bowel symptoms.

Thus, studies which have investigated the psychological functioning of IBS patients suggest that they report both affective and somatic symptoms. Studies which have included control groups, psychometrically sound measures, and specified diagnostic criteria suggest that psychological factors may co-exist and influence the manifestation of IBS symptoms.

**IBS and Psychopathology: Co-morbid Conditions.** Macdonald and Bouchier (1980) using a standardized questionnaire, The General Health Questionnaire, (GHQ) found a significant incidence of psychiatric illness in both organic (peptic ulcer, gallstones, coeliac disease) and non-organic (irritable bowel syndrome, constipation, diarrhea) patients attending a general adult outpatient clinic. A psychiatrist, using the GHQ and blind to the patient's physical diagnosis, classified 20% of the organic group as cases of psychiatric illness, namely, depressive psychosis and anxiety neurosis. Fifty-three percent of the non-organic group were similarly classified. However, given the mixed diagnoses within the non-organic group, it is difficult to interpret the data with respect to IBS. The data does indicate however that the occurrence of psychopathology is not restricted to those patients with a functional diagnosis but is also present in those individuals with organic disease. These findings suggest that psychological symptoms co-exist with bowel symptoms, however the nature of this relationship remains unclear. Psychological distress may lead the individual to focus on changes in bowel patterns and impair his or her ability to cope with these changes or it may be that psychological symptoms ensue from chronic bowel problems of unknown origin.

A recent study (Walker, Roy-Byrne, Katon, et al., 1990) compared patients with IBS and Inflammatory Bowel (IBD) disease in terms of psychiatric illness and the co-occurrence of psychiatric illness and bowel symptoms. Using a structured psychiatric interview the investigators found that significantly more of the patients with IBS had lifetime diagnoses of major depression, somatization disorder,

generalized anxiety disorder, panic disorder and phobic disorder. They also found that the IBS patients had significantly more unexplained medical symptoms and that most of the patients had a psychiatric problem prior to the onset of bowel symptoms. There were however no differences between the groups in terms of current psychiatric diagnoses. Given that the study was retrospective in nature, it is difficult to judge the accuracy of their claim that IBS patients had suffered from more psychiatric disorders prior to the onset of bowel symptoms than IBD patients. One could argue that IBS patients identified a causal link between psychiatric symptoms and bowel problems as a means of comprehending and explaining their bowel problems. Nevertheless the study does confirm a high prevalence rate of psychiatric disorders in IBS as compared to Crohn's disease.

In another attempt to further specify the nature of psychiatric disturbance in IBS patients, Blanchard, Scharff, Schwarz, Suls, and Barlow (1990) found that IBS patients were more likely to suffer from anxiety disorders, in comparison to IBD and healthy controls. The IBS patients also reported elevated levels of anxiety and depression on self-report questionnaires however their scores were considerably lower than those typically observed in patients with Anxiety Disorders or Major Depressive Disorder. Although these findings confirm that IBS patients are psychologically distressed, it is difficult to interpret any comparisons with the IBD group as these patients were selected from a support group and were seeking stress management training. It is possible that, due to selection bias, these patients experienced psychological distress differently or engaged in a health seeking behavior that is not representative of IBD patients.

Contrary to findings which have shown increased psychosocial abnormality in IBS patients, Smith, Greenbaum, Vancouver, et al. (1990) found no differences between IBS patients and a mixed group of organic GI conditions on measures of affective distress, social support, somatization and abnormal illness behavior.

Although their findings suggest that chronically ill patients experience psychosocial distress regardless of the nature of their diagnosis, it is possible that the diagnosis impacts on more illness specific variables such as cognitive coping activity.

Recent studies have compared reporters (individuals who consult for IBS symptoms) and non-reporters (individuals who do not consult for symptoms) of IBS. A prospective study by Heaton, Ghosh, and Braddon (1991) found that reporters of IBS experienced increased abnormal bowel function, greater pain, and increased levels of affective distress than non-reporters of IBS and healthy controls.

Drossman, McKee, Sandler, et al.(1988) compared IBS patients and non-reporters with IBS on various measures of psychosocial adjustment. IBS patients scored more abnormally than nonpatients and controls on the Minnesota Multiphasic Personality Inventory, the Illness Behavior Questionnaire and the Life Experiences Survey.

Similar results were obtained by Whitehead, Bosmajian, Zonderman, Costa, and Schuster (1988) in their comparison of IBS patients, lactose malabsorption patients, patients with vague, functional bowel symptoms not meeting the criteria for IBS, and normals. Results indicated that reporters of both IBS and lactose malabsorption had significantly more psychological symptoms than controls and non-reporters with IBS and lactose malabsorption. These findings further support the hypothesis that psychological distress is not inherent to IBS but will influence which sufferers will consult a physician. It should be noted here, that patients with functional bowel disease (having vague complaints and pain not associated with defecation or bowel habit) reported more psychological distress than controls regardless of whether or not they had consulted a physician for their symptoms. Thus, studies which have used vague criteria in the diagnosis of IBS may have overestimated the relationship between IBS and psychopathology.

While IBS patients have not been consistently identified in terms of specific psychological traits (Creed & Guthrie, 1987), reporters of IBS have been found to experience significantly greater amounts of psychological distress as compared to non-reporters of IBS and healthy controls (Drossman et al., 1988; Hislop, 1971; MacDonald & Bouchier, 1980; Whitehead et al., 1980; Whitehead et al., 1988) and such distress appears to influence which sufferers of IBS will seek medical attention as a means of coping with bowel symptoms. As noted by Drossman et al. (1988): psychological factors "may influence whether a person with bowel symptoms perceives the condition as an illness requiring medical care or a 'pain in the gut' not worthy of further attention or to be self-treated" (p. 707). " Thus, one can conceptualize IBS as a motility disorder in which psychological factors are not associated with the disorder itself, but rather interact with a susceptibility for bowel dysfunction to influence how one perceives and then copes with bowel symptoms.

The psychological distinction between reporters and non-reporters of IBS has opened the door to research into the area of symptom processing in the IBS. Rather than comparing and contrasting IBS patients to those with "neurotic" diagnoses or to measure and/or ascribe "trait like" qualities to IBS patients, the thrust in this area has been to discover how cognitive processes such as symptom processing, mental representations of illness and coping interact with emotional functioning to influence the illness experience. It is proposed here that by articulating psychological processes such as symptom processing and coping, that a greater understanding of the IBS patient can be achieved and ultimately lead to new insights into the effective management of the condition and its impact on patients' lives. The following sections review literature relevant to the psychological processes which may underlie and influence the development, presentation and maintenance of IBS symptomatology.

### **Symptom Recognition and Reporting in the IBS**

Robbins and Kirmayer (1986) have focused on the cognitive processes associated with the expression of physiological change as a discrete symptom. According to their model, symptom reporting behavior, as well as the choice of symptoms presented, depends on the subject's attentiveness to change in bodily and feeling states, the recognition of change as a symptom of a physical illness or emotional problem as well as the attribution of symptoms to physical or psychosocial problems. These processes form the individual's illness cognitions which serve to amplify or minimize symptoms and emphasize either the somatic or emotional aspects of bodily states. Robbins and Kirmayer (1986) for example, have demonstrated that illness cognitions mediate the translation of distress into somatic or psychosocial symptoms. Individuals with a bias toward interpreting symptoms as physical in origin displayed increased somatic symptom reporting while those who believed that they were affectively based reported increased affective symptoms.

Thus, an individual with a family history of bowel cancer may hold illness cognitions which will lead him or her to interpret colonic spasms as an indication of colonic cancer rather than the result of nervous butterflies or a change in diet. The development of particular illness cognitions has been attributed to the illness experiences and suggestions of significant others, previous contact with the medical profession and social and cultural restrictions on the appropriate expression of distress (Kleinman, 1980; Meyer, Leventhal, & Gutmann, 1985).

The cognitive representations of physical illness and the implications of these representations for specific health-related behaviors was originally articulated by investigators such as Leventhal, Meyer, and Nerenz (1980) and Pennebaker (1982). Leventhal has proposed a self-regulatory illness cognition model which emphasizes the common sense representation of the attributes of a symptom, plans to cope with a symptom, and appraisal of the outcomes of coping efforts. According to this

model sensory events are processed via anatomical and neurochemical mechanisms which are subject to schematic and conceptual processing.

Schematic processes consist of a storehouse of memory codes for various symptoms and the emotional and environmental events associated with previous illness episodes. Essentially these cognitive schema are "templates" for how individuals interpret and react to information in their bodies. Schema are reactivated by a change in physical state and emotional/environmental memories associated with previous illness episodes. Once retrieved, schema impose immediate structure and meaning to concrete physical perceptions.

Conceptual processing, in comparison, is an abstract form of processing which consists of the individual's observations and reflections regarding causes, consequences, and how they should best cope with an illness experience. It is via conceptual processing that the individual constructs his or her model of the causes, consequences and duration of illness episodes. Conceptual processing also guides coping responses. For example, a sore throat and congested nose are conceptualized as a cold with a duration of approximately a week, and as being responsive to decongestant medication. However, should these symptoms fail to subside after the estimated time line and appear unresponsive to the prescribed medication, the individual may conceive of a more serious cause and choose to see his/her physician as these symptoms no longer fit his/her conceptual rules for a cold.

Leventhal proposes that the individual's responses to symptoms are also organized on a hierarchical basis, in the sense that responses correspond to the level of stimulus organization. For example, the individual may respond at the schematic level by minimizing the associations which have been activated by redirecting his attention by distraction. Responding at the conceptual level, however involves more complex behavior such as active planning and execution of specific responses for the

cure or long term management of the illness, activities which are mediated by conceptual codes for causation and effect.

A complex relationship exists between symptom reporting, emotions and coping. Leventhal suggests that hierarchical perceptual and response systems are involved in the generation of emotion and guide coping behavior vis-a-vis emotional reactions. Thus it is the similarity between systems and the commonality in structure and content of illness and emotion schema which account for the interaction between illness and emotion experiences.

Leventhal (1986) has suggested that it is the interaction between illness and emotion schema which determine an individual's coping efforts and the extent to which he or she is disabled by symptoms. Symptoms activating emotionally-laden schema related to fear and threat of illness may generate automatic negative or dysfunctional interpretations of symptoms. Such interpretations may give rise to a variety of inappropriate self-diagnostic and preventative actions. Emotional arousal and anxiety increase, which in turn reduces one's ability to manage or cope with symptoms. Thus, the death of a friend from bowel cancer serves to increase the availability of illness schema and sensitizes the individual to monitor the body for changes in bowel habit and frequency of abdominal pain. The perception of such symptoms are likely to activate both emotional and illness schema indicative of cancer, and lead the individual to make dysfunctional appraisals of his or her symptoms which in turn result in ineffective coping efforts. In other words, the relatively automatic, emotionally-laden thoughts concerning sensory information, in the absence of parallel or simultaneous objective appraisals and interpretations of sensory information, increases emotional arousal and the presence of anxiety laden cognitions which in turn reduces one's ability to cope effectively with symptoms (Craig, 1984).

Leventhal's model of symptom processing suggests that individuals evaluate changes in physiological functioning against a particular model of illness, the model is largely based on dimensions which describe and elaborate sensory stimuli, in the sense that it emphasizes factors such as identification, duration and causality of symptoms. Turk, Rudy and Salovey (1986) have empirically demonstrated that, individuals tend to evaluate sensory events along dimensions which appear to be of a more personal nature, dealing with the impact and meaning of a given illness for a particular individual. They demonstrated that both patient and non-patient groups tend to consistently evaluate sensory events along four dimensions: 1) seriousness; 2) personal responsibility; 3) controllability; and 4) changeability. Turk et al. (1986) suggest that this four dimensional model serves as a generic cognitive structure of illness which evaluates and organizes sensory events for individuals. Their work demonstrated that the structure of the proposed implicit model of illness was stable across populations differing in demographic characteristics and health status, disease specific knowledge, and salience of the disease in an individual's life.

Recent investigations support the notion that these implicit models of illness influence one's ability to cope with or adjust to illness. For example, Affleck, Pfeiffer, Tennen, and Fifield (1987) found that among a group of rheumatoid arthritis patients, those individuals who were actively searching for the cause of their disease and continued to question their personal responsibility ("Why me?") reported greater functional problems and helplessness. On the other hand, those patients who believed that their disease could be controlled by monitoring activity reported less helplessness. Based on these findings, the investigators hypothesized that a preoccupation with the meaning of illness may derive from an inability to exercise effective control over the condition. Thus, as described by Turk et al. (1986), individuals appear to evaluate their symptoms in terms of personal meanings

such as "Why me", "Is it my fault?", "Can anything control it?", which in turn influences adjustment to illness.

Thus, the IBS patient may hold particular illness schema for bowel symptoms and is likely to evaluate the schema along these various dimensions. Although no investigations have examined the illness schema of IBS patients, the increased psychopathology among reporters would suggest that alterations in bowel functioning evokes particular schemas illness attributions, and emotional distress which in turn influences the patient's illness behavior.

Illness behavior refers to the ways in which symptoms are perceived, evaluated and acted upon (Pilowsky, 1978). IBS patients display abnormal illness behavior such as excessive somatic focusing, exaggerated disability and health related concerns. For example, when controlled for symptom severity, IBS patients reported more health related worries, anxiety and depression and believed that their illness interfered more with their lives than non-patients and healthy controls (Drossman et al., 1988). Non-reporters of IBS are described as demonstrating "wellness" behaviors or adaptation in that they reported less worry about their health, found their symptoms less disruptive to their lives and were better able to cope with stress. These adaptive behaviors permit individuals to perceive bowel symptoms as less disabling and more amenable to self-management.

Sandler et al. (1984) observed greater somatic focusing among IBS patients in that they reported significantly more non-gastrointestinal symptoms such as headache and back pain and made more frequent consultations for these symptoms than IBS non-patients and healthy controls. This increased rate of consultation remained when the number of symptoms were controlled, indicating a separate dimension of consultation behavior (Creed & Guthrie, 1987). In a telephone survey, Whitehead, Wingate, Federavicius, et al. (1982) found that IBS patients reported more somatic complaints, viewed colds and flu more seriously and sought

treatment for these minor illnesses more frequently than peptic ulcer patients or controls. IBS and peptic ulcer patients were similar with respect to psychopathology, so increased psychological distress alone did not account for the observed increase in illness behavior among the former.

Colgan, Creed, and Klass (1988) examined upper abdominal pain in patients with and without detectable pathology. They subdivided patients without pathology into two groups: those with psychiatric illness and those without psychiatric illness. Only those who had both pain of unknown etiology and a psychiatric disorder displayed abnormal illness behavior. These patients reported more severe somatic symptoms which were more widespread. They also reported more depression, anxiety, and fatigue than patients whose pain was of unknown origin but were free from psychiatric illness. These findings indicate that organicity and psychopathology are independent one from the other. One could speculate that the "functional" patients with a psychiatric illness were perhaps more physically distressed and thus engaged in greater abnormal illness behavior in an attempt to convince and engage a doubtful physician, thus appearing more disturbed.

Amongst patients presenting to a surgical clinic with acute abdominal pain, illness behavior was most likely in non-organic patients. Those with recurrent episodes of pain demonstrated greater chronic anxiety and abnormal illness behavior than those who previously had not experienced pain (Joyce, Bushnell, Walshe, & Morton, 1986). Again, these findings suggest chronic, unknown pain may lead to chronic anxiety as well as ways of behaving which may be at odds with what is typically expected from patients who are, in the medical sense, "healthy" people.

### **Cognitive Style, Coping and Emotional Reactions**

Few studies have formally assessed the ways in which IBS patients cope with their bowel symptoms. One can hypothesize however from the research on increased symptom reporting, health care utilization, and psychopathology that a

subgroup of IBS patients cope in ways that do not facilitate adjustment or minimize disability. For example, in a sample of 42 IBS patients, over 40% reported restricting their activities during flare ups (Corney & Stanton, 1990). Restrictions included avoiding certain foods, avoiding going to work, avoiding domestic and leisure activities, avoiding socializing and avoiding sexual intercourse. Thus IBS patients symptoms do have an impact on patients' daily lives, however it is difficult to evaluate the extent of this impact without a comparison group of chronically ill patients.

Coping has been defined "as constantly changing cognitive and behavioral efforts to manage specific external or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus & Folkman, 1984, p.141). Lazarus and Folkman (1984) have described cognitive appraisal in the coping process in terms of three stages: 1) the assessment of the significance of specific events in terms of threat, loss, or challenge; 2) the assessment of coping strategies for dealing with an environmental event and one's ability to implement such strategies; and 3) reappraisal, a changed appraisal based on new information arising from the individual's reactions and/or environmental feedback. This conceptualization is consistent with Leventhal's et al. (1980) view of coping and the self-regulation/symptom processing model, in that the individual's actions to manage symptoms associated with the illness schema are evaluated and this evaluation is used in reassessing the accuracy of the illness interpretation and for planning future coping (Bishop, 1991).

Cognitive appraisals and their impact on coping has been most thoroughly investigated in the study of experimental and clinical pain. Turk, Meichenbaum, and Genest (1983) have classified cognitive activity occurring in pain experiences into two categories: attempts to cope with the pain experience and cognitions which worsen the pain experience. The latter type has been referred to as catastrophizing

self-statements and have been associated with increased distress and decreased ability to cope. Clinicians have recognized that cognitive factors play an essential role in peoples' attempts to manage and limit suffering and in the maintenance, exacerbation, and dysfunctional adjustment to chronic pain (Turk et al., 1983).

Robinson and Granfield (1986) in their comparison of frequent and infrequent consulters found that although the former group had fewer stressful life events, they tended to have more negative mood and engage in less effective coping. These investigators suggest that ineffective coping results in increased negative mood which in turn exaggerates or brings into awareness tendencies for experiencing physical discomforts. Similarly, Bonbardie, D'Amico, and Jordan (1990) identified maladaptive emotion focused coping strategies which were positively correlated with poor psychosocial adjustment and depression for patients with a variety of chronic conditions. A relationship between negative self-statements, negative social cognitions and increased pain and psychological distress was confirmed among various pain populations (Gil, Williams, Keefe, & Beckham, 1990).

As noted by Barsky and Klerman (1983), cognitive activity in response to physical sensations becomes increasingly subject to dysfunctional or biased interpretations when discomforting sensations are ambiguous, vague and localized in parts of the body that are not readily observable or identifiable. Thus, individuals with an identifiable, easily explained, and localized organic pathology would be less likely to engage in dysfunctional cognitive activity in comparison to individuals with a condition of vague etiology, anatomically diffuse localization, and variable symptom presentation as in IBS. It is argued here that because the IBS patients may lack a perceived "real" diagnosis, it is difficult for them to access or construct an illness schemata that explains and accurately reflects their experience.

Furthermore, the lack of fit between the patient's and the physician's understanding of the illness is likely to influence the patient's adjustment and coping. For example, a patient whose representation of his or her symptoms includes undetected carcinoma may respond with increased amplification of symptoms and dysfunctional cognitive activity in an attempt to obtain treatment which is consistent with their understanding of carcinoma. The physician, on the other hand, who conceptualizes IBS as a psychiatric condition may label the patient as hypochondriacal and treat the patient as a psychiatric case. The patient's sense of helplessness, and unalleviated worry and anxiety is likely to perpetuate dysfunctional attempts at coping.

The present study will examine whether dysfunctional cognitions occur during an ambiguous sensory task and whether specific cognitions are related to the ability to cope with symptoms generated during the task.

### **Rationale and Hypotheses**

Although current research investigating IBS has failed to identify either physiological or psychiatric factors specific to the development of IBS, it does appear nonetheless that IBS patients experience greater depression and anxiety than healthy controls and display a higher frequency of symptom reports and health care utilization (Joyce et al., 1986; Sandler et al., 1984). As conceptualized within Leventhal's model of self-regulation illness cognition model and current models of IBS (Latimer, 1983; Whitehead & Schuster, 1985) it would appear that IBS patients have a propensity to direct attentional mechanisms internally and focus on changes in gut functioning. These changes are then perceived as symptoms and evoke a particular cognitive/emotional schemata which serves to appraise and interpret symptoms as well as direct one's coping strategies and adjustment.

At the present time, no investigations have examined the illness schemata of IBS patients, nor have any described their coping styles and adjustment to their

condition. Given the high rate of consultation in IBS patients, it behooves researchers to investigate those processes which determine self-regulation in this population.

The present study will examine between and within-group differences in disability level among individuals who present to gastroenterologists. Individuals who report bowel symptoms may fall along a disability continuum ranging from mildly disabled to severely disabled by bowel symptoms. Reported disability, symptom reporting, and affective distress are hypothesized to be a function of implicit models of illness, the tendency to direct attention to physical symptoms, the presence of dysfunctional cognitions, and the ability to employ effective coping strategies.

For the purposes of this investigation, the proposed mechanisms of IBS related disability and symptom reporting will be contrasted and compared with a group of individuals diagnosed with Crohn's disease. Crohn's disease is an inflammatory bowel disease that typically affects the lower ileum but may occur in any part of the gastrointestinal tract. Submucosal inflammation and edema lead to a thickening of the bowel wall which may cause scarring and bowel obstruction. Typical symptoms of Crohn's disease include diarrhea, abdominal pain, anorexia with weight loss, and fever. Crohn's disease is chronic with a fluctuating course. Forty to fifty percent of patients require surgical intervention primarily for bowel obstruction (Schwarz & Blanchard, 1990).

Crohn's patients are considered suitable controls for IBS patients in that their symptoms are similar and follow a chronic recurrent course. Crohn's disease is distinguished from IBS by the presence of detectable lesions within the walls of the lower GI tract mucosa. Thus, these two conditions differ in the "certainty" of the location and source of abdominal symptomatology. In other words, from the patient's perspective the pathophysiological substrate of IBS is considerably more

vague, elusive and undifferentiated than the specific qualities of a Crohn's disease "diagnosis". Thus, these patients are assumed to differ on fundamental characteristics of the implicit models they hold concerning their conditions. Because of the considerably greater ambiguity (Barsky & Klerman, 1983) associated with patients' conceptualizations of IBS they are hypothesized to be more effected by the symptom processing processes outlined above.

The proposed study will empirically examine disability and symptom reporting in three samples: IBS patients, Crohn's patients, and a group of healthy controls. One unique approach in this investigation has been the inclusion of a methodology designed to elicit ambiguous physical sensations and thus subjects reactions to a standard physical stimuli. One advantage of the assessment methodology proposed here in comparison to retrospective self report measures is that the error inherent in self-report measures of subjective states is greatly reduced. With this task, pre-task and on-task measures of symptom reporting behavior were collected for all subjects. Cognitive activity during the task was also assessed. Subjects completed self-report measures designed to assess impact of illness, models of illness, depression, anxiety and strategies used to cope with physical distress. Specific hypotheses were as follows:

1. It was expected that functional disease would lead to increased self-reported disability in comparison to organic disease as functional patients are more affectively distressed and interpret their symptoms in a way that does not allow for adjustment and coping. Thus, it was hypothesized that IBS patients would report more extensive disability on a measure of the symptom impact and physical restriction in comparison to Crohn's patients and healthy controls.

2. It was expected that IBS patients would report multiple somatic complaints in comparison to Crohn's patients and healthy controls as IBS patients have a tendency to focus on and interpret internal states maladaptively. Thus, it was hypothesized that IBS patients would endorse a greater number of general physical symptoms as well as GI specific symptoms in comparison to Crohn's patients and healthy controls.
3. It was expected that patients in both the IBS and Crohn's groups would experience affective distress, but that the IBS patients would report greater levels of affective distress given the maladaptive focus on internal states and coping strategies concerning their physical problems.. Thus, it was hypothesized that IBS patients would have elevated scores on measures of depression and anxiety in comparison to Crohn's patients and healthy controls.
4. Consistent with the notion that illness schema contributes to physical and psychological adjustment, it was expected that IBS patients would perceive themselves as having less personal responsibility and control and perceive their GI symptoms as more serious and changeable than Crohn's patients. Further, since the tendency to interpret symptoms from a more helpless and maladaptive stance was thought to be orthogonal to the physical complaints per se, it was hypothesized that IBS patients would evaluate symptoms of an unrelated illness similarly to how they evaluate their GI symptoms. Therefore IBS patients would perceive less responsibility and control and greater seriousness and changeability to symptoms of a 'neutral' illness in comparison to Crohn's patients and healthy controls.
5. As catastrophizing type cognitions are related to maladjustment to illness it was expected that IBS patients would engage in more catastrophizing type

cognitions as opposed to coping and self-efficacy strategies, than Crohn's patients and healthy controls. Thus, it was hypothesized that IBS patients would report using a greater number of catastrophizing coping strategies and fewer coping and self-efficacy strategies during painful episodes in comparison to Crohn's patients and healthy controls.

6. As social support is related to adjustment to illness it was expected that IBS patients would have greater interpersonal dysfunctional behavior in response to their symptoms relative to Crohn's patients. Thus it was hypothesized that IBS patients would report less supportive behaviors from significant others on a questionnaire designed to elicit behaviors from significant others in response to symptom complaints.

7. As IBS patients have a propensity to maladaptively focus on internal states it was expected that IBS patients would have a greater propensity to report symptoms following a task that elicits ambiguous physical sensations in comparison to Crohn's patients and healthy controls. Thus, it was hypothesized that IBS patients would report a greater number of symptoms on a post-task symptom questionnaire in comparison to Crohn's patients and healthy controls.

8. Given the assumption that IBS patients interpret and respond maladaptively to symptoms, it was expected that IBS patients would report using more dysfunctional coping self-statements during an ambiguous physical task. Thus it was hypothesized that IBS patients would report significantly more catastrophizing cognitions during the post task cognitive interview in comparison to Crohn's and healthy controls.

9. Consistent with the assumption that IBS patients experience less self-efficacy and control in response to symptoms, it was expected that attributions about their performance on a physical task would reflect a lack of personal agency and control. Thus it was hypothesized that on a questionnaire designed to elicit attributions about their performance on a physical task, the IBS patients would attribute the perceived causes of their performance to an external locus of causality and uncontrollability in comparison to Crohn's patients and healthy controls.

10. It was expected that there would exist variability in the extent of disability in both GI groups. It was further predicted that the dysfunctional processes predicted for IBS patients would occur to a greater extent in GI patients with high levels of disability than in GI patients with low levels of disability. Further, it was predicted that the GI diagnosis would interact with disability level, with highly disabled IBS patients manifesting the predicted dysfunctional coping more than less disabled IBS patients, or either the high or low disabled Crohn's patients.

11. Finally it was hypothesized that the level of disability could be predicted from variables reflecting implicit models of illness and cognitive coping activity. These variables were hypothesized to significantly predict disability beyond what would be predicted by symptom reporting tendencies and affective distress.

## METHOD

### Subjects

A total of 79 patients were recruited from the outpatient Gastrointestinal Unit of the Ottawa Civic Hospital, a tertiary care teaching hospital. The unit has 6 gastroenterologists on staff and in addition to inpatient consultation, provides over 1000 outpatient consultations per year. Individuals presenting to the clinic with a diagnosis of IBS (n=45) and Crohn's disease (n=34) were selected for inclusion in this investigation. Although IBS can be diagnosed and treated by a general practitioner, the patients presenting to this clinic are typically referred by their family physician or another specialist and are perhaps the more complex cases for intervention. Crohn's patients are typically diagnosed and managed by a gastroenterologist and thus the patients presenting to this clinic reflected a general sample of Crohn's patients either in acute distress or remission. Hospitalized patients were not, however, included in the study.

IBS patients that met the diagnostic criteria agreed upon by the international committee of gastroenterologists for the diagnosis of IBS were included in the study. Crohn's patients were referred by the gastroenterologist and their diagnosis had been confirmed through radiologic examination, specifically barium enema and blood analyses. Five patients (3 Crohn's patients and 2 IBS patients) who had a co-existing major physical disorder were excluded, as the primary source of disability could not be readily determined.

A convenience sample of 34 non-patient control subjects were obtained from heterogeneous sources including: university support staff, community groups, and staff in elementary and secondary educational institutions. It was estimated that these sources would have demographic characteristics similar to those of the clinical groups. Inclusion criteria for controls were: 1) individuals must not have been under

the care of a physician/psychologist for any physical or psychological condition; and 2) individuals must not have suffered from recurrent episodes of abdominal pain, constipation or diarrhea. Given that the incidence of IBS and healthcare utilization for this group is disproportionately greater in females, and in order to control effects attributable to gender, only female subjects participated in this study.

### Measures

**Sickness Impact Profile (SIP).** The SIP (Bergner, Bobbitt, Carter, & Gilson, 1981) is a 136 item, behaviorally based measure of sickness related dysfunction (see Appendix A). This self-administered questionnaire requires approximately 30 minutes to complete. The SIP was designed to provide a reliable, valid and sensitive measure of health status. Subjects reported their perception of their functioning in various activities of daily living. Subjects were instructed to check those items which described them today and were related to their health

On the SIP, individual items are aggregated into twelve categories: ambulation, mobility, body care and movement, social interaction, communication, alertness behavior, emotional behavior, sleep and rest, eating, work, home management, recreation and pastimes. Scores were obtained for each category and for a combination of categories yielding a physical dimension score, a psychosocial score, and an overall sickness impact score. The instrument has weights associated with each item which pre-determine the relative severity of dysfunction associated with each activity or function.

The SIP has a test-retest reliability of 0.92 and an internal consistency of 0.94 (Bergner et al., 1981). Although the SIP is a behavioral sample obtained on a day where the subject may or may not be experiencing physical symptoms, it has demonstrated adequate construct validity (Bergner et al., 1981). Specifically, the SIP has been shown to discriminate among subgroups with varying health status. In

addition, the SIP score, and patterns of checked items, are sensitive to change across time and to differences between high and low functioning groups (Bergner et al., 1981). SIP scores are related to subjects' self-assessment of health status, clinicians' assessment of subjects' health status, and scores obtained on functional assessment instruments (Bergner, Hallstrom, Bergner, Eisenberg, & Cobb, 1985).

While the subscale scores were examined for descriptive purposes, only the overall SIP score was used for the analyses. This score appeared to best measure disability in a global sense as it was a composite score of both physical and psychological aspects of disability. High scores on the SIP indicate significant levels of disability or disease impact. A score of 0 indicates "no disability or disease impact".

**Gastrointestinal Symptom Rating Scale (GSRS).** The GSRS, (Svedlund, Sjodin, & Dotevall, 1988) is a 15 item interview rating scale designed to assess symptoms associated with various gastrointestinal conditions (see Appendix B). GI symptoms were quantified on a 0 to 3 scale as to their intensity, frequency, and duration, yielding a total score ranging from 0 to 45. Higher scores are indicative of greater symptom severity. The total symptom severity score was used in this investigation. The GSRS has demonstrated satisfactory interrater reliability ranging from .86 to 1.00. The validity of the GSRS has not been firmly established, however, it has proven sensitive to changes in gastrointestinal functioning among patients treated with commonly prescribed drugs (Svedlund et al., 1988). Subjects completed the GSRS based on the month preceding the psychosocial assessment.

**Gastrointestinal Diseases Diary (GIDD).** The GIDD was derived from the Crohn's Disease Activity Index (Best, Becketl, Singleton, & Kern, 1976) which is a clinical index of degree of illness in Crohn's patients. The GIDD is comprised of a diary card which was completed over 7 consecutive days prior to assessment (see Appendix C). This diary provided self-monitored information on patient

occurrences of soft and hard stool consistency, as well as ratings of abdominal pain (0=none, 1=mild, 2=moderate, 3=severe) and general well being (0=generally well, 1=slightly under par, 2=poor, 3=very poor, 4=terrible). For each of the four variables, a ratio score was calculated and used in the analyses. The ratio score consisted of the sum of the daily ratings divided by the number of days monitored. A ratio score controlled for the occasional missing day of monitoring.

**Health Status Index (HSI).** As a check on possible differences between patient groups, gastroenterologists provided a subjective rating of the severity of the patients' health status for a subsample of 50 patients. The HSI rating scale assessed current health status on a six point rating scale ranging from 0 "perfectly healthy" to 6 "severely unhealthy" (see Appendix D). The HSI was used only for descriptive purposes to characterize the sample and was not included in the analyses.

**Pennebaker Inventory of Limbic Languidness (PILL).** The PILL (Pennebaker, 1982;) is a 54 item checklist which assessed the frequency of diverse physical symptoms (see Appendix E). The inventory is designed to measure an individual's general tendency to report symptoms and has been conceived of as a "trait" measure.

The PILL items were rated according to a 5 point scale (A=have never or almost never experienced the symptom, B=less than 3 or 4 times per year, C=every month or so, D=every week or so, E=more than once a week). Scoring for each item was based on a binary method (0=A & B; 1=C,D, & E) such that a point was obtained only if a symptom was experienced monthly or more frequently. The total score, which could range from 0 to 54, was used in the analyses with higher scores representing a greater number of reported symptoms occurring monthly or more frequently.

The PILL has demonstrated satisfactory reliability. Pennebaker (1982) has reported high internal consistency (Cronbach's alpha=.88). Further, over a two

month period, Pennebaker (1982) reported the test-retest reliability of the PILL to be .79 in a group of 177 adults.

**Center for Epidemiological Studies Depression Scale (CES-D).** The CES-D (Radloff, 1977) is a 20 item self-report scale designed to measure depressive symptomatology in the general population (see Appendix F). Respondents rated the frequency of symptoms experienced in the last week on a four point scale [0=rarely or none of the time (less than 1 day), 1=some or a little of the time (1-2 days), 2=occasionally or a moderate amount (3-4 days), 3=most or all of the time (5-7 days)]. The total score, which ranges from 0 to 60, was derived by summing the items and was used in the analyses. As reported in Radloff (1977) the scale has demonstrated high internal consistency and adequate test-retest reliability. Further, the CES-D correlates with other self-report measures of depression and clinical ratings of depression.

**State Trait Anxiety Inventory (STAI).** The form Y of the STAI (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) is a 40 item inventory that was used to measure two aspects of anxiety: trait anxiety and state anxiety (see Appendix G). Patients responded to 20 statements instructing them to report how they felt at the present moment (state anxiety) and to 20 statements instructing them to report how they felt generally (trait anxiety) on a four point scale (1=not at all, 2=somewhat, 3=moderately so, 4=very much so). The total scores for state and trait anxiety were used in the analyses. The reliability and construct validity of form Y of the STAI has been demonstrated in chronic disease conditions (Karloly & Jensen, 1987).

**Implicit Models of Illness Questionnaire (IMIQ).** The IMIQ (Turk, Rudy, & Salovey, 1986) is a 24 item questionnaire which assesses the intrapsychic dimensional structure used to organize individual illness schema (see Appendix H).. Items contain descriptive or explanatory statements about a particular illness and patients rated each item on a visual analogue scale ranging from "Strongly Agree" at

one end to "Strongly Disagree" at the other end. For scoring purposes, each visual analogue scale was scored from 1 to 9 depending where the subject placed an "X". Patients were instructed to complete this questionnaire twice: once describing their GI condition and once describing a supposedly neutral condition, namely flu. Control subjects completed the questionnaire once describing flu only.

An exploratory factor analysis of this questionnaire revealed a four dimensional structure of illness interpretation labeled a) seriousness, b) personal responsibility, c) controllability, and d) changeability. The structure has been cross-validated by means of confirmatory factor analysis and proven to be stable across subjects varying in disease, health and occupational status. Also, the factors demonstrate reliability and discriminant validity when used to evaluate various diseases such as cancer and diabetes (Turk et al., 1986). Therefore scores for each factor were calculated and used in subsequent analyses.

**Coping Strategies Questionnaire (CSQ).** The CSQ (Rosentiel & Keefe, 1983) consists of 41 items reflecting 6 scales of cognitive coping (i.e., diverting attention, reinterpreting pain sensations, coping self-statements, ignoring pain sensations, praying or hoping, and catastrophizing) and one scale of behavioral coping (i.e., increasing activity level). In addition there are two pain control effectiveness ratings (i.e., control over pain, and ability to decrease pain) (see Appendix I). Components of the CSQ are related to different patterns of adjustment to chronic pain conditions. For example, more frequent use of maladaptive cognitive activity is associated with poor psychosocial functioning.

Recent confirmatory factor analytic work with the CSQ has found that 3 factors (use of an active cognitive coping strategy, presence of 'self-efficacy cognitions, and cognitive diversion) account for most of the variance in cognitive coping activity (Lawson, Reesor, Keefe, & Turner, 1990). It appears that two scales, catastrophizing and increased behavioral activity, are factorally independent.

Therefore, consistent with the recommendations of Lawson et al. (1990), 5 scores were derived from the CSQ (use of an active cognitive coping strategy, presence of self-efficacy cognitions, cognitive diversion, catastrophizing and increased behavioral activity) and used in subsequent analyses to measure pain related cognitive coping activity.

**Multidimensional Pain Inventory (MPI).** The MPI (Rudy, 1987) is a 52 item self-report measure that is comprised of 13 separate scales derived from factor analytic studies. The MPI scales included here were 4 scales that assessed interpersonal responses to pain behavior; one scale measuring perceived social support and 3 scales reflecting the frequency and extent of various behavioral responses of spouses and/or significant others (punishing, solicitous, and distracting responses). Thus 4 measures reflecting interpersonal responses to painful or distressing symptoms were included in these analyses (see Appendix J). Both internal consistency (coefficient alphas range from .73 to .90) and test-retest reliabilities ( $r$ 's range from .62 to .89) have been reported for these scales (Kerns, Turk, & Rudy, 1985). The interpersonal response scales have also demonstrated significant association with measures of marital satisfaction and adjustment (Flor, Turk, & Scholz, 1987). Thus the MPI scales have demonstrated internal consistency, reliability over time, and construct validity. Since items on the MPI depend upon the presence of clinically significant symptoms, MPI scales were administered only to the patient groups.

### **Apparatus**

The apparatus used in the somatoprojective task, described below, consisted of a 180 cm vertical pole which was anchored to a tripod. The pole contained a series of holes in order to allow for the insertion of a metal pole which marked the maximum downward deviation of the arm permitted for each subject. A Sony

portable video recording camera was used to record the somatoprojective task for each subject.

Upon termination of the task subjects immediately viewed their taped performance on a Sony TV. During the playback of their performance, subjects' cognitions were recorded verbatim on a portable Sony cassette recorder.

### **Questionnaire Administration Procedure**

Identified patients were provided with copies of the information and informed consent form during clinic visits (see Appendix K). The experimenter reviewed the purpose of the study and answered questions pertaining to the project. Individuals who agreed to participate signed and received a copy of the information and informed consent form. Patients were given the MPI and the GIDD to complete at home and return at the time of the scheduled testing. Control subjects also completed the GIDD prior to the scheduled time of testing.

At the time of testing, prior to the experimental task, the experimenter administered the GSRS to both patient groups as well as control subjects. All subjects completed a Personal Information Sheet (see Appendix L) from which background information was obtained and then completed the SIP, PILL, IMIQ, CES-D, STAI, and the CSQ.

### **Somatoprojective Task (SPT) Procedure**

Once subjects had completed the psychosocial questionnaires, they participated in the SPT. This task was devised to create ambiguous physical sensations in a standardized context and to assess: 1) the variability in individuals' perceptions of their symptoms; 2) cognitions elicited in the presence of these symptoms; and 3) attributions of task performance. The task involved having the subjects extend their non-dominant arm perpendicular to their body for a maximum

of 15 minutes. The procedure was based on that devised by Nolan (1988). Each subject stood 50 cm away from the vertical pole. A metal bar was inserted 29 cm below the tip of the fingers, allowing each subject's arm to deviate 30 degrees from its original horizontal position (see Appendix M).

Subjects were first given a demonstration of the arm extension-task. The arm was extended to the side, at shoulder height, and horizontally parallel with the floor. Instructions were given regarding the arm-extension task and the provision of fatigue ratings. To ensure that the subject understood how to use the fatigue rating scale, a baseline measure of fatigue was obtained following the experimenter's instructions. Similarly, an overall measure of fatigue was obtained since general fatigue appeared to be related to arm fatigue (personal communication Nolan, 1988).

Once measurements for placement of the bar were taken and baseline/overall fatigue ratings taken, subjects began the arm extension-task. Timing began once the subject extended her arm and ended when the subject could no longer extend the arm in the non-supported position (the arm has dropped 30 degrees from the horizontal position) or the subject continued to engage in prohibited arm movements involving different muscles (i.e., movements such as turning the palm upward, bending the elbow, or lifting the shoulder) (Nolan, 1988).

The experimenter cued subjects to report fatigue ratings at 60 second intervals for the duration of the task or until 15 minutes had elapsed at which time the task was terminated. A measure of the length of time in seconds spent engaged in the arm extension-task was obtained for all subjects. The arm-extension task was videotaped.

**Fatigue Rating Scale (FRS).** A Fatigue Rating Scale similar to that employed by Matthews and Volkin (1981) and adapted by Nolan (1988) in the arm extension-task was used to assess fatigue in the present study. Subjects were

requested to give fatigue ratings on a scale of 0 "not at all tired" to 10 "extremely tired" at 60 second intervals. A chart illustrating the fatigue rating scale was fastened to the wall facing the subject. No time limits were given to subjects at the onset of the SPT. Subjects were instructed to discontinue when they were so tired they could no longer keep their arm extended and/or could no longer keep their arm within the pre-set boundaries (see Appendix N).

**Cognitive Assessment Scoring Key (CASK)** Following the arm extension-task subjects viewed the videotape of their arm extension task during which time they were asked to list any thoughts and/or feelings which they had experienced as they reported fatigue ratings (see Appendix O). Responses were audio recorded and coded by independent raters according to a cognitive rating scale (Reesor & Craig, 1988) which classified cognitions according to 6 categories: dissociation, mental relaxation, imagery, non-imagery distraction, sense of control, and catastrophizing (see Appendix P). Inter-rater correlations for the CASK have been reported between 0.71 and 0.87 (Reesor & Craig, 1988).

Following the cognitive interview, subjects completed the Post-Task Symptom Checklist and the Causal Dimension Scale.

**Post-Task Symptom Checklist (PSC).** The Post-Task Symptom Checklist (Nolan, 1988) is a 35 item checklist composed of both positive and negative symptoms (see Appendix Q). The PSC was originally administered to healthy adults and adolescents following the arm-extension task. It included both task relevant and task irrelevant symptoms. Subjects rated the presence or absence of symptoms on a three point scale consisting of "none at all", "some, a bit", and "quite a lot". Factor analysis revealed 2 separate components: negative and positive symptoms. Scores derived from these factors were used in the analyses.

**Causal Dimension Scale (CDS).** The Causal Dimension Scale (Russell, 1982) is a 9 item scale that assesses perceived causes and attributions for

performance (see Appendix R). Causal perceptions on this measure are assessed on three dimensions: locus of causality, stability and controllability. These three subscales have demonstrated adequate reliability and validity. Principal component analysis has confirmed the three dimensional structure of the scale. The CDS was used in the study as a means of assessing subjects' attributions concerning their performance on the arm-extension task.

### **Data Analysis Strategy**

Sample size estimates for the study were based on an alpha set at 0.5, with a power of 0.8 and a high expected effect size of 0.8. These parameters yielded an n of 25 subjects per group. However, given that many of the analyses would include a statistical correction for Type I error, calculations with a more stringent level of alpha yielded an n of 33 per group.

The choice of a large effect size was consistent with the conceptualization that psychosocial differences accounted for the IBS patient seeking consultation for her symptoms. A large effect size was also consistent with the data analysis strategy adopted here, in that small effect sizes were assumed to be of lesser clinical importance than group differences which produced large effect sizes. As statistical difference does not often reflect meaningful clinical differences, it was felt that this strategy would avoid or minimize the possibility of clinically non-meaningful results.

There were 5 basic analyses undertaken in this investigation:

- 1) examination of patient history, patient characteristics, and demographic variables were analyzed using one way analysis of variance (ANOVA), or Chi square analyses, or t-tests as appropriate.
- 2) examination of differences on dependent variables between the IBS Crohn's and control groups in a one-way factorial design, first on the clinical self-report measures then on the somatoprojective task measures;

- 3) examination of differences for dependent variables between the IBS and Crohn's groups;
- 4) examination of disease (IBS versus Crohn's) by disability (high versus low) effects on dependent variables in a 2 x 2 factorial design;
- 5) multiple regression prediction of disability in the combined clinical groups.

As the purpose of the first analysis was to confirm expectations that the groups were equivalent on background variables and to identify potential covariates, no special controls for Type I error problems were undertaken in analyzing patient background information. When significant differences in variances existed for comparisons between clinical groups, separate variance estimates for t-tests were used.

With respect to the second set of analyses in order to examine differences between the IBS, Crohn's and control groups on clinical/self-report measures, a set of dependent variables which included total or subscale scores as described above for the GSRS, PILL, CES-D, STAI, CSQ, and IMIQ, scales, data was grouped according to the a priori conceptualization of the hypothesized constructs. Therefore the majority of the hypotheses and assumptions were analyzed in 4 separate multivariate analyses encompassing the following groups of variables: 1) physical symptom severity variables, 2) emotional symptom variables, 3) coping strategy variables, and 4) implicit models of illness variables. Grouping the variables into construct related categories permitted the use of 4 one-way multivariate analyses of variance (MANOVA) to assess whether groups differ on linear combinations of variables reflecting common constructs and controlled for inflated Type I error that would occur if the data was analyzed using univariate strategies alone. To further control for Type I error, the alpha level for the one-way MANOVAs was corrected following the Bonferroni procedure, where alpha is divided by the number of analyses being conducted (i.e.,  $.05/4$  analyses = a stepped

down alpha at .0125) and the stepped-down alpha was used for the determination of significance. Then, only those one-way MANOVAs achieving statistical significance were subjected to univariate analyses and post-hoc range tests to aid interpretation of data. As a further control on Type I error rate, the Bonferroni correction was applied to each set of univariate analyses within each construct category of variables. The limited number of dependent variables in each category ensured sufficient power for the multivariate analyses (Tabachnick & Fidell, 1989) or, in other words, ensured a subject to variable ratio of at least 10 to 1 for each multivariate analysis. In each case, inspection for potential multivariate outliers which can also inflate Type I and Type II error rate was undertaken as was inspection of Box's M test to examine for gross violations of homogeneity of variance-covariance matrices (Tabachnick & Fidell, 1989). As the continuous variables appeared normally distributed, the use of multivariate analyses was judged appropriate. Multivariate significance was determined by using Wilks' criterion unless otherwise indicated.

Since it could be argued that the grouping of similar variables for separate construct related analyses could increase the chances of multicollinearity in these multivariate analyses, as a precaution, correlation matrices within groupings were undertaken and any highly correlated (over  $r = .50$ ) and therefore redundant measures were dropped from the multivariate analysis.

Finally, potential covariates were identified by examining differences among groups on patient characteristics and demographics. The identification and uses of covariates was thought to be important to rule out any spurious association that might confound the interpretation of group differences. Covariates identified were analyzed separately using a multivariate analysis of covariance (MANCOVA) to see if group differences were attenuated when the variance associated with the covariate was removed from the error variance. If this resulted in non-significance in a

significant MANOVA then examination of univariate analyses for a construct related set of variables was not undertaken.

The same strategy was applied for measures obtained from the somatoprojective task. Two one-way MANOVAs were conducted on the subjective ratings, tolerance time, PSC scores, in-vivo cognitive coping activity ratings, and CDS scores. This resulted in two construct related categories: (1) subject symptom ratings and tolerance time and (2) cognitive and attributional activity during the task. The MANCOVA's and appropriate univariate analyses were also undertaken with the same strategies as described for the clinical measures for control of Type I and Type II error.

As the GI IMIQ and the 4 MPI interpersonal scales were only administered to the two clinical groups, two separate Hotelling's  $T^2$  were undertaken with alpha stepped down to .025. These dependent variables were administered only to the patient groups since the measures were specific to clinical conditions. Significant multivariate findings then permitted analysis of the univariate scale scores in a series of t-tests with a stepped down alpha to control for Type I error.

To examine hypotheses that predicted possible effects for disability or disease/disability interactions a series of four 2 X 2 MANOVAs (high/low disability by disease status) were undertaken using a similar strategy and the same construct related groupings for control of Type I and Type II error as described above. Only if the 2 X 2 MANOVA was significant then a 2 X 2 MANCOVA was also undertaken to assess whether there was any attenuation in  $F$  ratios and significance level when the variance attributed to the covariate was removed from the error variance. If this resulted in a non-significant main or interaction effect, then univariate analyses were not undertaken.

As the number of subjects per cell was low after the median split to determine disability assignment, tests of homogeneity were examined to ensure

fairly equal distribution. It has been found that MANOVA is robust to a modest violation of normality if the violation is a result of skewness rather than as a multivariate outliers (Tabachnick & Fidell, 1989). As with previous multivariate analyses, inspection for the possibility of outliers was undertaken.

Finally, since understanding and predicting disability based on the hypothesized constructs affecting these clinical populations was another goal, a multiple regression analysis was undertaken to examine the extent to which hypothesized cognitive variables could account for the variance in disability. Power analyses indicated that with alpha set at 0.1 and power at .80, a total n of 47 subjects would be required to show robust correlations.

## RESULTS

### Group Differences

**Characteristics of Patient and Control Groups.** Prior to undertaking the data analysis strategies outlined above, various characteristics of this sample were examined to rule out any unexpected variation in patient characteristics that could spuriously account for group differences, and also to confirm expected variation among groups. As the intent of these analyses was to identify potential covariates for subsequent analyses, no attempt was made to control for Type I error.

As shown in Table 1, group differences were analyzed in a series of one way ANOVAs or chi square analyses depending on whether the data was continuous or discrete in nature to determine differences between the IBS, Crohn's and control groups. When significant differences were found on ANOVAs, post-hoc Tukey tests were used to determine how groups differed among each other.

As expected, both of the clinical groups had seen a significantly greater number of physicians in the past year and consumed more medications than the control subjects. Also, there were no significant differences with respect to marital status, educational level, employment status, or alcohol consumption. Crohn's patients in this sample, however, were significantly younger than both the IBS and control patients. Differences also emerged in the proportion of smokers in each group. A univariate ANOVA revealed significant differences across groups in mean cigarette consumption. A post-hoc Tukey test revealed that Crohn's patients consumed cigarettes, on average, greater than controls but not significantly different from IBS patients.

Differences across groups in age and cigarette consumption were not expected. It was felt that age effects could potentially account for differences

Table 1: Percentage Breakdowns or Mean Values on Subject Characteristics by Group

Characteristic	Group			Statistic
	IBS (n=45)	Crohn's (n=34)	Control (n=34)	
<u>Physical Characteristics:</u>				
Age <sup>a</sup>	39.0 (12.6)	31.9 (8.9)	40.4 (13.5)	F(2,110)=5.0*
<u>Demographic Characteristics:</u>				
Marital Status (%)				$\chi^2(4)=8.5$
Single	26.7	23.5	8.8	
Married/common law	64.4	76.5	76.5	
Separated/divorced	8.9	0.0	14.7	
Education (%)				$\chi^2(4)=6.3$
Secondary	40.0	41.2	38.2	
College/trade	35.5	29.4	14.7	
University	24.4	29.4	47.1	
Work status (%)				$\chi^2(2)=1.7$
Full/part-time work	80.0	76.5	88.2	
Unemployed/retired	20.0	23.5	11.8	
<u>Medication/Drug Consumption:</u>				
Medications (%)				$\chi^2(4)=14.1^*$
No Medication	37.8	26.5	67.6	
1 Medication	33.3	29.4	11.8	
2 or more	28.9	44.1	20.5	
Alcohol consumption (%)				$\chi^2(4)=1.7$
No alcohol	31.1	23.5	32.4	
1 drink/wk	35.6	32.4	26.5	
2+ drink/wk	33.3	44.1	41.2	
Cigarettes				
% smokers	26.7	50.0	8.8	$\chi^2(1)=14.3^{**}$
Daily frequency <sup>b</sup>	4.5 (9.3)	7.1 (9.8)	1.1 (4.6)	F(2,110)=4.4*

(cont'd)

Table 1 (cont'd): Percentage Breakdowns or Mean Values on Subject Characteristics by Group

Characteristic	Group			Statistic
	IBS (n=45)	Crohn's (n=34)	Control (n=34)	
<u>Health Care Utilization:</u>				
Physicians seen in past year (%)				$\chi^2(4)=54.3***$
One or none	4.4	5.9	67.7	
2 or 3	64.4	58.8	32.4	
4 or more	31.1	35.3	0.0	

\*p&lt;.01; \*\*p&lt;.001; \*\*\*p&lt;.0001

a IBS, Controls &gt; Crohn's on post-hoc Tukey test

b Crohn's &gt; Controls on post-hoc Tukey test

Note: Numbers in parentheses denote standard deviations next to mean values

between groups, and so age was used as a covariate in subsequent relevant analyses. Also, there is evidence that cigarette smokers, as a group, exhibit more negative attitudes toward health (Castro, Newcomb, McCreary, & Baezconde-Garbanati, 1989). Further, with greater cigarette consumption, there is less health consciousness and greater tendency to engage in less healthy lifestyles and less motivation to change. The implication from a variety of studies (Carmody, Brischetto, Matarazzo, O'Donnell, & Conner, 1985; Castro, et al., 1989; Istvan & Matarazzo, 1984; Remington, Forman, Gentry, Marks, Hogelin, & Trowbridge, 1985) that cigarette smoking covaries with a constellation of unhealthy attitudes, unhealthy behaviors, and impaired health or self-management motivation, suggested that it was prudent to include cigarette smoking as a covariate to rule out the interpretation that differences between groups was not a function of symptom information processing per se, but a function of dysfunctional health-related psycho-behavioral lifestyle. Therefore cigarette consumption was also used as a covariate in relevant analyses.

Some patient characteristics particular to the two gastrointestinal groups were analyzed using t-tests for continuous data and Chi-square for discrete data. As shown in Table 2, consistent with the expected medical involvement of Crohn's disease, Crohn's patients had consulted with a significantly greater number of GI specialists than had the IBS patients. Crohn's patients also reported a greater frequency of previous hospitalization for their GI condition. However, there were no differences in the percentage reporting 'flare up' episodes, the number of current 'flare up' episodes, the duration of their condition, or the GI specialist's rating of the severity of their symptoms.

**Disability.** Following hypothesis 1, that the IBS group would be more disabled than the other groups, disability level as measured by the total SIP disability score was analyzed in a series of univariate one-way ANOVAs and post-

Table 2: Percentage Breakdowns or Mean Values on Subject Characteristics by GI Group

Characteristic	GI Group		Statistic
	IBS (n=45)	Crohn's (n=34)	
<u>Contact with Specialists:</u>			
% seeing GI Specialists			$\chi^2(4)=75.3^{**}$
one	35.6	2.9	
2 or 3	51.2	64.8	
4 or more	13.3	32.4	
Mean number of GI specialists	2.2 (1.3)	3.5 (2.1)	$t(76)=3.4^*$
<u>Hospitalization History:</u>			
% hospitalized over past year	8.9	18.2	$\chi^2(1)=1.5$
% previously hospitalized for GI condition	22.2	90.9	$\chi^2(1)=36.0^{**}$
<u>Chronicity/Severity:</u>			
Mean duration (months)	82.9 (81.8)	105.1 (72.7)	$t(76)=1.2$
Gastroenterologists' severity rating (HSI)	3.3 (1.5)	3.2 (1.6)	$t(49)=0.1$
<u>Flare-up episodes:</u>			
% with flare up episodes over past year	52.3	42.4	$\chi^2(1)=0.7$
Mean flare ups	45.9 (94.1)	40.0 (107.4)	$t(71)=0.3$

\*p&lt;.001; \*\*p&lt;.0001

Note: Numbers in parentheses denote standard deviations next to mean values

hoc Tukey tests. As shown in Table 3, total disability was significantly greater for the two clinical groups in comparison to controls, who reported minimal disability. There was no difference between the clinical groups on the post-hoc Tukey test for total disability. This was contrary to the assumption that the IBS patients would report more extensive disability and impact on their functioning in comparison to Crohn's patients and healthy controls. As shown in Table 3, the overall physical and psychosocial disability scores were also significantly greater for the two clinical groups in comparison to controls. Similar total SIP scores ( $8.6 \pm 9.8$ ) for Crohn's patients are cited in Drossman, Patrick, Mitchell et al. (1989).

Subscale scores were examined for exploratory/descriptive purposes since there were no specific hypotheses about the specific manifestation of disability. No significant differences emerged between the clinical groups on any of the measures of disability. In eight of the twelve scale scores (sleep and rest, emotional behavior, body care and movement, home management, social interaction, work, recreation, and eating) disability was significantly higher in both clinical groups as compared to controls. In three of the scales, ambulation, alertness behavior and communication IBS patients reported significantly greater disability than the controls. Finally, on one of the scales, mobility, Crohn's patients were significantly more disabled than controls. Thus, the clinical groups were subtly different from each other but clearly different from the control group.

As inspection of the mean SIP psychosocial disability scores was suggestive of a difference between clinical groups post-hoc power analyses were conducted in order to investigate the possibility of a Type II error. Effect size and power analyses on the obtained SIP psychosocial disability scores revealed an actual effect size between the clinical groups of .28 which would be considered small. As a result, the power of this analysis was calculated to be .26. Using a revised sample size

Table 3: SIP Scale Scores by Group

SIP Score	Group						F(2, 110)
	IBS (n=45)		Crohn's (n=34)		Control (n=34)		
	Mean	(SD)	Mean	(SD)	Mean	(SD)	
Total Disability <sup>a</sup>	8.5	(6.9)	7.2	(7.7)	0.4	(1.1)	18.6***
<u>Subscales:</u>							
Physical Disability <sup>a</sup>	3.6	(5.0)	3.6	(4.9)	0.0	(0.2)	8.9**
Psychosocial Disability <sup>a</sup>	11.4	(10.8)	8.4	(10.6)	0.7	(2.7)	14.0***
Sleep and Rest <sup>a</sup>	12.0	(13.7)	15.4	(21.3)	0.6	(2.5)	9.7**
Emotional Behavior <sup>a</sup>	14.3	(21.0)	14.1	(14.4)	1.8	(5.3)	7.4**
Body Care and Movement <sup>a</sup>	3.8	(5.7)	2.8	(4.1)	0.0	(0.0)	7.9**
Home Management <sup>a</sup>	10.3	(15.8)	9.6	(17.7)	0.0	(0.0)	6.1*
Mobility <sup>b</sup>	4.5	(7.6)	6.1	(12.1)	0.2	(1.1)	4.8*
Social Interaction <sup>a</sup>	11.8	(11.3)	9.1	(14.0)	0.6	(3.2)	11.2***
Ambulation <sup>c</sup>	3.3	(6.2)	2.0	(3.5)	0.0	(0.0)	5.6*
Alertness Behavior <sup>c</sup>	14.5	(19.0)	8.8	(16.1)	0.3	(1.8)	8.8**
Communication <sup>c</sup>	4.6	(10.9)	1.1	(3.8)	0.3	(1.5)	4.1*
Work <sup>a</sup>	18.4	(23.5)	19.8	(29.3)	0.8	(2.7)	8.2**
Recreation <sup>a</sup>	15.4	(16.4)	11.0	(15.7)	1.6	(4.6)	10.0**
Eating <sup>a</sup>	3.7	(4.6)	2.7	(4.7)	0.2	(1.0)	8.0**

\*p&lt;.05; \*\*p&lt;.001; \*\*\*p&lt;.0001

<sup>a</sup> IBS, Crohn's >Controls on post-hoc Tukey test<sup>b</sup> Crohn's >Controls on post-hoc Tukey test<sup>c</sup> IBS > Controls on post-hoc Tukey test

estimate, it would be possible to get a significant result here with a sample size of 200 patients in each group.

**Physical Symptom Severity.** The GSRs, the PILL and the 4 GIDD indices were analyzed in a one way MANOVA. Using the Wilks' criterion, the overall MANOVA for physical symptom severity measures revealed a significant difference among groups [Mult  $F(12,194)=10.53$ ,  $p < .001$ ]. However, the Box's M test was significant on this analysis suggesting a potential threat to robustness. On inspection of the variances for the cells, the IBS group with the largest  $n$  had larger variance than the controls. In this situation, the null hypothesis can be rejected with confidence (Tabachnick & Fidell, 1989). Alternatively, the use of Pillai's criterion, instead of the Wilks' criterion, has been recommended to determine multivariate significance when Box's M is significant (Tabachnick & Fidell, 1989); this also revealed a significant difference [Mult  $F(12,196)=9.86$ ,  $p < .001$ ]. This effect remained significant with Pillai's criteria even when the covariates age and cigarette consumption were introduced in a MANCOVA [Mult  $F(12,190)=8.81$ ,  $p < .001$ ]. Inspection of univariate one-way ANOVAs and post-hoc Tukey tests for group differences is shown in Table 4. With alpha stepped down to .0083, GI specific symptom severity, general physical symptom severity, abdominal pain severity, frequency of normal and soft stools and ratings of physical well-being were all found to be significant. Both clinical groups demonstrated greater symptom severity, reduced well being, reduced frequency of normal stools and greater frequency of soft stools in comparison to controls. Consistent with their clinical condition Crohn's patients reported a significantly greater number of soft stools than IBS patients and controls.

As inspection of the mean PILL scores was suggestive of a difference between the clinical groups post-hoc analyses were conducted in order to investigate the possibility of a Type II error. The resulting effect size was found to be .32. With

Table 4: Physical and Psychological Symptoms by Group

Measure	Group						F(2,110)
	IBS (n=45)		Crohn's (n=34)		Control (n=34)		
	Mean	(SD)	Mean	(SD)	Mean	(SD)	
<u>Physical Symptoms:</u>							
Gastrointestinal Symptoms (GRSR) <sup>a</sup>	15.1	(6.2)	14.1	(6.2)	4.2	(2.4)	45.2**
General Physical Symptoms (PILL) <sup>a</sup>	19.8	(9.9)	16.7	(9.2)	7.9	(4.9)	19.9**
<u>Physical Symptom Diary (GIDD):<sup>d</sup></u>							
Mean Daily Number of Soft Stools <sup>b</sup>	1.1	(1.1)	2.9	(3.0)	0.6	(0.8)	14.3**
Mean Daily Number of Hard Stools <sup>c</sup>	1.0	(1.2)	0.6	(0.8)	2.0	(2.0)	7.7*
Abdominal Pain Severity Rating <sup>a</sup>	1.0	(0.7)	0.9	(0.7)	0.1	(0.2)	21.7**
Well Being Rating <sup>a</sup>	0.9	(0.7)	0.9	(0.8)	0.2	(0.3)	13.0**
<u>Psychological Symptoms:</u>							
Depression (CES-D) <sup>a</sup>	15.8	(11.4)	14.0	(11.3)	4.0	(4.9)	15.2**
State Anxiety (STAI) <sup>a</sup>	35.5	(11.1)	35.7	(11.0)	26.8	(6.3)	9.5*
Trait Anxiety (STAI) <sup>a</sup>	42.6	(11.2)	39.4	(10.5)	29.6	(6.6)	16.7**

\*p&lt;.001;

\*\*p&lt;.0001

<sup>a</sup> IBS, Crohn's > Controls on post hoc Tukey test<sup>b</sup> Crohn's > IBS, controls on post-hoc Tukey test<sup>c</sup> Controls > IBS, Crohn's on post-hoc Tukey test<sup>d</sup> Due to missing diary data, n's are as follows: IBS=42, Crohn's=30, Controls=33; df(2,102)

the alpha reset, following the Bonferroni correction, this would provide a power of .14. Using a revised sample size estimate, it would be possible to get a significant result here with a sample size of 230 patients per group.

**Emotional Symptom Severity.** Both depression and anxiety as measured by the CES-D and the STAI also revealed a pattern consistent with the findings for group differences on physical severity. For the purposes of the multivariate analyses, the trait anxiety score was dropped to prevent potential multicollinearity problems as it was highly correlated with state anxiety. Using the Wilks' criterion, the overall MANOVA for emotional distress variables revealed a significant difference among groups [Mult  $F(4,218)=7.53$ ,  $p<.001$ ]. This effect remained significant even when the covariates age and cigarette consumption were introduced in a MANCOVA [Mult  $F(4,212)=6.68$ ,  $p<.001$ ]. Univariate ANOVAs and post-hoc Tukey test are shown in Table 4. Even with alpha stepped down to .017 both clinical groups evidenced significantly greater depression and anxiety than did the controls. No differences were found between the clinical groups. Similar scores for on the CES-D ( $13.48\pm 9.79$ ) and the STAI ( $42.0\pm 11.2$ ) are cited in Smith, Greenbaum, Vancouver et al. (1990).

As inspection of the mean Trait anxiety scores was suggestive of a difference between clinical groups, post-hoc power analyses were conducted in order to investigate the possibility of a Type II error. Effect size and power analyses conducted on the obtained Trait anxiety scores revealed an actual effect size of .29 between the two clinical groups which would be considered small. At the Bonferroni reduced alpha level this produced a power of about .15. Using a revised sample size estimate, it would be possible to get a significant result here with a sample of 240 patients in each group.

**Implicit Models of Illness.** The four scales of the IMIQ rated for a "neutral" illness (flu) were analyzed in a one-way MANOVA. The overall MANOVA for

group differences was significant [Mult  $F(8,214)=3.87$ ,  $p < .001$ ]. This effect remained significant at the stepped down alpha level even with the introduction of the age and cigarette consumption as covariates [Mult  $F(8,208)=2.55$ ,  $p < .011$ ]. The univariate one-way ANOVAs with post-hoc Tukey tests are shown in Table 5. With the alpha stepped down to .0125, significant group differences emerged on seriousness, personal responsibility and controllability. On post-hoc Tukey tests, in comparison to IBS and control patients, Crohn's patients rated the seriousness of flu as more severe. With respect to interpreting whether they have personal causation for flu symptoms, IBS patients were more likely than controls to attribute personal responsibility for the development and progression of flu than Crohn's and controls. However, in terms of perceived controllability of flu symptoms, IBS patients perceived greater ability to control flu symptoms than did Crohn's patients. None of the groups were significantly different in their perceptions of the variability or instability of the flu symptoms.

**Coping Strategies.** The 5 CSQ coping factors scales were analyzed in a one-way MANOVA which, using Wilks' criterion, revealed a significant group difference [Mult  $F(10,212)=3.85$ ,  $p < .001$ ]. This effect remained significant even with introduction of the covariate age and cigarette smoking [Mult  $F(10,206)=3.74$ ,  $p < .001$ ]. As shown in Table 6, frequency of reported use of various coping strategies as measured by the CSQ was analyzed for group differences using one-way ANOVAs and post-hoc Tukey tests. Group differences on the attention diversion factor tended toward significance ( $p < .03$ ) but when alpha was stepped down to .01 only 2 of the 5 factors emerged as significantly different across groups. "Catastrophizing" was found to be utilized with greater frequency in both clinical groups in comparison to controls. Sense of self-efficacy in ability to decrease and control pain was rated by both clinical groups as less than the controls.

Table 5: Illness Beliefs (IMIQ) Concerning Flu Across Groups

IMIQ Scale	Group						F(2,110)
	IBS (n=45)		Crohn's (n=34)		Control (n=34)		
	Mean	(SD)	Mean	(SD)	Mean	(SD)	
Seriousness <sup>a</sup>	6.5	(1.0)	7.2	(0.9)	6.5	(0.8)	7.8**
Personal Responsibility <sup>b</sup>	7.4	(1.2)	7.1	(1.4)	6.5	(1.2)	4.9*
Controllability <sup>c</sup>	5.9	(1.3)	5.0	(1.5)	5.2	(1.4)	5.3*
Changeability	4.4	(2.3)	4.1	(2.2)	4.2	(1.9)	0.2

\*p&lt;.01; \*\*p&lt;.001

<sup>a</sup> Crohn's > IBS, Controls on post-hoc Tukey test<sup>b</sup> IBS > Controls on post-hoc Tukey test<sup>c</sup> IBS > Crohn's on post-hoc Tukey test

Table 6: Coping Strategies (CSQ) by Group

CSQ Factor Scale	Group						F(2,110)
	IBS (n=45)		Crohn's (n=34)		Control (n=34)		
	Mean	(SD)	Mean	(SD)	Mean	(SD)	
Active Cognitive Coping Strategy	13.9	(7.0)	13.9	(6.3)	13.1	(5.9)	0.1
Self-efficacy Cognitions <sup>a</sup>	2.7	(1.2)	3.1	(1.0)	3.8	(1.0)	9.2*
Cognitive Diversion	14.8	(8.4)	13.6	(6.7)	10.4	(6.9)	3.4
Catastrophizing <sup>b</sup>	13.4	(8.2)	10.4	(7.0)	5.2	(4.5)	13.8**
Increased Behavioral Activity	15.2	(7.2)	13.8	(7.7)	13.7	(8.6)	0.5

\*p&lt;.001; \*\*p&lt;.0001

<sup>a</sup> Controls > IBS, Crohn's on post-hoc Tukey test<sup>b</sup> IBS, Crohn's > Controls on post-hoc Tukey test

As inspection of the mean catastrophizing scores was suggestive of a difference between the clinical groups, post-hoc power analyses were conducted in order to investigate for the possibility of Type II error. Effect size and power analyses conducted on the obtained catastrophizing scores revealed an actual effect size between the clinical groups of .39. This yielded a power of .22. Using a revised sample size estimate, it would be possible to get a significant result here with a sample size of 152 patients per group.

### **Differences Between GI Groups.**

**Interpersonal Responses.** Since data on the interpersonal responses to noxious physical symptoms had limited face validity for control subjects, the MPI was administered to the GI groups exclusively. The social interaction subscales of the MPI were analyzed in a Hotelling's  $T^2$  which revealed a significant multivariate effect [ $T^2(4,74) = .33, p < .001$ ]. As shown in Table 7, the social interaction subscales of the MPI were further analyzed using t tests. Both perceived support and frequency of solicitous responses emerged significant at the .05 level, however with the alpha level stepped down to .0125, only perceived support remained a significant difference. Crohn's patients reported greater ratings of perceived support than did the IBS patients. They reported more positive, helpful responses on the part of significant others to their distress than did the IBS patients. There were no differences in reported occurrence on ratings of negative or simple distracting responses on the part of others.

**Implicit Models of Illness for GI Condition.** The GI IMIQ scales were analyzed in a Hotelling's  $T^2$  which revealed a significant multivariate effect [ $T^2(4,74) = .42, p < .001$ ]. As shown in Table 8, both seriousness and personal responsibility emerged significantly different between the two clinical groups with alpha stepped down to .0125. In rating the illness schema dimensions on the IMIQ

Table 7: MPI Interpersonal Scale Scores by GI Group

MPI Scale	GI Group				t(76)
	IBS (n=45)		Crohn's (n=34)		
	Mean	(SD)	Mean	(SD)	
Perceived support	3.5	(1.8)	4.5	(1.3)	2.7*
Punishing responses	1.3	(1.4)	1.1	(1.5)	0.5
Sollicitous responses	2.9	(1.7)	3.7	(1.5)	2.2
Distracting responses	2.5	(1.9)	2.1	(1.9)	0.9

\*p&lt;.01

Table 8: Illness Beliefs (IMIQ) about GI Condition in Patient Groups

IMIQ Scale	GI Group				t(77)
	IBS (n=45)		Crohn's (n=34)		
	Mean	(SD)	Mean	(SD)	
Seriousness	2.2	(0.7)	1.7	(0.6)	3.6*
Personal Responsibility	5.6	(1.5)	7.2	(1.5)	4.9*
Controllability	6.2	(1.4)	6.4	(1.1)	0.7
Changeability	3.4	(1.8)	3.3	(2.0)	0.1

\*p&lt;.001

concerning their own respective GI conditions, IBS patients were found to rate their condition as more serious than did Crohn's patients. Also, Crohn's patients reported having more personal responsibility for their symptoms than did the IBS patients. No differences were found between the clinical groups on their perceived amount of control or changeability symptoms.

### **Group Differences: Somatoprojective Task**

**Performance and Subjective Symptom Ratings.** Performance and subjective symptom ratings were analyzed in a one-way MANOVA using Wilks' criterion which revealed an overall significant group difference [Mult  $F(12,180)=2.08, p < .02$ ] with a stepped down alpha. However, when the covariates of age and cigarette consumption were introduced the MANCOVA failed to reach significance. [Mult  $F(12,174)=1.60, p=.09$ ]. Table 9 shows means and standard deviations of all ratings and total time in the somatoprojective task. While the overall MANOVA was significant because the covariates had contributed to statistical significance, further univariate analyses were not undertaken as part of the effect on perceived symptoms and performance on the somatoprojective task was due to factors related to age and smoking behavior.

For descriptive purposes, Figure 1 shows the ratings over the course of the task. At six of the intervals in which ratings were obtained, either one or both of the clinical groups manifested higher fatigue ratings and attrition than did controls. However, if control for Type I error is introduced, then no significant differences emerged on the ratings during the task.

**Cognitive and Attributional Variables.** As shown in Table 10, the cognitive and attributional variables from the somatoprojective task were entered in a one way MANOVA which, using Wilks' criterion, revealed significant group differences at the stepped down alpha level [Mult  $F(18,196)=2.40, p=.002$ ]. The effect

Table 9: Somatoprojective Task Ratings and Measures by Group

Measure	Group					
	IBS (n=45)		Crohn's (n=34)		Control (n=34)	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
<b>Performance:</b>						
Total Time	371.5	(179.1)	358.2	(173.6)	452.5	(195.9)
<b>Fatigue Ratings (FRS):<sup>a</sup></b>						
Overall Fatigue	4.1	(2.8)	4.3	(2.3)	2.3	(2.2)
Base Fatigue	1.6	(2.2)	1.8	(2.0)	1.4	(2.3)
Maximum Fatigue	9.5	(1.2)	9.4	(1.3)	9.1	(1.8)
<b>Post Symptom Checklist (PSC):</b>						
Positive Symptoms	.84	(.52)	.92	(.53)	.77	(.50)
Negative Symptoms	.35	(.30)	.31	(.23)	.17	(.13)

Note: No univariate statistical analyses were undertaken for the measures in this table as the overall multivariate analysis was not significant for this group of variables.

<sup>a</sup> Fatigue rating data missing for 1 IBS patient.

Figure 1. Subjective Fatigue Rating for Somatoprojective Task

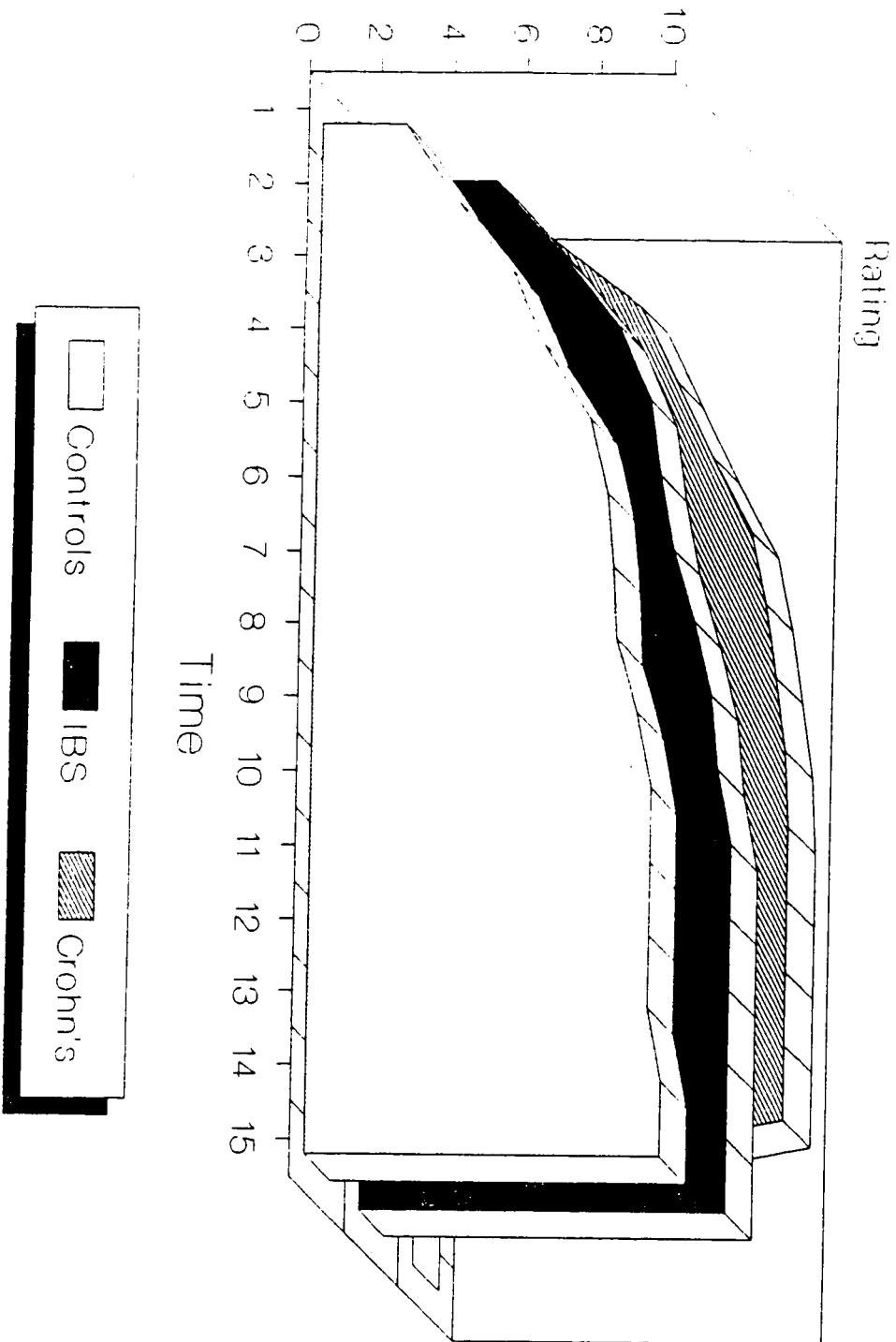


Table 10: Cognitive Activity Ratings and Attributions for Somatoprojective Task by Group

Cognitive Measure	Group						F(2,110)
	IBS (n=45)		Crohn's (n=34)		Control (n=34)		
	Mean	(SD)	Mean	(SD)	Mean	(SD)	
<u>In-vivo Cognitive Assessment:</u>							
Dissociation	2.2	(1.2)	2.0	(1.1)	2.1	(1.2)	0.3
Relaxation	1.3	(0.8)	1.2	(0.5)	1.2	(0.7)	0.3
Imagery	1.5	(1.0)	1.3	(0.8)	1.2	(0.6)	0.8
Non-imagery	2.6	(1.3)	2.8	(1.3)	3.0	(1.3)	0.7
Sense of Control	2.4	(1.2)	2.1	(1.2)	2.9	(1.4)	2.7
Catastrophizing <sup>a</sup>	2.6	(1.2)	2.5	(1.1)	1.7	(0.9)	7.4*
<u>CDS Scale:</u> <sup>c</sup>							
Locus of Causality	19.8	(4.0)	19.4	(4.1)	22.1	(3.5)	4.5
Controllability <sup>b</sup>	16.1	(6.9)	15.6	(5.5)	20.9	(4.1)	9.0*
Stability	12.5	(4.8)	11.2	(3.7)	14.8	(6.8)	4.0

\*p&lt;.001

<sup>a</sup> IBS, Crohn's > Controls on post-hoc Tukey test<sup>b</sup> Controls > IBS, Crohn's on post-hoc Tukey test<sup>c</sup> Due to missing CDS data, n's are as follows: IBS=42, Crohn's=33, Controls=34; df(2,106)

remained significant when the covariate age and cigarette consumption were introduced into a MANCOVA [ $F(18, 190) = 2.12, p = .007$ ]. These were also analyzed again using univariate one-way ANOVAs. With alpha stepped down to .006, 2 variables emerged as significant. On a measure of attributions about experimental task performance, as measured by the CDS, controls reported significantly greater control over their performance than both clinical groups. Finally, on the structured cognitive assessment for the experimental task, the clinical groups both engaged in greater catastrophizing. No differences emerged between groups on the use of any other type of cognitive activity or attributions of performance.

#### **High versus Low Disability**

Overall, the previous comparisons suggested that the two clinical groups were more similar rather than different in terms of self-report, self-monitoring and somatoprojective task measures. Consistent with the hypotheses, analyses were undertaken to determine if diagnosis interacted with disability level on biopsychosocial functioning. Examination of the clinical groups alone was justified because disability was absent in the controls.

Inspection of the total SIP disability scores revealed a bimodal distribution for GI patients with roughly half evidencing minimal to mild disability/sickness impact and half evidencing moderate to extensive disability/sickness impact. Therefore, clinical groups were divided on an approximate median split for heuristic purposes. Scores of 6.6 or greater on the SIP total score were considered as high disability and scores of less than 6.6 were considered low disability. This allowed for analysis of the data in a 2 X 2 design. This resulted in 42.3% of the IBS group as low disabled ( $n = 19$ ) and 57.7% as high disability ( $n = 26$ ). Of the Crohn's group, 58.8% ( $n = 20$ ) were low disabled and 41.2% were high disabled ( $n = 14$ ). The

resulting proportions of high versus low disability by disease status was not significantly different from chance on a chi square test.

**Characteristics of High and Low Disability Patient Groups.** Disability was not associated with age, cigarette consumption, alcohol consumption, number of physicians or specialists seen, duration of condition or number of flare ups. These are shown in Table 11. Therefore there was no need to use MANCOVA for the interpretation of disability main effects in subsequent analyses.

**Physical Symptom Severity.** The Box's M test was significant on these variables suggesting a potential threat to robustness. Pillai's criterion, instead of the Wilks' criterion, was used to determine multivariate significance. Consistent with the hypotheses, this revealed significant main effects for disability on the 2 x 2 (disability by diagnosis) MANOVA which included the GSRS, the PILL and the 4 GIDD measures [Mult  $F(6,63)=11.22$ ,  $p<.001$ ]. High disability patients had greater GI specific symptoms, greater general physical symptoms, greater frequency of soft stools, greater abdominal pain, and less overall rated physical well-being as shown in Table 12.

**Emotional Symptom Severity.** Consistent with the hypotheses there were significant main effects for disability on the 2 x 2 MANOVA for psychological symptom measures which included the CES-D and the STAI [Mult  $F(2,74)=20.16$ ,  $p<.001$ ]. As shown in Table 12, there was greater depression and anxiety in the high disability patients.

**Implicit Models of Illness.** Patients' implicit models of their GI problem as measured by the IMIQ scales also emerged as a significant main effect for disability on the 2 X 2 MANOVA [Mult  $F(4,72)=6.45$ ,  $p<.001$ ]. As shown in Table 13, this effect was largely due to the lower perceived controllability over GI condition in the high disability patients. The disability main effect was not significant for Flu IMIQ MANOVA [Mult  $F(4,72)=0.37$ , NS]

Table 11: Patient Characteristics by Level of Functional Disability

Characteristic	Level of Disability		Statistic
	High (n=40)	Low (n=39)	
<b>Contact with Physicians/Specialists:</b>			
Physicians seen in past year (%)			$\chi^2(2)=1.6$
One or none	2.5	7.7	
2 or 3	60.0	64.1	
4 or more	37.5	28.2	
Mean Number of Physicians	3.5 (1.6)	3.9 (5.2)	$t(77)=0.5$
% Seeing GI Specialists			$\chi^2(2)=.77$
one	22.5	20.5	
2 or 3	60.0	53.8	
4 or more	17.5	25.6	
Mean number of GI specialists	2.6 (1.7)	2.8 (1.9)	$t(77)=0.7$
<b>Chronicity/Severity:</b>			
Mean duration(months)	100.1 (76.1)	84.0 (80.0)	$t(77)=0.9$
Gastroenterologists' severity rating (HSI)	3.2 (1.6)	3.3 (1.5)	$t(49)=0.1$
<b>Demographic Characteristics</b>			
Marital Status (%)			$\chi^2(2)=1.2$
Single	20.0	30.8	
Married/common law	75.0	64.1	
Separated/divorced	5.0	5.1	
Education (%)			$\chi^2(2)=0.2$
Secondary	42.5	38.5	
College/trade	32.5	33.3	
University	25.0	28.2	
Work status (%)			$\chi^2(1)=3.4$
Full/part-time work	70.0	87.2	
Unemployed/retired	30.0	12.8	
Age	36.8 (11.4)	35.1 (12.0)	$t(77)=0.7$

(cont'd)

Table 11 (cont'd): Patient Characteristics by Level of Functional Disability

Characteristic	Level of Disability		Statistic
	High (n=40)	Low (n=39)	
<u>Medication/Drug Consumption:</u>			
Medications (%)			$\chi^2(2)=3.6$
No Medication	25.0	41.0	
1 Medication	30.0	33.3	
2 or more	45.0	25.6	
Alcohol consumption	1.9 (2.7)	1.8 (1.7)	$t(77)=0.2$
Cigarettes			$\chi^2(1)=0.0$
% smokers	37.5	35.9	
Cigarettes	6.7 (10.6)	4.6 (8.3)	$t(77)=1.0$

Note: Numbers in parentheses denote standard deviations next to mean values

Table 12: Mean Values for Physical and Psychological Symptoms by Disability Level

Variable	Disability				F <sup>a</sup>
	High		Low		
	IBS n=26	Crohns n=14	IBS n=19	Crohns n=20	
<u>Physical Symptoms:</u>					
Gastrointestinal symptoms (GSRs)	17.7	18.9	11.5	10.8	35.5*
Physical symptoms (PILL)	22.5	22.8	16.3	12.5	15.9*
<u>Physical Symptom Diary (GIDD):</u>					
Soft stools	1.4	5.0	0.8	1.5	16.7*
Hard stools	1.3	0.6	0.7	0.7	1.6
Abdominal pain	1.1	1.4	0.8	0.5	13.5*
Well-being	1.2	1.6	0.5	0.4	36.2*
<u>Psychological Symptoms:</u>					
Depression (CES-D)	20.9	23.7	10.2	7.6	37.4*
State anxiety (STAI)	39.3	41.4	30.4	32.4	14.5*
Trait anxiety (STAI)	47.3	45.5	36.0	34.9	24.6*

\*p&lt;.001

<sup>a</sup> Main effect for disability

Table 13: Illness Beliefs (IMIQ) Concerning GI Condition: Disability by Disease

IMIQ Scale	Disability				F <sup>a</sup>
	High		Low		
	IBS n=26	Crohns n=14	IBS n=19	Crohns n=20	
Seriousness	2.1	1.8	2.4	1.7	1.0
Personal responsibility	5.4	7.3	5.9	7.2	0.5
Controllability	6.9	7.0	5.4	6.1	24.7*
Changeability	3.3	4.0	3.5	2.8	1.1

\*p&lt;.001

<sup>a</sup> Main effect for disability

**Coping Strategies.** Consistent with the hypotheses there were significant main effects for disability on the 2 x 2 (disability by diagnosis) MANOVA on coping activity as measured by the CSQ factor scales [Mult  $F(5,71)=4.64$   $p=.001$ ]. As shown in Table 14, the GI patients with high disability were less confident in ability to decrease of control pain, and evidenced greater catastrophizing.

**Interpersonal Responses.** Contrary to expectations, interpersonal responses to patients' illness behavior did not reach significance on a main effect for disability on the 2 X 2 MANOVA [Mult  $F(4,66)= 1.60$ , NS].

**Performance and Subject Symptom Ratings.** Symptom rating on the SPT did not reach significance on a main effect for disability on the 2 X 2 MANOVA [Mult  $F(6,55)=1.77$ ,NS].

**Cognitive and Attributional Variables.** The cognitive/attributional ratings on the SPT did not reach significance on a main effect for disability on the 2 X 2 MANOVA [Mult  $F(6,63)=1.00$ , NS].

### **Diagnosis By Disability Interactions**

Contrary to the hypotheses, there were no interaction effects. The only significant effect being on the GIDD data where high disability in Crohn's was associated with greater soft stools and reduced well being. However this failed to reach significance with the stepped down alpha and with the introduction of the covariates.

### **Prediction of Disability**

In order to test whether cognitive variables predicted disability, the GI groups were pooled and 3 separate multiple regression analyses on the total SIP score were undertaken. Each multiple regression included a different set of cognitive predictor variables. The 3 sets of independent variables were as follows:

Table 14: Coping Strategies (CSQ): Disability by Disease

CSQ Factor Scale	Disability				F <sup>a</sup>
	High		Low		
	IBS n=26	Crohns n=14	IBS n=19	Crohns n=20	
Active Cognitive Coping	13.9	12.8	13.8	14.7	0.3
Self Efficacy	2.4	2.6	3.1	3.5	9.5*
Attentional Diversion	16.3	13.4	12.7	13.6	1.2
Catastrophizing	16.9	13.4	8.7	8.4	18.7**
Increased behavior	14.4	11.7	16.5	15.3	2.6

\*p&lt;.01; \*\*p&lt;.001

<sup>a</sup> Main effect for disability

(1) cognitive coping strategy variables, (2) illness model variables, and (3) somatoprojective task related cognitive and attributional variables.

As an additional precaution to rule out spurious interpretations, the 3 regression analyses were conducted by first forcing entry of GSRS score, a measure of GI symptom severity, and then forcing entry of the CES-D depression score. Forcing entry of physical symptom severity was felt to be necessary as dysfunctional cognitive activity has been found to covary with physical symptom severity in chronic conditions (Reesor & Craig, 1988). Forcing entry of depression was felt to be necessary as there has been some suggestion that dysfunctional cognitive activity in chronic conditions may be a function of depressed mood (Sullivan & D'Eon, 1990). Therefore, other variables loading into the equation would be contributing significantly to the change in  $R^2$  above and beyond what would be accounted for by symptom severity and depression alone.

**Coping Strategies.** As shown in Table 15, when the CSQ coping factors were included, only the diverting attention factor added significantly to the overall prediction of disability. These three variables accounted for over 50% of the variance in disability.

**Implicit Models of Illness.** As shown in Table 16, when the IMIQ scores for GI condition were included, only controllability added significantly to the overall prediction of disability. These three variables accounted for over 50% of the variance in disability.

**Cognitive and Attributional Variables.** As shown in Table 17, when the cognitive ratings and CDS scores were included, only locus of causality added to the overall prediction of disability. These three variables accounted for over 50% of the variance in disability.

Table 15: Stepwise multiple regression of coping activity in predicting SIP in GI patients beyond symptom reporting and depression

Variables	Pearson Correlations			
	Total Disability (SIP)	GI Symptoms (GRSR)	Depression (CES-D)	Diverting Attention (CSQ Factor)
GI Symptoms (GRSR)	.59	----		
Depression (CES-D)	.68	.48	----	
Diverting Attention (CSQ)	.27	.14	.01	----
Means	8.0	14.7	15.0	14.2
Standard Deviations	7.2	6.2	11.3	7.7
	<u>B</u>	<u>β</u>	<u>sr<sup>2</sup>(incremental)</u>	
GI Symptoms (GRSR)	0.35	0.30	.34**	
Depression (CES-D)	0.34	0.53	.20**	
Diverting Attention (CSQ)	0.20	0.22	.05*	
Intercept = -5.12		Adjusted <u>R<sup>2</sup></u> = .58		
		<u>R</u> = .77***		

\*p<.01; \*\*p<.001; \*\*\*p<.0001

Table 16: Stepwise multiple regression of IMIQ scores in predicting SIP in GI patients beyond symptom reporting and depression

Variables	Pearson Correlations			
	Total Disability (SIP)	GI Symptoms (GRSR)	Depression (CES-D)	Illness Controllability (IMIQ)
GI Symptoms (GRSR)	.59	----		
Depression (CES-D)	.68	.48	----	
Controlability (IMIQ)	.27	.31	.45	----
Means	8.0	14.7	15.0	6.3
Standard Deviations	7.2	6.2	11.3	1.3
	$\beta$	$\beta$	$\Delta R^2$ (incremental)	
GI Symptoms (GRSR)	0.35	0.31	.34**	
Depression (CES-D)	0.27	0.42	.20**	
Controlability (IMIQ)	1.34	0.24	.05*	
Intercept	=-9.84		$R^2 = .59$	Adjusted $R^2 = .57$
			$R = .77***$	

\*p<.01; \*\*p<.001; \*\*\*p<.0001

Table 17: Stepwise multiple regression of CDS scores in predicting SIP in GI patients beyond symptom reporting and depression

Variables	Pearson Correlations			
	Total Disability (SIP)	GI Symptoms (GRSR)	Depression (CES-D)	Locus of Causality (CDS)
GI Symptoms (GRSR)	.59	----		
Depression (CES-D)	.68	.48	----	
Locus of Causality (CDS)	.27	.18	.09	----
Means	8.0	14.7	15.0	19.7
Standard Deviations	7.2	6.2	11.3	4.0

	B	$\beta$	$sr^2$ (incremental)
GI Symptoms (GRSR)	0.37	0.31	.34**
Depression (CES-D)	0.33	0.51	.20**
Locus of Causality (CDS)	0.29	0.16	.03*

Intercept = -2.85

$R^2 = .57$

Adjusted  $R^2 = .55$

$R = .75***$

\* $p < .01$ ; \*\* $p < .001$ ; \*\*\* $p < .0001$

## DISCUSSION

On the whole, these results can be considered to support recent findings that when accurate diagnostic criteria are used for IBS, there is no evidence of a specific association between psychological dysfunction or psychiatric illness and IBS (Thornton, McIntyre, Murray-Lyon, & Gruzelier, 1990). By adopting the restrictive criteria of the international working team, we excluded patients with vague abdominal complaints who have been shown in previous studies to account for observed psychopathology (Whitehead et al., 1988). In fact, very few differences emerged between IBS and Crohn's on measures in this study, consistent with evidence on the lack of observed differences between so called 'functional' and 'organic' GI conditions (Smith et al., 1990). The fact that IBS patients were largely indistinguishable from a chronic GI condition such as Crohn's on a wide variety of standardized psychosocial instruments, seriously questions whether psychological or psychiatric disturbance can be considered an etiological explanation for the presence of IBS symptomatology or the motivating force behind health care utilization among these patients. It may be that those individuals with the most severe physical symptoms as well as psychosocial stress seek consultation for their GI symptoms. These findings support those of Heaton et al. (1991) suggesting that IBS patients do indeed suffer from abnormal bowel function.

These results also indicated that patients with either type of GI condition showed elevated levels of emotional distress, adjustment, and coping problems in comparison to disease-free controls. Such findings support the notion that the inherent stressors and demands of chronic physical conditions are often associated with psychological distress, regardless of the etiology of the physical dysfunction. It may be argued that etiology, or in other words, whether the GI condition is 'functional' or 'organic', may be irrelevant from a psychological coping perspective. The emotional/psychological/social coping demands are largely equivalent and do

not appear to be a function of etiology. This stands in contrast to traditional biomedical models, wherein the differentiation between a diagnosis of Crohn's disease and IBS has obvious implications for medical treatment. From an emotional coping perspective, the GI diagnosis is not as important in guiding the psychological aspects of patient management and/or psychologic intervention.

The findings here suggest that psychological distress is associated with illness impact and disability. Regardless of diagnosis, the patient's adjustment to their illness and the actions they take in response to their symptoms is related to their level of emotional distress and their cognitive coping. Depressed patients and those who engaged in dysfunctional coping such as catastrophizing were among the most disabled patients.

While psychological characteristics of IBS have been examined before, this investigation represented the first attempt to compare and contrast the way in which IBS and Crohn's patients construe, construct, and conceptualize illness. It was originally thought that perhaps the illness schema differences might account for differences in adjustment and disability between the GI groups. While there were no differences between GI groups on measures of emotional and physical symptom severity there were, however, significant differences in terms of how the two clinical groups perceived and interpreted the severity and responsibility they had in affecting their illness. As was originally predicted in the hypotheses, IBS patients perceived less personal responsibility in affecting their condition and also perceived that their condition was more serious than did the Crohn's patients. These findings are consistent with the notion that it may be more difficult for an IBS patient to conceptualize, understand, and predict anything about the course of their symptom picture than for a patient with a GI disease with a specific pathophysiological process. Without a readily identifiable disease process and a prescribed treatment, the IBS patient cannot easily access a prototypic explanation or illness schemata to

explain his or her symptoms. This uncertainty and ambiguity is inherently stressful and may enhance the perceived seriousness of IBS. In contrast, Crohn's disease patients can identify and explain the source of their symptoms and thus have a much clearer 'model' of their disease. Although their prognosis is much worse than IBS patients, the more accurate and concrete knowledge they have about their disease and its likely outcomes may reduce the psychologic stress of living with this illness.

Without an accessible, recognized schemata for understanding their symptoms IBS patients experience a decreased sense of personal responsibility in effecting their symptoms. Being less able to relate their symptoms to any previous illness experience, they are at a loss for taking any personal action to manage their symptoms. Furthermore, the predominant psychiatric model of IBS may lead health care professionals into a course of action that targets psychologic problems but fails to address patients' concerns about their physical complaints and how they might manage and cope with physical discomfort.

The difference between the patient's and physician's model of IBS has important implications for the management of IBS and the interpretation of psychologic/psychiatric research with these patients. The level of uncertainty and ambiguity associated with IBS necessitates that, in the clinical management of these patients, information, validation of the patient's experience, and reassurance may be crucial in counteracting the stress of IBS (Thompson & Pigeon-Reesor, 1990). It could be argued that, in this investigation, the lack of greater psychological distress in IBS in comparison to Crohn's may be attributed to beneficial psychoeducational effects that the medical consultations in this clinic had in attenuating the distress in IBS. Conversely, it could be argued that findings of greater psychologic distress in IBS relative to Crohn's, or other 'organic' GI conditions, could be an artifact of a clinic or referral system that had not accommodated or addressed IBS patients' psychologic needs concerning their

symptoms and the reactions of others to their complaints. Thus anxiety and depression may be exacerbated in IBS patients due to interactions with health care professionals and others in their immediate environment which are inherently stressful and undermine attempts at coping with their symptoms.

This is an important factor that needs to be taken into account in explaining some of the discrepancy from previous research that found considerably more *psychopathology in IBS patients*. It may be that depending on the nature of the referral source or origin of the referral, and the route by which these patients come to seek medical attention, that some IBS patients may have had more negative experiences that have "psychopathologized", and invalidated their experience. This can have a very detrimental affect not only on the patient's adjustment efforts but on the illness behavior that patients engage in. Patients may perceive that their symptoms are not taken seriously or are attributed to psychological process. Various disorders have described a process where patients may engage in more "amplified" or "exaggerated" behavior in order to convince health care professionals of the reality of their disease (Leavit & Sweet, 1986). In the process of doing so, such patients often get labelled as having "hypochondriacal" tendencies because of the dysfunctional presentation style that they engage in. For example, a recent study by Dinan, O'Keane, O'Boyle, Chua, and Keeling, (1991) found no differences between IBS patients and peptic ulcer patients recruited from a general practice. The investigators suggest that they excluded the more psychologically distressed patients by avoiding patients consulting to tertiary care such as a gastroenterology unit. Perhaps the lack of excessive distress in the IBS patient group may be attributable to the current practices and reassurance provided to patients seen on this particular GI unit.

This investigation revealed that IBS patients may have a different quality of social interaction and response to their illness than Crohn's patients. IBS patients

report less overall perceived support and help from their family, friends, and significant others. Patients with nonsupportive families have been shown to report greater pain intensity, to rely more on medication, and engage in lower activity levels than pain patients with supportive families (Jamison & Virts, 1990).

Consistent with the uncertainty that patients themselves may be experiencing, family members may be less supportive as they do not understand the condition and may be more likely to make interpretations about patients' symptoms which result in less supportive behaviors for this patient group. Consequently, IBS patients may be more at risk for interpersonal problems because of the greater degree of misunderstanding and misattribution about the source of their symptoms. Again, this has important patient management implications, in that it may be more important to include family members in feedback/counseling for this patient group.

Results from this investigation indicate that disability in GI disorders such as IBS and Crohn's can only be accounted for within the context of a biopsychosocial model. It was found that over 50% of total impact and disability could be accounted for by symptom reporting, depression, and some aspect of cognitive activity. Physical complaints alone were not sufficient to account for disease impact and disability. Further, variance in illness impact and disability was significantly determined by various cognitive variables even when the level of depression was controlled.

Understanding the factors that determine illness impact and disability is crucial in terms of patient management, recommendations, and disability determination. Clearly a patient's expected functional level cannot be predicted solely on physical severity or the presence of physical symptoms. The mediating effects of affective problems, maladaptive cognitive activity, and perceived social support on the individual's psychosocial and occupational functioning all must be

considered in the determination and management of patient adjustment to IBS and Crohn's.

This study was unique in that it attempted to employ a standardized somatoprojective task in order to elicit, in a standardized behavioral sample, some of the processes measured by the questionnaires and self-report measures that are commonly used in this type of research. On the whole it appeared that, under conditions of ambiguous unpleasant sensory input, both IBS and Crohn's patients perform in a similar manner. Further, while there were some suggestive trends, the GI groups did not differ behaviorally or in their subjective ratings. There was, however, clear demonstration that the GI patient groups engaged in more maladaptive cognitive activity in response to unpleasant physical sensations and attributed less control over their tolerance for physical sensations.

This type of assessment methodology provides some concurrent and construct validity to the variables measured in self-report questionnaires. Whether this can be developed into a measure with clinical utility or efficiency has yet to be determined. The advantages, however, with an actual in-vivo behavioral sample make pursuing such evaluation procedures attractive.

On the SPT both clinical groups respond to physical sensations in a manner suggesting greater 'sensitization' and 'learned helplessness' than disease-free controls. Given the chronic recurrent nature of their conditions, these patients are repeatedly exposed to unpleasant or aversive symptoms outside of their control. Consequently, patients learn to anticipate aversive consequences (catastrophize) and perceive a lack of control over symptoms (helplessness). Such appraisals may become conditioned cognitive reactions to the occurrence of aversive physical sensations or symptoms. With repeated exposure, this cognitive learning reinforces the development of a cognitive schema to process physical stimuli.

The sample of Crohn's patients in this investigation were younger and tended to smoke more. There has been evidence to suggest that with increased cigarette smoking, individuals tend to deny the significance of health threats and place less value on health enhancement. However, neither age nor smoking status attenuated the overall significance when introduced as a covariate, with the exception of performance and symptom ratings on the somatoprojective task. On the whole, our results suggest that these factors did not play a significant role in accounting for any of the observed group differences or variation among disability measures.

Continued refinement is warranted of the implicit models of illness questionnaires. This study attempted to measure implicit models not only of GI conditions, but of a supposedly "neutral" condition. The assumptions behind choosing "flu" as a neutral condition may not have been warranted as flu may interact more adversely with Crohn's patients in comparison to other groups. Such an interaction may account for group differences related to patients' beliefs about flu. Perhaps future research employing this type of methodology could use a different "neutral" illness. Nevertheless, when evaluating flu, IBS patients overemphasized their ability to bring on and control symptoms. For Crohn's patients the higher ratings of seriousness may reflect the biophysical reality of disease exacerbation when subjected to flu.

Further research in this area could be directed toward the identification of social interactions between IBS patients and their family or friends that either facilitate or detract from coping/adjustment efforts. Specifically whether or not a pattern of social support or interactions affect how people interpret, construe, and appraise their illness.

In conclusion, the psychological aspects of IBS may be better understood as a reaction to a chronic illness condition rather than a psychopathological etiology. Clearly there are unique psychologic demands placed on IBS patients because of the

ambiguity and uncertainty of the condition. However, having knowledge of these factors may be significant in assisting IBS patients adjust and cope with the symptoms they experience.

On the whole the results suggest that specific coping strategies per se are no different among IBS and Crohn's patients, but these clinical groups engage in activities that may appear as more helpless, desperate, less confident, and perhaps *more so with IBS patients when compared to non-clinical controls.*

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## Appendix A

### STANDARD INSTRUCTIONS FOR THE SICKNESS IMPACT PROFILE (SIP):

You have certain activities that you do in carrying on your life. Sometimes you do all of these activities. Other times, because of your state of health, you don't do these activities in the usual way: you may cut some out; you may do some for shorter lengths of time; you may do some in different ways. These changes in your activities might be recent or longstanding. We are interested in learning about any changes that describe you today and are related to your state of health.

You will be reading statements that people have told us describe them when they are not completely well. Whether or not you consider yourself sick, there may be some statements that will stand out because they describe you today and are related to your state of health. As you read the questionnaire, think of yourself today. When you see one that does describe you and is related to health check it.

Let me give you an example. You might read the statement "I am not driving my car." if this statement is related to your health and describes you today, you would check it. Also, if you have not been driving for some time because of your health, and are still not driving today, you should respond to this statement.

On the other hand, if you never drive or are not driving today because your car is being repaired, the statement, "I am not driving my car" is not related to your health and you should not respond to it. If you are simply driving less, or are driving shorter distances, and feel that the statement only partially describes you, please do not respond to it.

Let me know any time you would like to review the instructions. Remember we are interested in the recent or longstanding changes in your activities that are related to your health.

Note: IBS and Crohn's are variable diseases, thus subjects may say that today is a particularly good day or a particularly bad day and have difficulty answering. Explain: that you understand her state of health may vary but the questionnaire is designed to measure her behavior on a particular day and she should try to answer as best she can as of today.

**THE SICKNESS IMPACT PROFILE**

(SR-0499)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

\_\_\_\_\_ (070-083) 1. I spend much of the day lying down in order to rest

\_\_\_\_\_ (062-049) 2. I sit during much of the day

\_\_\_\_\_ (063-104) 3. I am sleeping or dozing most of the time-day and night

\_\_\_\_\_ (066-058) 4. I lie down more often during the day in order to rest

\_\_\_\_\_ (065-084) 5. I sit around half asleep

\_\_\_\_\_ (069-061) 6. I sleep less at night, for example wake up too early, don't fall asleep for a long time, awaken frequently.

\_\_\_\_\_ (071-060) 7. I sleep or nap more during the day

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE \_\_\_\_\_

(EB-0705)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

\_\_\_\_ (274-087) 1. I say how bad or useless I am, for example, that I am a burden on others

\_\_\_\_ (272-068) 2. I laugh or cry suddenly

\_\_\_\_ (269-069) 3. I often moan and groan in pain or discomfort

\_\_\_\_ (281-132) 4. I have attempted suicide

\_\_\_\_ (284-046) 5. I act nervous or restless

\_\_\_\_ (262-062) 6. I keep rubbing or holding areas of my body that hurt or are uncomfortable

\_\_\_\_ (273-078) 7. I act irritable and impatient with myself, for example, talk badly about myself, swear at myself, blame myself for things that happen

\_\_\_\_ (283-089) 8. I talk about the future in a hopeless way

\_\_\_\_ (278-074) 9. I get sudden frights

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE \_\_\_\_\_

(BCM-2003)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH

- \_\_\_\_ (168-084) 1. I make difficult moves with help, for example, getting into or out of cars, bathtubs
- \_\_\_\_ (170-121) 2. I do not move into or out of bed or chair by myself but am moved by a person or a mechanical aid
- \_\_\_\_ (155-072) 3. I stand only for short periods of time
- \_\_\_\_ (146-098) 4. I do not maintain balance
- \_\_\_\_ (152-064) 5. I move my hands or fingers with some limitation or difficulty
- \_\_\_\_ (165-100) 6. I stand up only with someone's help
- \_\_\_\_ (171-064) 7. I kneel, stoop, or bend down only by holding on to something
- \_\_\_\_ (158-125) 8. I am in a restricted position all the time
- \_\_\_\_ (148-058) 9. I am very clumsy in body movements
- \_\_\_\_ (169-082) 10. I get in and out of bed or chairs by grasping something for support or using a cane or walker
- \_\_\_\_ (162-113) 11. I stay lying down most of the time
- \_\_\_\_ (147-030) 12. I change position frequently
- \_\_\_\_ (143-086) 13. I hold on to something to move myself around in bed
- \_\_\_\_ (310-089) 14. I do not bathe myself completely, for example require assistance with bathing
- \_\_\_\_ (312-115) 15. I do not bathe myself at all, but am bathed by someone else
- \_\_\_\_ (292-114) 16. I use a bedpan with assistance
- \_\_\_\_ (305-057) 17. I have trouble getting shoes, socks, or stockings on
- \_\_\_\_ (290-124) 18. I do not have control of my bladder

\_\_\_\_(298-074) 19. I do not fasten my clothing, for example, require assistance with buttons, zippers shoelaces

\_\_\_\_(302-074) 20. I spend most of the time partly undressed or in pajamas

\_\_\_\_(295-128) 21. I do not have control over my bowels

\_\_\_\_(300-043) 22. I dress myself, but do so very slowly

\_\_\_\_(297-088) 23. I get dressed with someone's help

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS  
PAGE \_\_\_\_\_

(HM-0668)

THIS GROUP OF STATEMENTS HAS TO DO WITH ANY WORK YOU USUALLY DO IN CARING FOR YOUR HOME OR YARD. CONSIDERING JUST THOSE THINGS THAT YOU DO, PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

\_\_\_\_(117-054) 1. I do work around the house for short periods of time or rest often

\_\_\_\_(119-044) 2. I am doing less of the regular daily work around the house than I would usually do

\_\_\_\_(120-086) 3. I am not doing any of the regular daily work around the house that I would usually do

\_\_\_\_(001-062) 4. I am not doing any of the maintenance or repair work that I would usually do

\_\_\_\_(106-071) 5. I am not doing any of the shopping that I would usually do

\_\_\_\_(116-077) 6. I am not doing any of the house cleaning that I would usually do

\_\_\_\_(107-069) 7. I have difficulty doing handwork, for example, turning faucets, using kitchen gadgets, sewing, carpentry

\_\_\_\_(111-077) 8. I am not doing any of the clothes washing that I would usually do

\_\_\_\_(115-044) 9. I am not doing heavy work around the house

\_\_\_\_(105-084) 10. I have given up taking care of personal or household affairs, for example, paying bills, banking, working on budget

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE \_\_\_\_\_

(M-0719)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH

- \_\_\_\_ (134-086) 1. I am getting around within one building
- \_\_\_\_ (128-106) 2. I stay within one room
- \_\_\_\_ (130-081) 3. I am staying in bed more
- \_\_\_\_ (131-109) 4. I am staying in bed most of the time
- \_\_\_\_ (140-041) 5. I am not now using public transportation
- \_\_\_\_ (133-066) 6. I stay home most of the time
- \_\_\_\_ (125-056) 7. I am only going to places with restrooms nearby
- \_\_\_\_ (124-048) 8. I am not going into town
- \_\_\_\_ (139-054) 9. I stay away from home for only brief periods of time
- \_\_\_\_ (121-072) 10. I do not get around in the dark or unlit places without someone's help

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE \_\_\_\_\_

(SI-1450)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

- \_\_\_\_ (028-044) 1. I am going out less to visit people
- \_\_\_\_ (029-101) 2. I am not going out to visit people
- \_\_\_\_ (003-067) 3. I show less interest in other people's problems, for example, don't listen when they tell me about their problems, don't offer to help
- \_\_\_\_ (015-084) 4. I often act irritable toward those around me, for example, snap at people, give sharp answers, criticize easily
- \_\_\_\_ (007-052) 5. I show less affection
- \_\_\_\_ (012-036) 6. I am doing fewer social activities with groups of people.
- \_\_\_\_ (027-043) 7. I am cutting down the length of visits with friends
- \_\_\_\_ (034-080) 8. I am avoiding social visits form others
- \_\_\_\_ (039-051) 9. My sexual activity is decreased
- \_\_\_\_ (018-052) 10. I often express concern over what might be happening to my health
- \_\_\_\_ (002-056) 11. I talk less with those around me
- \_\_\_\_ (038-088) 12. I make many demands, for example, insist that people do things for me, tell them how to do things
- \_\_\_\_ (023-086) 13. I stay alone much of the time
- \_\_\_\_ (249-088) 14. I act disagreeable to family members, for example, I act spiteful, I am stubborn
- \_\_\_\_ (240-119) 15. I have frequent outbursts of anger at family members, for example, strike at them, scream, throw things at them
- \_\_\_\_ (237-102) 16. I isolate myself as much as I can from the rest of the family
- \_\_\_\_ (238-064) 17. I am paying less attention to the children
- \_\_\_\_ (256-115) 18. I refuse contact with family members, for example, turn away from them
- \_\_\_\_ (242-079) 19. I am not doing the things I usually do to take care of children or family

\_\_\_\_(255-043) 20. I am not joking with family members as I usually do

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS  
PAGE \_\_\_\_\_

(A-0842)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH

\_\_\_\_ (050-048) 1. I walk shorter distances or stop to rest often

\_\_\_\_ (046-056) 2. I do not walk up or down hills

\_\_\_\_ (042-067) 3. I use stairs only with mechanical support, for example, handrail, cane, crutches

\_\_\_\_ (044-076) 4. I walk up or down stairs only with assistance from someone else

\_\_\_\_ (057-096) 5. I get around in a wheelchair

\_\_\_\_ (052-105) 6. I do not walk at all

\_\_\_\_ (049-055) 7. I walk by myself but with some difficulty, for example, limp, wobble, stumble, have stiff leg

\_\_\_\_ (053-088) 8. I walk only with help from someone

\_\_\_\_ (040-054) 9. I go up and down stairs more slowly, for example, one step at a time, stop often

\_\_\_\_ (041-083) 10. I do not use stairs at all

\_\_\_\_ (047-079) 11. I get around only by using a walker, crutches, cane, walls or furniture

\_\_\_\_ (051-035) 12. I walk more slowly

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE \_\_\_\_\_

(AB-0777)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH

- \_\_\_\_ (223-090) 1. I am confused and start several actions at time
- \_\_\_\_ (234-075) 2. I have more minor accidents, for example, drop things, trip and fall, bump into things
- \_\_\_\_ (228-059) 3. I react slowly to things that are said or done
- \_\_\_\_ (227-067) 4. I do not finish things I start
- \_\_\_\_ (224-084) 5. I have difficulty reasoning and solving problems, for example, making plans, making decisions, learning new things
- \_\_\_\_ (231-113) 6. I sometimes behave as if i were confused or disoriented in place or time, for example, where I am, who is around directions, what day it is
- \_\_\_\_ (222-078) 7. I forget a lot, for example, things that happened recently, where I ut things appointments
- \_\_\_\_ (220-067) 8. I do not keep my attention on any activity for long
- \_\_\_\_ (225-064) 9. I make more mistakes than usual
- \_\_\_\_ (217-080) 10. I have difficulty doing activities involving concentration and thinking

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE \_\_\_\_\_

(C- 0725)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH

- \_\_\_(191-070) 1. I am having trouble writing or typing
- \_\_\_(177-102) 2. I communicate mostly by gestures, for example, moving head, pointing, sign language
- \_\_\_(179-093) 3. My speech is understood only by a few people who know me well
- \_\_\_(197-083) 4. I often lose control of my voice when I talk, for example, my voice gets louder or softer, trembles, changes unexpectedly
- \_\_\_(188-083) 5. I don't write except to sign my name
- \_\_\_(178-067) 6. I carry on a conversation only when very close to the other person or looking at him
- \_\_\_(176-076) 7. I have difficulty speaking, for example, get stuck, stutter, stammer, slur my words
- \_\_\_(200-087) 8. I am understood with difficulty
- \_\_\_(201-064) 9. I do not speak clearly when I am under stress

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE \_\_\_\_

THE NEXT GROUP OF STATEMENTS HAS TO DO WITH ANY WORK YOU USUALLY DO OTHER THAN MANAGING YOUR HOME. BY THIS WE MEAN ANYTHING THAT YOU REGARD AS WORK THAT YOU DO ON A REGULAR BASIS.

DO YOU USUALLY DO WORK OTHER THAN MANAGING YOUR HOME?

YES  NO

IF YOU ANSWERED YES, GO ON TO THE NEXT PAGE!

IF YOU ANSWERED NO:

ARE YOU RETIRED?  YES  NO

IF YOU ARE RETIRED, WAS YOUR RETIREMENT RELATED TO YOUR HEALTH?  YES  NO

IF YOU ARE NOT RETIRED, BUT ARE NOT WORKING, IS THIS RELATED TO YOUR HEALTH?

NOW SKIP THE NEXT PAGE.

(W-0515)

IF YOU ARE NOT WORKING AND IT IS NOT BECAUSE OF YOUR HEALTH, PLEASE SKIP THIS PAGE.

NOW CONSIDER THE WORK YOU DO AND RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH (IF TODAY IS SATURDAY OR SUNDAY OR SOME OTHER DAY THAT YOU WOULD USUALLY HAVE OFF, PLEASE RESPOND AS IF IT WERE A WORKING DAY).

\_\_\_\_ (100-361) 1. I am not working at all

(IF YOU CHECKED THIS STATEMENT, SKIP TO THE NEXT PAGE).

\_\_\_\_ (094-037) 2. I am doing part of my job at home

\_\_\_\_ (096-055) 3. I am not accomplishing as much as usual at work

\_\_\_\_ (088-080) 4. I often act irritable toward my work associates, for example, snap at them, give sharp answers, criticize easily

\_\_\_\_ (095-043) 5. I am working shorter hours

\_\_\_\_ (086-050) 6. I am doing only light work

\_\_\_\_ (090-061) 7. I work only for short periods of time or take frequent rests

\_\_\_\_ (092-034) 8. I am working at my usual job but with some changes, for example, using different tools or special aids, trading some tasks with other workers

\_\_\_\_ (097-062) 9. I do not do my job as carefully and accurately as usual

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE \_\_\_\_

(RP-0422)

THIS GROUP OF STATEMENTS HAS TO DO WITH ACTIVITIES YOU USUALLY DO IN YOUR FREE TIME. THESE ACTIVITIES ARE THINGS THAT YOU MIGHT DO FOR RELAXATION, TO PASS THE TIME, OR FOR ENTERTAINMENT. PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

\_\_\_(215-039) 1. I do my hobbies and recreation for shorter periods of time

\_\_\_(214-036) 2. I am going out for entertainment less often

\_\_\_(207-059) 3. I am cutting down on some of my usual inactive recreation and pastimes, for example, watching TV, playing cards, reading

\_\_\_(208-084) 4. I am not doing any of my usual inactive recreation and pastimes, for example, watching TV, playing cards, reading

\_\_\_(211-051) 5. I am doing more inactive pastimes in place of other usual activities

\_\_\_(216-033) 6. I am doing fewer community activities

\_\_\_(210-043) 7. I am cutting down on some of my usual physical recreation or activities

\_\_\_(209-077) 8. I am not doing any of my usual physical recreation or activities

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE \_\_\_

(E-0705)

PLEASE RESPOND TO (CHECK) ONLY THOSE STATEMENTS THAT YOU ARE SURE DESCRIBE YOU TODAY AND ARE RELATED TO YOUR STATE OF HEALTH.

- (085-037) 1. I am eating much less than usual
- (073-077) 2. I feed myself but only by using specially prepared food or utensils
- (081-043) 3. I am eating special or different food, for example, soft food, bland diet, low-salt, low-fat, low-sugar
- (077-104) 4. I eat no food at all but am taking fluids
- (083-059) 5. I just pick or nibble at my food
- (080-036) 6. I am drinking less fluids
- (074-099) 7. I feed myself with help from someone else
- (075-117) 8. I do not feed myself at all, but must be fed
- (076-133) 9. I am eating no food at all, nutrition is taken through tubes or intravenous fluids

CHECK HERE WHEN YOU HAVE READ ALL STATEMENTS ON THIS PAGE

## Appendix B

### GASTROINTESTINAL SYMPTOM RATING SCALE (GSRs)

1. **Abdominal pains.** Representing subjectively experienced bodily discomfort, aches and pains.

The type of pain may be classified according to the patient's description of the appearance and quality of the pain as epigastric, on the basis of typical location, association with acid-related symptoms, and relief of pain by food or antacids; as colicky when occurring in bouts, usually with a high intensity, and located in the lower abdomen; and as dull when continuous, often for several hours, with moderate intensity.

Rate according to intensity, frequency, duration, request for relief, and impact on social performance.

- 0 No or transient pain
- 1 Occasional aches and pains interfering with some social activities
- 2 Prolonged and troublesome aches and pains causing requests for relief and interfering with many social activities
- 3 Severe or crippling pains with impact on all social activities

2. **Heartburn.** Representing retrosternal discomfort or burning sensations. Rate according to intensity, frequency, duration, and request for relief.

- 0 No or transient heartburn
- 1 Occasional discomfort of short duration
- 2 Frequent episodes of prolonged discomfort; requests for relief
- 3 continuous discomfort with only transient relief by antacids

3. **Acid regurgitation.** Representing sudden regurgitation of acid gastric content. Rate according to intensity, frequency, and request for relief.

- 0 No or transient regurgitation
- 1 Occasional troublesome regurgitation
- 2 Regurgitation once or twice a day; requests for relief
- 3 Regurgitation several times a day; only transient and insignificant relief by antacids

4. **Sucking sensations in the epigastrium.** Representing a sucking sensation in the epigastrium with relief by food or antacids. If food or antacids are not available, the sucking sensations progress to aches and pains. Rate according to intensity, frequency, duration, and requests for relief.

- 0 No or transient sucking sensation
- 1 Occasional discomfort of short duration; no requests for food or antacids between meals
- 2 Frequent episodes of prolonged discomfort; requests for food and antacids between meals
- 3 Continuous discomfort; frequent requests for food or antacids between meals

**5. Nausea and vomiting.** Representing nausea which may increase to vomiting. Rate according to intensity, frequency, and duration.

- 0 No nausea
- 1 Occasional episodes of short duration
- 2 Frequent and prolonged nausea; no vomiting
- 3 Continuous nausea; frequent vomiting

**6. Borborygmus.** Representing reports of abdominal rumbling. Rate according to intensity, frequency, duration, and impact on social performance.

- 0 No or transient borborygmus
- 1 Occasional troublesome borborygmus of short duration
- 2 Frequent and prolonged episodes which can be mastered by moving without impairing social performance
- 3 Continuous borborygmus severely interfering with social performance

**7. Abdominal distension.** Representing bloating with abdominal gas. Rate according to intensity, frequency, duration, and impact on social performance.

- 0 No or transient distension
- 1 Occasional discomfort of short duration
- 2 Frequent and prolonged episodes which can be mastered by adjusting the clothing
- 3 Continuous discomfort seriously interfering with social performance.

**8. Eructation.** Representing reports of belching. rate according to intensity, frequency, and impact on social performance.

- 0 No or transient eructation
- 1 Occasional troublesome eructation
- 2 Frequent episodes interfering with some social activities
- 3 Frequent episodes seriously interfering with social performance.

**9. Increased flatus.** Representing reports of excessive wind. rate according to intensity, frequency, duration, and impact on social performance.

- 0 No increased flatus
- 1 Occasional discomfort of short duration
- 2 Frequent and prolonged episodes interfering with some social activities
- 3 Frequent episodes seriously interfering with social performance.

**10. Decreased passage of stools.** Representing reported reduced defecation. Rate according to frequency. Distinguish from consistency.

- 0 Once a day
- 1 Every third day
- 2 Every fifth day
- 3 Every seventh day or less frequently.

11. **Increased passage of stools.** Representing reported increased defecation. Rate according to frequency. distinguish from consistency.

- 0 Once a day
- 1 Three times a day
- 2 Five times a day
- 3 Seven times a day or more frequently.

12. **Loose stools.** Representing reported loose stools. Rate according to consistency independent of frequency and feelings of incomplete evacuation.

- 0 Normal consistency
- 1 Somewhat loose
- 2 Runny
- 3 Watery

13 **Hard stools.** Representing reported hard stools. Rate according to consistency independent of frequency and feelings of incomplete evacuation.

- 0 Normal consistency
- 1 Somewhat hard
- 2 Hard
- 3 Hard and fragmented, sometimes in combination with diarrhea.

14. **Urgent need for defecation.** representing reports of urgent need for defecation, feelings of incomplete control, and inability to control defecation. Rate according to intensity, frequency, and impact on social performance.

- 0 Normal control
- 1 Occasional feelings of urgent need for defecation
- 2 Frequent feelings of urgent need for defecation with sudden need for a toilet interfering with social performance
- 3 Inability to control defecation.

15. **Feeling of incomplete evacuation.** Representing reports of defecation with straining and a feeling of incomplete evacuation of stools. Rate according to intensity and frequency.

- 0 feeling of complete evacuation without straining
- 1 Defecation somewhat difficult; occasional feelings of incomplete evacuation
- 2 Defecation definitely difficult; often feelings of incomplete evacuation
- 3 Defecation extremely difficult; regular feelings of incomplete evacuation.

**Appendix C**

**GASTROINTESTINAL DISEASES DIARY**

Patient:

Diagnosis:

Seven days preceding scheduled visit

Date:

1. Number of liquid or very soft stools						
2. Number of hard stools						
3. Abdominal pain: 0 = none 1 = mild 2 = moderate 3 = severe						
4. General well being: 0 = generally well 1 = slightly under par 2 = poor 3 = very poor 4 = terrible						

**INSTRUCTIONS:** Complete this card each day before going to bed. Your answer should describe the preceding 24 hours. Record scores in proper columns for date.



## Appendix E

## THE PENNEBAKER INVENTORY OF LIMBIC LANGUIDNESS (PILL)

On the following pages several common symptoms of bodily sensations are listed. Most people have experienced most of them at one time or another. We are currently interested in finding out how common these symptoms are among individuals. All information will be kept confidential.

Please respond by circling the appropriate letter for each question.

- (A) Have never or almost never experienced the symptom  
 (B) Less than 3 or 4 times per year  
 (C) Every month or so  
 (D) Every week or so  
 (E) More than once every week

For example, if your ears tend to ring once every week or so, you would circle D next to item # 3.

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 1. Eyes water                            |   |   |   |   |   |
| 2. Itching or painful eyes               | A | B | C | D | E |
| 3. Ringing in ears                       | A | B | C | D | E |
| 4. Temporary deafness or hard of hearing | A | B | C | D | E |
| 5. Lump in the throat                    | A | B | C | D | E |
| 6. Choking sensations                    | A | B | C | D | E |
| 7. Sneezing spells                       | A | B | C | D | E |
| 8. Running nose                          | A | B | C | D | E |
| 9. Congested nose                        | A | B | C | D | E |
| 10. Bleeding nose                        | A | B | C | D | E |
| 11. Asthma or wheezing                   | A | B | C | D | E |
| 12. Coughing                             | A | B | C | D | E |
| 13. Out of breath                        | A | B | C | D | E |
| 14. Swollen ankles                       | A | B | C | D | E |
| 15. Chest pains                          | A | B | C | D | E |
| 16. Racing heart                         | A | B | C | D | E |

17. Cold hands or feet even in hot weather	A	B	C	D	E
18. Leg cramps	A	B	C	D	E
19. Insomnia	A	B	C	D	E
20. Toothaches	A	B	C	D	E
21. Upset stomach	A	B	C	D	E
22. Indigestion	A	B	C	D	E
23. Heartburn	A	B	C	D	E
24. Severe pains or cramps in stomach	A	B	C	D	E
25. Diarrhea	A	B	C	D	E
26. Constipation	A	B	C	D	E
27. Hemorrhoids	A	B	C	D	E
28. Swollen joints	A	B	C	D	E
29. Stiff muscles	A	B	C	D	E
30. Back pain	A	B	C	D	E
31. Sensitive or tender skin	A	B	C	D	E
32. Face flushes	A	B	C	D	E
33. Severe itching	A	B	C	D	E
34. Skin breaks out in rash	A	B	C	D	E
35. Acne or pimples on face	A	B	C	D	E
36. Acne or pimples other than face	A	B	C	D	E
37. Boils	A	B	C	D	E
38. Sweat even in cold weather	A	B	C	D	E
39. Strong reactions to insect bites	A	B	C	D	E
40. Headaches	A	B	C	D	E
41. Sensation of pressure in head	A	B	C	D	E
42. Hot flashes	A	B	C	D	E

43. Chills	A	B	C	D	E
44. Dizziness	A	B	C	D	E
45. Feel faint	A	B	C	D	E
46. Numbness or tingling in any part of body	A	B	C	D	E
47. Twitching of eyelid	A	B	C	D	E
48. Twitching other than eyelid	A	B	C	D	E
49. Hands tremble or shake	A	B	C	D	E
50. Stiff joints	A	B	C	D	E
51. Sore muscles	A	B	C	D	E
52. Sore throat	A	B	C	D	E
53. Sunburn	A	B	C	D	E
54. Nausea	A	B	C	D	E

**Appendix F**

**CENTRE FOR EPIDEMIOLOGICAL STUDIES DEPRESSION SCALE**

**INSTRUCTIONS FOR QUESTIONS:** Below is a list of the ways you might have felt or behaved. Please tell me how often you have felt this way during the past week.

During the past week:

1. I was bothered by things that usually don't bother me.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time ( 1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
2. I did not feel like eating; my appetite was poor.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
3. I felt that I could not shake off the blues even with help from my family or friends.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
4. I felt that I was just as good as other people.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
5. I had trouble keeping my mind on what I was doing.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
6. I felt depressed.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
7. I felt that everything I did was an effort.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time(1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)

8. I felt hopeful about the future.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
  
9. I thought my life had been a failure.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
  
10. I felt fearful.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
  
11. My sleep was restless.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
  
12. I was happy.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
  
13. I talked less than usual.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
  
14. I felt lonely.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
  
15. People were unfriendly.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
  
16. I enjoyed life.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)

17. I had crying spells.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
  
18. I felt sad.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
  
19. I felt that people dislike me.
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)
  
20. I could not get "going".
  0. Rarely or none of the time (less than 1 day)
  1. Some or a little of the time (1-2 days)
  2. Occasionally or a moderate amount of time (3-4 days)
  3. Most or all of the time (5-7 days)

Appendix G

STATE TRAIT ANXIETY INVENTORY (STAI)

Name \_\_\_\_\_ Date \_\_\_\_\_ S \_\_\_\_\_  
 Age \_\_\_\_\_ Sex: M \_\_\_\_ F \_\_\_\_ T \_\_\_\_\_

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

VERY MUCH SO  
 MODERATELY SO  
 SOMEWHAT  
 NOT AT ALL

- |  |   |   |   |   |
|--|---|---|---|---|
| 1. I feel calm .....                                       | ① | ② | ③ | ④ |
| 2. I feel secure .....                                     | ① | ② | ③ | ④ |
| 3. I am tense .....  | ① | ② | ③ | ④ |
| 4. I feel strained .....                                   | ① | ② | ③ | ④ |
| 5. I feel at ease .....                                    | ① | ② | ③ | ④ |
| 6. I feel upset .....                                      | ① | ② | ③ | ④ |
| 7. I am presently worrying over possible misfortunes ..... | ① | ② | ③ | ④ |
| 8. I feel satisfied .....                                  | ① | ② | ③ | ④ |
| 9. I feel frightened .....                                 | ① | ② | ③ | ④ |
| 10. I feel comfortable .....                               | ① | ② | ③ | ④ |
| 11. I feel self-confident .....                            | ① | ② | ③ | ④ |
| 12. I feel nervous .....                                   | ① | ② | ③ | ④ |
| 13. I am jittery .....                                     | ① | ② | ③ | ④ |
| 14. I feel indecisive .....                                | ① | ② | ③ | ④ |
| 15. I am relaxed .....                                     | ① | ② | ③ | ④ |
| 16. I feel content .....                                   | ① | ② | ③ | ④ |
| 17. I am worried .....                                     | ① | ② | ③ | ④ |
| 18. I feel confused .....                                  | ① | ② | ③ | ④ |
| 19. I feel steady .....                                    | ① | ② | ③ | ④ |
| 20. I feel pleasant .....                                  | ① | ② | ③ | ④ |

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

ALMOST NEVER  
SOMETIMES  
ALMOST ALWAYS  
OFTEN

- |  |   |   |   |   |
|--|---|---|---|---|
| 21. I feel pleasant .....  | ① | ② | ③ | ④ |
| 22. I feel nervous and restless .....  | ① | ② | ③ | ④ |
| 23. I feel satisfied with myself .....   | ① | ② | ③ | ④ |
| 24. I wish I could be as happy as others seem to be .....  | ① | ② | ③ | ④ |
| 25. I feel like a failure .....  | ① | ② | ③ | ④ |
| 26. I feel rested .....  | ① | ② | ③ | ④ |
| 27. I am "calm, cool, and collected" .....   | ① | ② | ③ | ④ |
| 28. I feel that difficulties are piling up so that I cannot overcome them                            | ① | ② | ③ | ④ |
| 29. I worry too much over something that really doesn't matter .....                                 | ① | ② | ③ | ④ |
| 30. I am happy .....   | ① | ② | ③ | ④ |
| 31. I have disturbing thoughts .....   | ① | ② | ③ | ④ |
| 32. I lack self-confidence .....   | ① | ② | ③ | ④ |
| 33. I feel secure .....  | ① | ② | ③ | ④ |
| 34. I make decisions easily .....  | ① | ② | ③ | ④ |
| 35. I feel inadequate .....  | ① | ② | ③ | ④ |
| 36. I am content .....   | ① | ② | ③ | ④ |
| 37. Some unimportant thought runs through my mind and bothers me                                     | ① | ② | ③ | ④ |
| 38. I take disappointments so keenly that I can't put them out of my<br>mind .....                   | ① | ② | ③ | ④ |
| 39. I am a steady person .....   | ① | ② | ③ | ④ |
| 40. I get in a state of tension or turmoil as I think over my recent concerns<br>and interests ..... | ① | ② | ③ | ④ |

Appendix H

ILLNESS MODELS OF ILLNESS QUESTIONNAIRE

How familiar are you with this illness?

Very familiar \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_ Not at all Familiar

We would like you to respond to a number of statements about Crohn's Disease. Please record your responses by placing an "X" in the most appropriate blank on the scale list below each of the statements to indicate the level of your agreement or disagreement with each statement about this illness.

1. This illness is controllable.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_ Strongly Disagree

2. This illness requires medical attention.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_ Strongly Disagree

3. This illness is chronic (long lasting) rather than acute ( short-lived).

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_ Strongly Disagree

4. This illness is disabling.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_ Strongly Disagree

5. This illness is caused by changes in weather.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_ Strongly Disagree

6. This illness is painful.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_ Strongly Disagree

7. The symptoms of this illness are similar to the common cold.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_ Strongly Disagree

8. This illness is permanent rather than temporary.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Disagree Strongly

9. This illness is cured by reduced stress.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Disagree Strongly

10. This illness is caused by stress or nerves.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Disagree Strongly

11. This illness goes away on its own.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Disagree Strongly

12. This illness is caused by one's behavior.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Disagree Strongly

13. This illness is cured by proper eating habits.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Disagree Strongly

14. This illness is controllable by the individual.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Disagree Strongly

15. The presence of this illness relates to something the individual did.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Disagree Strongly

16. This illness is contagious.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Disagree Strongly

17. This illness is caused by germs or virus.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Disagree Strongly

18. This illness is caused by lack of rest.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Disagree Strongly

19. This illness is serious.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Strongly Disagree

20. This illness often comes back.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Strongly Disagree

21. This illness is changeable.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Strongly Disagree

22. This illness is caused by a poor diet.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Strongly Disagree

23. This illness changes over time.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Strongly Disagree

24. This illness is cured by physical exercise.

Strongly Agree \_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:\_\_\_\_\_:Strongly Disagree

## Appendix I

## COPING STRATEGY QUESTIONNAIRE

Individuals who experience pain have developed a number of ways to cope, or deal with, their pain. These include saying things to themselves when they experience pain, or engaging in different activities. Below are a list of things that patients have reported doing when they feel pain. For each activity, please indicate, using the scale below, how much you engage in that activity when you feel pain, where a 0 indicates you never do that when you are experiencing pain, a 3 indicates that you sometimes do that when you experience pain, and a 6 indicates you always do it when you experience pain. Remember, you can use any point along the scale.

0	1	2	3	4	5	6
Never do			Sometimes do that			Always do that

## WHEN I FEEL PAIN. . .

- \_\_\_\_\_ 1. I try to feel distant from the pain, almost as if the pain was in somebody else's body.
- \_\_\_\_\_ 2. I leave the house and do something, such as going to the movies or shopping
- \_\_\_\_\_ 3. I try to think of something pleasant.
- \_\_\_\_\_ 4. I don't think of it as pain but rather as a dull or warm feeling.
- \_\_\_\_\_ 5. It is terrible and I feel it is never going to get any better.
- \_\_\_\_\_ 6. I tell myself to be brave and carry on despite the pain.
- \_\_\_\_\_ 7. I read.
- \_\_\_\_\_ 8. I tell myself that I can overcome the pain.
- \_\_\_\_\_ 9. I count numbers in my head or run a song through my mind.
- \_\_\_\_\_ 10. I just think of it as some other sensation, such as numbness.
- \_\_\_\_\_ 11. It is awful and I feel it overwhelms me.
- \_\_\_\_\_ 12. I play mental games with myself to keep my mind off the pain.
- \_\_\_\_\_ 13. I feel my life isn't worth living.
- \_\_\_\_\_ 14. I know someday someone will be here to help me and it will go away for awhile.
- \_\_\_\_\_ 15. I pray to God it won't last long.
- \_\_\_\_\_ 16. I try not to think of it as my body, but rather as something separate from me.
- \_\_\_\_\_ 17. I don't think about the pain.
- \_\_\_\_\_ 18. I try to think years ahead, what everything will be like after I've gotten rid of the pain.
- \_\_\_\_\_ 19. I tell myself it doesn't hurt.
- \_\_\_\_\_ 20. I tell myself I can't let the pain stand in the way of what I have to do.
- \_\_\_\_\_ 21. I don't pay any attention to it.
- \_\_\_\_\_ 22. I have faith in doctors that someday there will be a cure for my pain.
- \_\_\_\_\_ 23. No matter how bad it gets, I know I can handle it.
- \_\_\_\_\_ 24. I pretend it is not there.
- \_\_\_\_\_ 25. I worry all the time about whether it will end.
- \_\_\_\_\_ 26. I replay in my mind pleasant experiences in the past.
- \_\_\_\_\_ 27. I think of people I enjoy doing things with.
- \_\_\_\_\_ 28. I pray for the pain to stop.
- \_\_\_\_\_ 29. I imagine that the pain is outside of my body.
- \_\_\_\_\_ 30. I just go on as if nothing happened.

## WHEN I FEEL PAIN. . .

31. I see it as a challenge and don't let it bother me.  
 32. Although it hurts, I just keep going.  
 33. I feel I can't stand it any more.  
 34. I try to be around other people.  
 35. I ignore it.  
 36. I rely on my faith in God.  
 37. I feel like I can't go on.  
 38. I think of things I enjoy doing.  
 39. I do anything to get my mind off the pain.  
 40. I do something I enjoy, such as watching TV or listening to music.  
 41. I pretend it is not a part of me.  
 42. I do something active, like household chores or projects.

Based on all the things you do to cope, or deal with, your pain, on an average day, how much control do you feel you have over it? Please circle the appropriate number. Remember, you can circle any number along the scale.

0	1	2	3	4	5	6
No control			Some control			Complete control

Based on all the things you do to cope, or deal with pain, on an average day, how much are you able to decrease it? Please circle the appropriate number. Remember, you can circle any number along the scale.

0	1	2	3	4	5	6
Can't decrease it at all			Can decrease it some what			Can decrease it completely



**Section I**

1. Rate the level of your pain at the present moment.

0 1 2 3 4 5 6  
No pain Very intense pain

2. In general, how much does your pain interfere with your day-to-day activities?

0 1 2 3 4 5 6  
No interference Extreme interference

3. Since the time your pain began, how much has your pain changed your ability to work?  
( Check here, if you have retired for reasons other than your pain).

0 1 2 3 4 5 6  
No change Extreme change

4. How much has your pain changed the amount of satisfaction or enjoyment you get from taking part in social and recreational activities?

0 1 2 3 4 5 6  
No change Extreme change

5. How supportive or helpful is your spouse (significant other) to you in relation to your pain?

0 1 2 3 4 5 6  
Not at all supportive Extremely supportive

6. Rate your overall mood during the past week.

0 1 2 3 4 5 6  
Extremely low Extremely high

7. How much has your pain interfered with your ability to get enough sleep?

0 1 2 3 4 5 6  
No interference Extreme interference

8. On the average, how severe has your pain been during the last week?

0 1 2 3 4 5 6  
 Not at all Extremely  
 severe severe

9. How able are you to predict when your pain will start, get better, or get worse?

0 1 2 3 4 5 6  
 Not at all Very able  
 able to predict to predict

10. How much has your pain changed your ability to take part in recreational and other social activities?

0 1 2 3 4 5 6  
 No change Extreme change

11. How much do you limit your activities in order to keep your pain from getting worse?

0 1 2 3 4 5 6  
 Not at all Very much

12. How much has your pain changed the amount of satisfaction or enjoyment you get from family-related activities?

0 1 2 3 4 5 6  
 No change Extreme change

13. How worried is your spouse (significant other) about you because of your pain?

0 1 2 3 4 5 6  
 Not at all Extremely  
 worried worried

14. During the past week how much control do you feel that you have had over your life?

0 1 2 3 4 5 6  
 No control Extreme control

15. On an average day, how much does your pain vary (increase or decrease)?

0 1 2 3 4 5 6  
 Remains Changes  
 the same a lot

16. How much suffering do you experience because of your pain?

0 1 2 3 4 5 6  
No suffering Extreme suffering

17. How often are you able to do something that helps to reduce your pain?

0 1 2 3 4 5 6  
Never Very often

18. How much has your pain changed your relationship with your spouse, family, or significant other?

0 1 2 3 4 5 6  
No change Extreme change

19. How much has your pain changed the amount of satisfaction or enjoyment you get from work?

(  Check here, if you are not presently working).

0 1 2 3 4 5 6  
No change Extreme change

20. How attentive is your spouse (significant other) to you because of your pain?

0 1 2 3 4 5 6  
Not at all attentive Extremely attentive

21. During the past week how much do you feel that you've been able to deal with your problems?

0 1 2 3 4 5 6  
Not at all Extremely well

22. How much control do you feel that you have over your pain?

0 1 2 3 4 5 6  
No control at all A great deal of control

23. How much has your pain changed your ability to do household chores?

0 1 2 3 4 5 6  
No change Extreme change

24. During the past week, how successful were you in coping with stressful situations in your life?

0 1 2 3 4 5 6  
 Not at all Extremely  
 successful successful

25. How much has your pain interfered with your ability to plan activities?

0 1 2 3 4 5 6  
 No change Extreme change

26. During the past week how irritable have you been?

0 1 2 3 4 5 6  
 Not at all Extremely  
 irritable irritable

27. How much has your pain changed or interfered your friendships with people other than your family?

0 1 2 3 4 5 6  
 No change Extreme change

28. During the past week how tense or anxious have you been?

0 1 2 3 4 5 6  
 Not at all Extremely  
 tense or anxious tense and anxious

**Section II**

In this section, we are interested in knowing how your spouse (or significant other) responds to you when he or she knows that you are in pain. On the scale listed below each question, circle a number to indicate how often your spouse (or significant other) responds to you in that particular way when you are in pain. Please answer all of the 14 questions.

1. Ignores me.

0 1 2 3 4 5 6  
 Never Very Often

2. Asks me what he/she can do to help.

0 1 2 3 4 5 6  
Never Very Often

3. Reads to me.

0 1 2 3 4 5 6  
Never Very Often

4. Gets irritated with me.

0 1 2 3 4 5 6  
Never Very Often

5. Takes over my jobs or duties.

0 1 2 3 4 5 6  
Never Very Often

6. Talks to me about something else to take my mind off the pain.

0 1 2 3 4 5 6  
Never Very Often

7. Gets frustrated with me.

0 1 2 3 4 5 6  
Never Very Often

8. Tries to get me to rest.

0 1 2 3 4 5 6  
Never Very Often

9. Tries to involve me in some activity.

0 1 2 3 4 5 6  
Never Very Often

10. Gets angry with me.

0 1 2 3 4 5 6  
Never Very Often

11. Gets me pain medication.

0 1 2 3 4 5 6  
Never Very Often

12. Encourages me to work on a hobby.

0 1 2 3 4 5 6  
Never Very Often

13. Gets me something to eat or drink.

0 1 2 3 4 5 6  
Never Very Often

14. Turns on the T.V. to take my mind off my pain.

0 1 2 3 4 5 6  
Never Very Often

### Section III

Listed below are 19 daily activities. Please indicate **how often** you do each of these by **circling a number** on the scale listed below each activity. Please complete all 18 questions.

1. Wash dishes.

0 1 2 3 4 5 6  
Never Very Often

2. Mow the lawn (  Check here, if you do not have a lawn to mow).

0 1 2 3 4 5 6  
Never Very Often

3. Go out to eat.

0 1 2 3 4 5 6  
Never Very Often

4. Play cards or other games.

0 1 2 3 4 5 6  
 Never Very Often

5. Go grocery shopping.

0 1 2 3 4 5 6  
 Never Very Often

6. Work in the garden (  Check here, if you do not have a garden).

0 1 2 3 4 5 6  
 Never Very Often

7. Go to a movie.

0 1 2 3 4 5 6  
 Never Very Often

8. Visit friends.

0 1 2 3 4 5 6  
 Never Very Often

9. Help with the house cleaning.

0 1 2 3 4 5 6  
 Never Very Often

10. Work on the car (  Check here, if you do not have a car).

0 1 2 3 4 5 6  
 Never Very Often

11. Take a ride in a car or bus.

0 1 2 3 4 5 6  
 Never Very Often

12. Visit relatives

(  Check here, if you do not have relatives within 100 miles).

0 1 2 3 4 5 6  
 Never Very Often

13. Prepare a meal.

0 1 2 3 4 5 6  
 Never Very Often

14. Wash the car (\_\_\_ Check here, if you do not have a car).

0 1 2 3 4 5 6  
 Never Very Often

15. Take a trip.

0 1 2 3 4 5 6  
 Never Very Often

16. Go to a park or beach.

0 1 2 3 4 5 6  
 Never Very Often

17. Do the laundry.

0 1 2 3 4 5 6  
 Never Very Often

18. Work on a needed household repair.

0 1 2 3 4 5 6  
 Never Very Often

19. Engage in sexual activities.

0 1 2 3 4 5 6  
 Never Very Often

## Appendix K

### INFORMATION AND INFORMED CONSENT

The Department of Psychology, University of Ottawa, and the Ottawa Civic Hospital, Gastroenterology Unit, are conducting a research project designed to study the relationship between muscle reactivity and the development of disorders such as IBS and Crohn's disease. The study also investigates the impact of health and disability on individuals' daily lives.

Currently we are looking for healthy individuals who would be willing to participate in the study. Your participation will allow us to compare the physical and psychological functioning of healthy and chronically ill individuals. If you agree to participate in this project, you will be asked to fill out questionnaires and to participate in a muscle fatigue inducing task.

The questionnaires ask information regarding: 1) your current health status; 2) the extent to which your health affects your daily activities; 3) your emotional well being; and 4) how you cope with stressful situations. You will also be asked to monitor your health for a one week period.

The muscle fatigue inducing task requires that you extend your non-dominant arm parallel to the floor in a non-supported position for as long as possible. During the task you will be asked to report your level of fatigue. The muscle fatigue inducing task will be video taped and you will be asked to view the video tape and report the thoughts you experienced during the task. You will also be asked questions regarding your performance on the muscle fatigue inducing task. Your responses will be audiotaped for purposes of recording and scoring information. All video and audio tapes are confidential and will be erased once they have been scored.

The study will take place at the University of Ottawa and the Gastroenterology Unit at the Ottawa Civic Hospital. We will require approximately one and a half hours of your time.

You are under no obligation to participate. Your involvement in this research is voluntary and independent of any current or future treatment received at the Ottawa Civic Hospital. You may withdraw your consent and discontinue participation in this study at any time.

To date research with healthy and chronically ill individuals indicates that people who participate by completing questionnaires are not subject to any physical or psychological risks. The arm extension task has been used with adults and adolescents and these individuals did not report any physical or psychological side effects. Although you will not receive any direct benefit from participating in this study, you will be contributing to scientific research and will be helping us develop a better understanding of the physical and psychological needs of Irritable Bowel Syndrome patients and Crohn's disease patients.

Confidentiality

All information you give to this research project will be kept in confidence and in accordance with the guidelines of the Ontario Board of Examiners in Psychology. You will be identified by a number only and all information will be statistically pooled so that individuals cannot be identified.

This study will be directed by Helen Pigeon-Reesor (doctoral candidate, University of Ottawa). The study will be supervised by Dr. Patrick McGrath, a registered psychologist in Ontario, Director of clinical psychology and professor of psychology, Psychology department Dalhousie University, Halifax, Nova Scotia.

I being asked to participate in a study to examine the relationship between muscle reactivity and the development of bowel disorders, as well as the impact of health and disability on daily living. I give permission for the collection of data for the study. I understand that all information gathered about my health and performance on the muscle fatigue inducing task will be held in strict confidence within the limits of the law and in accordance with the ethical principles of the Ontario Board of Examiners in Psychology, and that this information will be available only to those who are directly involved in the study. My participation in this research is voluntary and I may withdraw from this study at any time without penalty and without affecting my current or future treatment at the Ottawa Civic Hospital.

I can contact Helen Pigeon-Reesor at 739-7339 to answer any questions or concerns that I may have.

Signature of Participant \_\_\_\_\_

Telephone # (H) \_\_\_\_\_ (W) \_\_\_\_\_

Investigator's Signature \_\_\_\_\_

Witness' Signature \_\_\_\_\_

## Appendix L

## PERSONAL INFORMATION SHEET

All the information you provide us with is confidential and will be used for research purposes only. PLEASE FILL OUT THIS FORM AS COMPLETELY AS POSSIBLE.

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Home address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Phone # during the day: \_\_\_\_\_ During the evening \_\_\_\_\_

1. My age is \_\_\_\_\_ years
2. I am male \_\_\_\_\_ Female \_\_\_\_\_
3. My present marital status is: (check one)
  - a) Single (never married)
  - b) Married and living with spouse
  - c) Common -law
  - d) Separated
  - e) Divorced
  - f) Widowed
4. The highest level of education I have completed is (check one)
  - a) Grade School
  - b) High School
  - c) Trade School
  - d) College
  - e) University (undergraduate)
  - f) University (graduate)
5. Presently, I am
  - a) Employed full-time
  - b) Employed part-time
  - c) Unemployed, but looking for work
  - d) Unemployed, but not looking for work
  - e) Full-time homemaker
  - f) Retired
  - g) On disability leave
  - h) Volunteering
6. If you are retired, was your retirement related to your health? Yes \_\_\_\_\_ No \_\_\_\_\_
7. If you are not retired, but are not working, is this related to your health condition? Yes \_\_\_\_\_ No \_\_\_\_\_

8. Please list any medication (prescription and non-prescription, diet supplements, laxatives) which you are currently taking well as the length of time you have been using the medication, the dose, the number of time taken daily.

Medication Name	Use:	Time on Medication	Dose	Times/day
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

9. Do you smoke? Yes \_\_\_\_\_ No \_\_\_\_\_  
 Number of cigarettes per day \_\_\_\_\_

10. Do you drink alcohol? Yes \_\_\_\_\_ No \_\_\_\_\_  
 Number of alcoholic beverages per week \_\_\_\_\_

11. How many physicians and/ or specialists have you seen over the past year? # \_\_\_\_\_

12. Have you been diagnosed with Irritable Bowel Syndrome? Yes \_\_\_\_\_ No \_\_\_\_\_

a) If so, how many physicians have you seen for this condition? # \_\_\_\_\_

b) How long have you had this condition? # \_\_\_\_\_

c) How many flare ups of your condition have you experienced within the last year? # \_\_\_\_\_

d) Are you currently (within the last week) experiencing a flare up? Yes \_\_\_\_\_ No \_\_\_\_\_

e) Have you ever been hospitalized for this condition? Yes \_\_\_\_\_ No \_\_\_\_\_

f) Have you been hospitalized within the last 6 months Yes \_\_\_\_\_ No \_\_\_\_\_

13. Have you been diagnosed with Crohn's disease?

Yes \_\_\_ No \_\_\_

a) If so, how many physicians have you seen for this condition?

# \_\_\_

b) How long have you had this condition? # \_\_\_

c) How many flare ups of your condition have you experienced within the last year?

# \_\_\_

d) Are you currently (within the last week) experiencing a flare up ?

Yes \_\_\_ No \_\_\_

e) Have you ever been hospitalized for this condition?

Yes \_\_\_ No \_\_\_

f) Have you been hospitalized within the last 6 months

Yes \_\_\_ No \_\_\_

14. Are you currently under the care of a physician or psychologist for any acute or chronic disorder or condition, such as: headaches, pain problems, asthma, diabetes, constipation, diarrhea, depression etc.

Yes \_\_\_ No \_\_\_

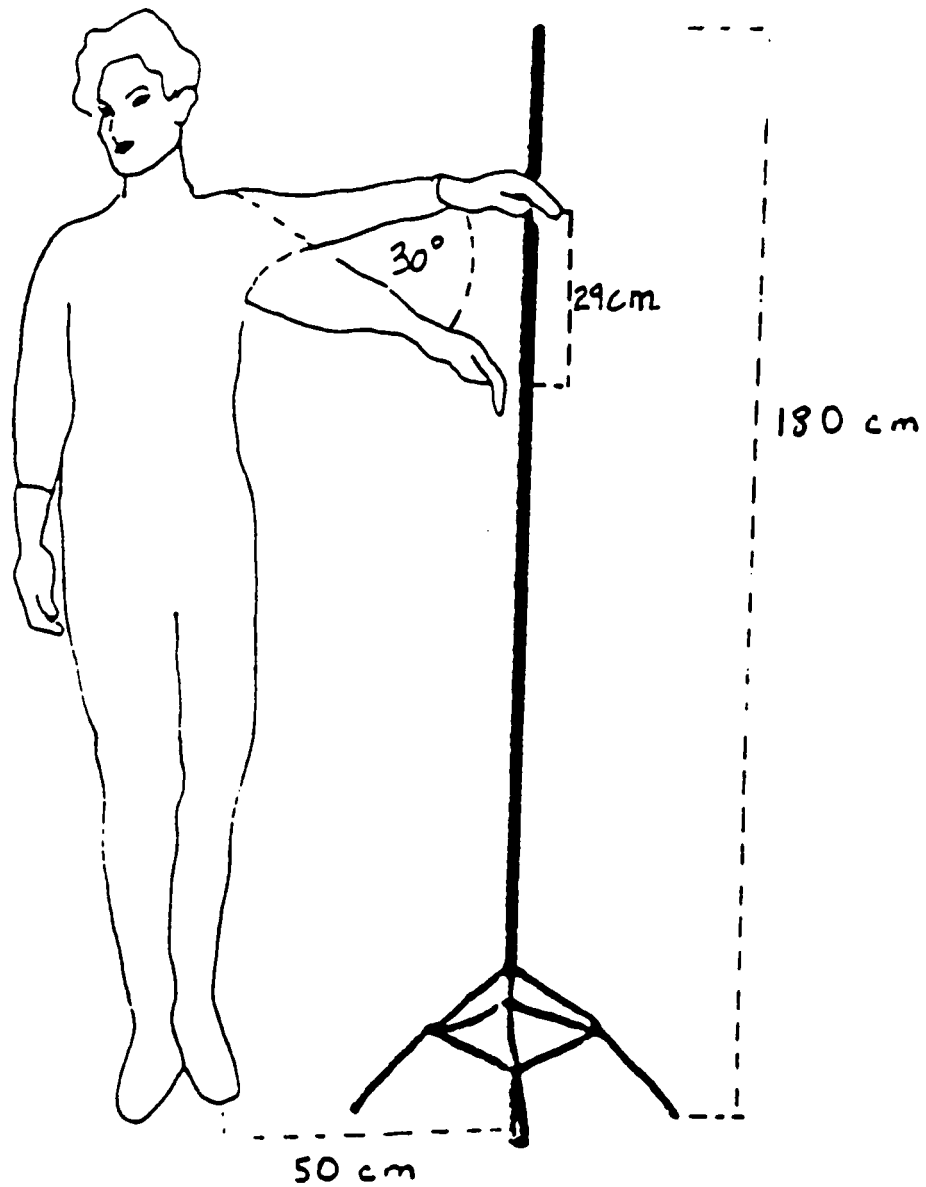
Have you ever been treated for arthritis Yes \_\_\_ No \_\_\_

Have you ever been treated for heart problems, chest pains, difficulty breathing, shortness of breath

Yes \_\_\_ No \_\_\_

Appendix M

**EXAMPLE OF SOMATOPROJECTIVE TASK AND MEASUREMENTS TO DETERMINE MAXIMUM DOWNWARD DEVIATION THAT EACH SUBJECT'S ARM IS ALLOWED FROM INITIAL HORIZONTAL POSITION**



## Appendix N

### INFORMATION PROVIDED FOR THE SOMATOPROJECTIVE TASK

In a few minutes I will be asking you to do two things. First of all, I will be asking you to stand like this with your arm extended until your arm is so tired that you cannot hold it up any longer. Please do not change the position of your arm (like this) or let it touch this metal bar (like this). If you should change the position of your arm or it touches the metal bar I will correct you. If your arm is so tired that you cannot make these corrections you may drop your arm. Any questions.

Secondly, when your arm is extended I will be asking you every 60 seconds to rate the fatigue in your arm on this scale. You may rate the fatigue in your arm anywhere from 0 "not at all tired" to 10 extremely tired" and anywhere in between. When you here the instruction "fatigue rating", please refer to the chart and rate your arm fatigue accordingly. To familiarize yourself with the fatigue rating scale, please give me a fatigue rating that represents your overall fatigue level right now; how tired you feel in general. "Good." Now, please give me a fatigue rating that represents how fatigued your arm is right now. "Good". Remember when you hear the words "fatigue rating" please rate the fatigue in your arm according to the scale on the wall.

Do you have any questions? Please extend your arm when you hear the word "begin".

## Appendix O

### INSTRUCTIONS FOR THE COGNITIVE INTERVIEW

One of the things we are interested in this study is what people are feeling and thinking about as they extend their arm. I am going to play back the video and ask you to a few questions about any thoughts, feelings or anything that occurred to you while you had your arm extended. I would like you to answer in as much detail as possible.

1. Let's go back to a few minutes before you extended your arm. Tell me everything you can remember about what you were thinking and feeling at that time, even if your thoughts were brief or random, and even if they seem trivial (Prompt if necessary).

Prompts:

What were you thinking?  
How were you feeling?  
Was there anything else going on?  
Can you tell me more about that?

2. Is there anything else? ( repeat this question until the subject reports no new cognitions that occurred before the arm extension. Then proceed:
3. When you gave your first fatigue rating, what kind of feelings and thoughts did you have then? (Prompt if necessary)
4. After that what can you remember? (repeat until no further responses are given)
5. Is there anything else? (ask when no further cognitions are reported)

When subject reports that she can recall no further information, repeat, 3, 4, and 5 for all subsequent fatigue ratings.

6. Once you dropped your arm what kind of feelings and thoughts did you have then (Prompt if necessary).
7. After that what can you remember? (repeat until no further responses are given)
8. Is there anything else? (ask when no further cognitions are reported)

## Appendix P

### COGNITIVE ASSESSMENT SCORING KEY (CASK)

The spontaneously reported cognitions were coded on a 5-point scale developed previously (Reesor & Craig, 1988) for each of 6 categories used in investigations with pain induction tasks (Genest, 1978; Reesor & Craig, 1988).

The 5-point rating scale had the following anchors:

- 1) No occurrence of the thought/feeling category
- 2) Some elements of the thought/feeling category
- 3) At least one clear occurrence of the thought/feeling category
- 4) Multiple examples or implication that this thought/feeling category was more than an isolated cognitive event
- 5) Implication that the thought/feeling category predominated mental activity

The categories were defined as follows:

#### 1. Dissociates Discomfort From Self

a. Statement or implied meaning that the discomfort is limited to one part of the body with the implication or explicit statement that this limitation made the discomfort less aversive or bothersome.

Examples: "My mind was calm; it was just my arm that was hurting". "I just thought about how comfortable I was in the rest of my body. My arm wasn't going to bug the rest of me".

b. Report of "Objectively observing" or attempting to objectively observe sensations in the area of discomfort with some detachment (i.e., negative affect is not salient).

Examples: "I think I was trying to feel the pain, to think about what was going on in my arm". "I was feeling the sensations, the throbbing and the numbness; looking at my arm and feeling it".

c. An expression of distance from the sensations, either physical or psychological.

Examples: "The ache seemed far away, not really bothersome". "It seemed my arm was experiencing something irrelevant, unimportant".

d. Report of not thinking or thinking about "nothing".

Examples: "I tried not to think". "It felt like nothing was coming, no input, just sort of an emptiness".

#### 2. Relaxation

Reference to being drowsy, relaxed, at ease, or in a similar state, either physically or mentally.

Examples: "I felt calm, just took it easy". "I took a deep breath and felt the tension drain away for awhile". "I just tried to relax".

### 3. Imagery

Report of an image, either from memory or fantasy, that does not include unpleasant physical sensations, or includes discomfort but without negative affect.

Examples: "I was just imaging that I had broken my arm and was lying on a hospital bed being taken care of by nice nurses". "I was planning my summer trip home, thinking of all the details".

### 4. Non-Imagery Distraction

Report of any thought or feeling not related to the discomfort, or an attempt to ignore or distract attention from the unpleasant sensations, that does not constitute an image (see 3 above).

Examples: "I was going over my appointment schedule for tomorrow". "I kept my thoughts on the sounds from the corridor". "I was tapping my foot".

### 5. Sense of Control Expressed

a. A statement that the patient could, or felt able to control physical sensations or degree of discomfort.

Examples: "I thought it would be possible to just not think about it; then it shouldn't really bother me; it wouldn't hurt me as much". "I felt I could reduce the unpleasantness if I tried".

b. A deliberate attempt to use some strategy or technique to affect the sensations, or the attribution of some variation in the sensations, painfulness, fatigue, or the awareness of sensations to some action of the patient. Just the use of a strategy is not sufficient: intention to affect the experience must be explicit or implicit (e.g., determined extensive or deliberate use, or statement of intent).

Examples: "I was just trying not to concentrate on my arm, because sometimes when you're conscious about something you can increase your feelings in it". "I started to distract myself...to wiggle my toes...and to move my other arm I thought that would help". "When I looked at it seemed that it hurt more than when I looked away so I turned away". "I was singing this song in my head, and then I noticed that it didn't bother me as much".

BUT NOT: "I was just looking around the room". "I was bored and began thinking about a book I'm reading".

c. A statement that the patient could, or felt able to control his reactions to the sensations experienced, that is, that he could persevere despite fatigue and discomfort.

Examples: "Oh I can take this. I've got a lot of strength in my arms. I think it's a snap". "I figured I could control myself--that it would be uncomfortable, but what's a little soreness? I could take it anyway".

d. A deliberate attempt to use some strategy or technique to affect reactions to the sensations, or the attribution of control of reactions to some action of the patient.

Examples: "I was concentrating on saying to myself, 'You've got to keep it up; you've got to keep it up,' and gritting my teeth, and biting my lip--doing anything". "I was able to stay because I was thinking about how others had done, and that made me stay in longer".

e. Indication of being in control by being able to terminate.

Example: "I knew I could stop whenever I wanted, so I just kept going".

## 6. Catastrophizing

a. An expression of fear, anxiety, or other negative affect, or "worry-thoughts" about possible dire outcomes.

Examples: "I was afraid of what was going to happen to my arm". "I was thinking that I was going to pull a muscle or tear some ligaments in my shoulder". "I thought, 'This will hurt'". "I hate pain" (as a reported cognition). "I thought my arm might be damaged if I stayed to long".

b. Attention focused on or drawn to pain or other unpleasant feelings. Either: (a) a statement that the patient thought of little other than the discomfort and fatigue, or could not attend to anything else; or (b) reference to fatigue, discomfort, or unpleasant feelings, or to attempts to escape from such events or both.

Examples: "Except for the hurt and aching, I wasn't really thinking about anything else". "All I could feel was my arm weak, heavy, and sore". "I couldn't concentrate on anything else".

Examples: "It's really bugging me now...It was starting to bug me there...Just trying to get away from the thought again... The ache was steady, you know, it was hard". "I was thinking I should think about other things...I was trying not to think about it...It was bothering me more...When I looked at it, it hurt".

c. Termination thoughts. The patient mentions having thought about termination or not terminating (as a conflict, not a resolved decision to stay).

Examples: "All the way through, I was wondering, 'Well, should I stay a little longer'". "I was thinking, how long could I stand it... 'I wish I could drop my arm'...kept encouraging myself to keep it up". "I really wanted to drop it". "It crossed my mind to drop it, but I just didn't... thinking, 'God, I'd like to drop it'...I was saying to myself, 'You've got to keep it up'...I figured I'd be dropping it soon".

d. Indication of no control over sensations, painfulness, or reactions to sensations.

Examples: "It (the patient's attempt to distract herself from the discomfort) didn't work. I couldn't concentrate on it". "I wondered whether I would feel a lot of discomfort anyway (despite attempts to control it)".

## Appendix Q

### POST-TASK SYMPTOM CHECKLIST (PSC)

Patients were asked to rate the extent to which they experienced the following symptoms during the somatoprojective task. The 3 point rating scale included the descriptors "Not At All", "Somewhat, A Bit", and "Quite A Lot".

1. ringing in ear
2. good general muscle tone
3. lump in throat
4. out of breath
5. strong back
6. chest pain
7. racing heart
  
8. physically relaxed body
9. cold hands or feet
10. sturdy legs
11. even breathing
12. leg cramps
13. physically alert
14. upset stomach
  
15. clear head
16. pains or cramps in stomach
17. stiff arm muscles
18. settled stomach
19. back pain
20. firm grip
21. regular heart beat
  
22. athletic
23. tender skin on arm
24. flushed face
25. headache
26. comfortable body  
temperature
27. pressure in head
28. dizziness
  
29. relaxed arm
30. feel faint
31. numbness in arm or hand
32. physically fit
33. legs shaking
34. hands shaking
35. strong arms

## Appendix R

## THE CAUSAL DIMENSION SCALE

Think about the reason or reasons you have given for your performance on the arm-extension task. The items below concern your impressions or opinions of the cause or causes of your performance. Circle one number for each of the following scales.

1. Is the cause(s) something that:

Reflects an aspect of yourself							Reflects an aspect of the situation			
	9	8	7	6	5	4		3	2	1

2. Is the cause(s):

Controllable by you or other people							Uncontrollable by you or other people			
	9	8	7	6	5	4		3	2	1

3. Is the cause(s) something that is:

Permanent							Temporary		
	9	8	7	6	5	4		3	2 1

4. Is the cause(s) something:

Intended by you or other people							Unintended by you or other people		
	9	8	7	6	5	4		3	2 1

5. Is the cause(s) something that is:

Outside of you							Inside of you		
	9	8	7	6	5	4		3	2 1

6. Is the cause(s) something that is:

Variable over time							Stable over time		
	9	8	7	6	5	4		3	2 1

7. Is the cause(s):

Something about you	9	8	7	6	5	4	3	Something about others	2	1
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8. Is the cause(s) something that is:

Changeable	9	8	7	6	5	4	3	Unchanging	2	1
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9. Is the cause(s) something for which:

No one is responsible	9	8	7	6	5	4	3	Someone is responsible	2	1
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**Appendix S**

**IBS STUDY-PROCEDURE CHECKLIST**

**A. CLINIC ATTENDANCE:**

- 1) Prior to clinic ensure that all IBS and Crohn's patients have the Health Status Index in their charts.
- 2) Explain study to subject. Provide subject with a copy of the information and informed consent form so that she may follow along.
- 3) Subject signs two copies of the information and informed consent form. Note: remind subject to print her name under the section : I understand.
- 4) Schedule next appointment with subject.
- 5) Explain Gastrointestinal Diseases Diary to subject.
- 6) Explain Multidimensional Pain Inventory to subject. Request that subject bring both the completed MPI and GIDD to next appointment.
- 7) Retrieve Health Status Index and add to subject's file.

**B. PROCEDURES FOR TESTING:**

- 1) Review GIDD and MPI with subject. Ensure that both are complete. Note: if subject has forgotten to bring these questionnaires provide her with an addressed and stamped envelope so that they may be returned by mail.
- 2) Briefly explain to subject that she will be required to do two things: 1) fill out questionnaires and 2) participate in a physical task.
- 3) Proceed with Gastrointestinal Symptom Rating Scale for IBS and Crohn's patients.
- 4) For all subjects review instructions for questionnaires. These should be verbatim, as per instructions. This is easiest if researcher is sitting beside subject. Questionnaires should be in the following order: 1) GSRS; 2) Personal information sheet; 3) SIP; 4) PILL; 5) IMIQ; 6) CES-D; 7) STAI; 8) CSQ; 9) PSC; 10)CDS.
- 5) Before proceeding with Somatopjective Task, if feasible, next subject should begin filling out questionnaires. Note: order B. 1) 2) 3) and 4) must be followed in all cases. Thus, some subjects may be required to finish questionnaires in the examining room so that the next subject may be seen in the consult room.
- 6) Check that questionnaires have been completed.
- 7) Read aloud instructions for the Somatopjective Task.

- 8) Ensure that video is on ie. view finder indicates record.
- 9) Begin timing task.
- 10) Following completion of the Somatoprojective Task read aloud instructions for Cognitive Interview.
- 11) Change tape and press record on tape recorder so that subjects' cognitions will be recorded.
- 12) Request that patient complete Post Task Symptom Checklist and Causal Dimension Scale.