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FEASIBILITY OF COMPUTERIZED PSYCHIATRIC SCREENING
AMONG CORONARY HEART PATIENTS

James K. Hill.

A thesis submitted to
the Faculty of Graduate Studies and Research
in partial fulfilment of
the requirements for the degree of

Master of Arts

Department of Psychology

Carleton University

Ottawa, Ontario

October, 1991

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FEASIBILITY OF COMPUTERIZED PSYCHIATRIC SCREENING
AMONG CORONARY HEART PATIENTS

submitted by James K. Hill.
in partial fulfilment of the requirements for
the degree of Master of Arts

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October, 1991

Abstract

Computerized psychiatric screening among myocardial infarction (MI) patients is evaluated on the basis of two issues: 1) psychiatric illness rates and 2) concordance measures between the face-to-face (DISR) and computerized administrations (CDISR) of the Diagnostic Interview Schedule. Sixty-nine male and five female MI patients, ages ranging from 26 to 74 years (mean age= 56), volunteered to complete the DISR, CDISR, Hopkins Symptom Checklist (SCL-90) and the Recent Life Change Questionnaire (RLCQ). Psychiatric illness rates were found to be similar to the normal population, notable exceptions being major depressive disorder and phobic disorders. Interview concordance was calculated using Cohen's kappa and Yule's Y and was found to be acceptable. The CDISR and DISR exhibited similar characteristics when compared to SCL-90 results and measures of life change. These results suggest that computerized psychiatric screening can be a useful alternative to psychiatric interviews. Results are discussed with respect to previous research on psychiatric disorders among coronary patients.

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Table of Contents

	PAGE
Acceptance sheet	ii
Abstract	iii
Acknowledgements	iv
Table of Contents	v
List of Tables	vi
List of Figures	vii
List of Appendices	viii
Introduction	9
Heart Disease	10
Heart Disease Etiology	10
Heart Disease and Personality Factors	15
Type A Behaviour	15
Other Personality Factors	20
Research Difficulties	31
The Diagnostic Interview Schedule (DIS)	35
Computerized Testing	38
The Computerized Version of the DIS (C-DIS)	40
Rationale	43
Method	47
Subjects	47
Materials	47
Procedures	50
Data Analyses	51
Results	55
Discussion	69
References	85
Appendix	105

LIST OF TABLES

TABLE	DESCRIPTION	PAGE
I	Demographic Information on MI Patients	56
II	Mean Number of Diagnosis by Interview Method	57
III	Lifetime Prevalence Rates for Substance Use Disorders: ECA vs. DISR vs. CDISR	58
IV	Lifetime Prevalence Rates for Anxiety and Affective Disorders: ECA vs. DISR vs. CDISR	59
V	Age Rates of Major Depressive Episode: Males	60
VI	Lifetime Prevalence Rates for Depressive Symptoms: ECA vs. DISR vs. CDISR	61
VII	Lifetime Prevalence Rates for Simple Phobia Symptoms: DISR vs. CDISR	62
VIII	Concordance Statistics Comparing DISR and CDISR For Substance Use Disorders	63
IX	Concordance Statistics Comparing DISR and CDISR For Anxiety and Affective Disorders	64
X	Pearson Correlations Among Life Change and Diagnostic Variables	67
XI	Diagnostic Status According to DISR and CDISR by Life Change Scores	68

LIST OF FIGURES

FIGURE	DESCRIPTION	PAGE
I	CDISR and DISR Diagnosis vs. SCL-90 Sub-scale Scores	66

LIST OF APPENDICES

DESCRIPTION	PAGE
Informed Consent	105

Feasibility of Computerized Psychiatric Screening Among Coronary Heart Patients

There is extensive research on the psychological characteristics of individuals who have coronary heart disease (CHD). Research has centred on the physical, behavioural and psychological characteristics of this population in an attempt to discern the relationship between heart disease and psychological characteristics. It is generally recognized that psychological factors have an effect on physical illness, especially in the case of CHD (Friedman & Booth-Kewley, 1987a). In this light, the lack of established, reliable prevalence rates of psychiatric disorders among this population is even more surprising. Psychiatric epidemiology can increase organization and quantification of the area, thus simplifying our ability to pose the appropriate research questions. However, obtaining valid and reliable prevalence rates of psychiatric disorders among a population of physically ill patients is a difficult task. The use of psychiatrists has inherent time and financial difficulties as well as reliability problems (Robins, 1985; Spitzer, Endicott & Robins). Thus, it is necessary to examine the effectiveness of other diagnostic methods.

The present investigation is a pilot study which has two main components to assess the feasibility and utility of using computerized psychiatric assessment with MI patients.

The first component consists of an assessment of the rates of specific psychiatric disorders among a population of myocardial infarction (MI) patients. The second component examines the concordance between the lay-administered Diagnostic Interview Schedule-Revised (DISR) and the revised computerized administration and scoring version of the DISR (CDISR) among a sample of patients with heart disease.

Heart Disease

Cardiovascular disease is the leading cause of death in Canada, accounting for almost one half of all deaths each year (Statistics Canada, 1986). Therefore, the identification of risk factors has been an issue of great importance among many health care professionals. Investigators have examined behavioural and psychological characteristics for many years, yet the relationship between psychological factors and heart disease remains unclear. Researchers have proposed various theories to explain the relationship between coronary-prone behaviour and the physical result, coronary heart disease. Before an examination of these theories, the physical processes that result in the development of heart disease will be discussed.

Heart Disease Etiology

Friedman and Rosenman (1974) explained the development of heart disease as beginning with a failed attempt of the

body to heal minor structural damage of the arterial wall. The lining of the artery wall is damaged through normal physical deterioration or chemical injury. These injuries can be caused by hypertension, toxic blood lipids, endocrine substances, immunologic factors or other mechanisms (Krantz & Manuck, 1984). After such an injury, there is a development of cells to repair the damage (Friedman & Rosenman, 1974). However, these cells also cause a minute thickening of the wall that, frequently, obtains deposits of fats and cholesterol. In the best case the wound heals and healthy scar tissue develops. In some cases the wound does not heal and the accumulation of cholesterol and fats continues resulting in an expansion of the cell mass which becomes arterial plaque. If this plaque does not receive an adequate blood supply, the cells will die and form a hardened mass, known as coronary bone. This process may continue because of further cycles of injury and repair and result in coronary artery disease (CAD). CAD is a symptomless condition characterized by deterioration and narrowing of the artery. It is important to note that CAD does not necessarily develop into CHD. Frequently, the thickening of the artery wall causes no problems whatsoever. However, in some cases, the blockage caused by the development of plaque will thicken causing an obstruction which reduces blood supply to the heart. Damage to the heart may result, causing the identifiable symptoms of CHD.

The plaque may also rupture, causing blood clots. Two factors known to influence the likelihood of a rupture are the location of the plaque and its size. Thus, the development of heart disease is complex and is mediated by a variety of factors, making a simple causal model difficult to formulate (Friedman & Rosenman, 1974; Krantz & Manuck, 1984).

To help understand the complicated evolution of heart disease investigators have examined the association between physical and behavioural processes, resulting in the formulation of the construct of coronary-prone behaviour. Coronary-prone behaviour is defined as behaviour that increases the risk of coronary heart disease. This is not necessarily exclusive to psychological dimensions but also the physical behaviours of the individual. Pearson (1987) reviewed the various risk factors which predispose an individual to CAD in an effort to suggest preventative strategies. The author indicated that diet is important in the progression of heart disease. Specifically, diets high in fats and cholesterol have a negative effect on the cardiovascular system. Cessation of cigarette smoking was also isolated as a factor which decreases the likelihood of reinfarction among myocardial infarction (MI) patients. Sustained physical activity is also shown to decrease the possibility of CHD. Exercise has been shown to increase circulation, increase artery diameter, increase heart

efficiency and lower the frequency of abnormal heart beats. Friedman and Rosenman (1974), in their examination of coronary-prone behaviour, identified these same risk factors and noted the presence of an important genetic component in the development of heart disease.

Goldstein and Brown (1988) review four lines of research that support the hypothesis of a genetic predisposition to heart disease. First, they indicate variations in prevalence among racial groups living in similar environments. Secondly, first-degree relatives of coronary patients exhibit five to seven times the risk of death due to MI compared with controls. Thirdly, twin studies show a higher concordance for MI for monozygotic (44%) than dizygotic (14%) twins. Finally, association with one or more genetically determined risk factors (ie. high cholesterol, obesity, high blood pressure, diabetes). These authors also review a number of chromosomal, single-gene and multiple gene disorders which increase the risk of developing coronary disease. The authors indicate the nature of the factors underlying genetic predisposition to CAD are difficult to distinguish and that most patients have multiple risk factors. However, they conclude that treatment of even one of the predisposing factors will slow the development of CAD.

Despite the evidence of a genetic link, Friedman and Rosenman (1974) indicate that psychological characteristics

provide an important independent contribution to the development of heart disease. In his review of stress and CHD, Tennant (1987) pointed out that conventional physical risk factors explain no more than 50% of the variance of heart disease. Although the physical risk factors play a very important role in the development of heart disease, these findings emphasize the importance of exploring other avenues of research.

One of the more interesting avenues of research attempting to explain the development of heart disease are studies which examine psychophysiologic reactivity to emotional stress. Krantz and Manuck (1984) have reviewed this area of investigation and provided an explanation of the process. Investigators in this area claim that stress and anxiety interact with the sympathetic nervous system to increase adrenal-medullary and/or pituitary adrenal-cortical activity. Increases in the amount of catecholamines cause increased heart rate, increased blood pressure, abnormal heart rhythms, damage to the artery lining, the release of lipids, clotting and heart damage. As mentioned above, many of these processes can hasten the development of plaque on the artery wall and cause heart disease. Thus, these theories provide a possible connection between emotional stress and CHD.

In a related area, Stein, Keller and Schleifer (1988) examined how stress, anxiety and depression interact with

the individual's immune system. This interaction can diminish the body's ability to ward off disease. The authors indicate that stress and anxiety can have an impact on the central nervous system which, in turn, causes changes in the immune system. However, other researchers reviewing the relationship between depression and the immune system conclude that the findings are inconsistent and inconclusive (Stein, Miller & Trestman, 1991). These investigators indicate that many studies in the area are of weak design, lack conceptual clarity and have little clinical relevance. Although it is possible that aberrations within the immune system may increase an individual's susceptibility to heart disease, there is still debate as to the extent of any relationship.

Heart Disease and Personality Factors

Type A Behaviour

Many studies in the stress and heart disease literature attempt to show how psychological characteristics can be a causal factor in the development of heart disease. The most renowned psychological construct in the area is type A behaviour pattern. Friedman and Rosenman (1974:84) defined type A behaviour pattern as "an action-emotion complex that can be observed in any person who is aggressively involved in a chronic, incessant struggle to achieve more and more in less and less time, and if required to do so, against the

opposing efforts of other things or other persons." A major positive attribute of their formulation is its apparent predictive strength (Friedman & Rosenman, 1974). Jenkins (1976) put forth a slightly different definition of type A behaviour. He characterized type A behaviour as: intense striving for achievement, competitiveness, easily provoked impatience, time urgency, abruptness of gesture and speech, over commitment to profession and excesses of drive and hostility. This definition fits into the more general formulation by Friedman and Rosenman (1974) and has the added benefit of having a superior operational definition. The use of various definitions of type A behaviour pattern in research has resulted in focusing on specific aspects, to the detriment of others (Matthews, 1983).

The type A behaviour construct has been examined in association with biological model of stress. Smith and Anderson (1986) examined two biological models, and proposed a third model, which attempt to explain the interaction between biological processes and type A behaviour. The first model, the mechanistic interactional model, assumes that type A behaviour mediates between stimuli and physiological reactivity. It is this reactivity which causes coronary artery disease and coronary heart disease. In the second model, the biologic interactional model, the stimuli affect both type A behaviour and physiological reactivity. This physiological response to the stimuli also

influences type A behaviour, therefore, the stimuli have both a direct and indirect influence on type A behaviour. This postulates an interaction between these three factors that results in the physical disease. The authors propose a third hypothesis to explain the development of heart disease, the biopsychosocial interactional model. This model theorizes a relationship between type A behaviour, the environment, and reactivity which all interact and result in the development of heart disease. Type A individuals not only react to their surroundings but seek out a demanding environment. These three models maintain that physiological reactivity causes the CHD but differ on the exact process preceding this reactivity.

Some support for the predictive value of type A behaviour pattern is indicated in the literature. Brackett and Powell (1988), assessed type A behaviour among 1012 post-infarction patients using the Structured Interview. The authors found type A behaviour to be an independent predictor of sudden cardiac death among patients who survived an earlier MI. Using various personality measures, Bernardo, Flores, Valdes, Mestre and Fernandez (1987) examined a sample of individuals suffering from angina pectoris. These patients score significantly higher on neuroticism measures, measures of aggression and on measures of type A behaviour, as assessed by the Jenkins Activity Survey. These studies support the usefulness of the type A

behaviour pattern construct in the study of CHD.

A recent meta-analysis of the literature on type A behaviour shows support is waning among researchers (Booth-Kewley & Friedman, 1987). These researchers examined 83 studies, spanning a period of 30 years. Study inclusion was based on the following criteria: Type A pattern (or a component thereof) as the independent variable, a manifestation of CHD or CAD as the dependent variable, quantitative data (as opposed to descriptive studies) and the inclusion of information which allowed the estimation of effect size and significance level. Findings revealed an attenuated relationship between type A behaviour and CHD. Studies after 1977 tend to show less correlation or even a negative correlation between the two variables. This finding illustrates the increasing disenchantment with the original conceptualization of type A behaviour pattern among professionals in the field (Eysenck, 1985; Tennant & Langeneck, 1985; Smith & Anderson, 1986).

One explanation of the attenuated relationship between type A behaviour and heart disease is the manner of assessment. There are two major methods of assessment of type A behaviour used in North America: the Structured Interview (SI) (Rosenman, 1978) and the Jenkins Activity Survey (JAS) (Jenkins, Zyzanski & Rosenman, 1971). Corse, Manuck, Cantwell, Giordani and Matthews (1982) compared these two instruments and found that the two measures were

discordant in roughly 30% of cases. The authors also found that although both instruments assess some part of type A behaviour, the SI classifications showed greater relationship with cardiovascular responsivity. Tennant and Langeluddecke (1985) compared the JAS to another type A assessment device, the Framingham Scale (Haynes, Feinleib & Kannel, 1980), and found a statistically significant correlation between the JAS type A scores and CAD. However, the Framingham type A score did not relate significantly to any clinical indices of CHD.

Matthews (1983) reviewed assessment issues pertinent to these three measures of the type A behaviour pattern. She indicated that the JAS and Framingham scales agree with the SI classification of middle-class men 10-20% above chance. The author concluded that there is little overlap between the three measures. Assessment problems such as ignoring the multidimensional aspect of the type A construct, the use of only one measure of type A and treating it as a typology instead of a continuum may explain the differences. She indicated the need to increase specificity and sensitivity of the type A measures and to examine type A in various cultures. Matthews (1983) also supported the inclusion of other behavioural measures in the assessment of coronary-prone behaviour.

In a study conducted in Britain, Johnston, Cook and Shaper (1987) examined a random sample of 5936 males between

40 and 50 years of age for an average of 6.2 years. They found that type A behaviour, as assessed by Bortner questionnaire, did not predict new major coronary heart disease events. The Bortner questionnaire is a 14 item questionnaire used extensively in western Europe and has been shown to relate well with the JAS (Johnson and Shaper, 1983). However, the authors did find a significant relationship between type A behaviour and existing evidence of CHD, according to electrocardiographic and questionnaire data.

Other Personality Factors

The recent tendency away from acceptance of the type A behaviour pattern construct has expanded research into other personality dimensions. In an effort to identify a high-risk subgroup of type A individuals, Lovallo and Pishkin (1980) examined behaviours such as self-involvement, autonomic activity, neuroticism and extraversion among type A males. They found that a high number of self-referrals was positively related to higher systolic blood pressure and higher extraversion scores, possibly indicating a higher arousal state among this subgroup.

In an analysis of the literature Friedman and Booth-Kewley (1987b) found a statistically significant positive correlation between CHD and depression, anxiety, anger/ hostility/ aggression, anger/hostility, and

extraversion. Ray and Simons (1982) examined the role of authoritarianism as an element of coronary-prone behaviour. They found a statistically significant negative relationship between type A behaviour and CHD, as assessed by medical history and the Rose and Blackburn (1968) Cardio-vascular Questionnaire. However, Ray and Simons (1982) also discovered that an authoritarian style of dominance was the only predictor of CHD with regard to the measures they examined. MacDougall, Dembroski, Dimsdale and Hackett (1985) examined CAD severity among a sample of 125 male patients undergoing cardiac catheterization. CAD severity was assessed by ratings of angiograms by a cardiac radiologist blind to the patient's type A status. They found that global measures of type A behaviour do not correlate with CAD severity. However, they also found that the type A measures of hostility and anger-in were significant independent predictors of disease severity. MacDougall et al. (1985) suggest the necessity for changes in the definition and assessment of type A behaviour which would focus on these aspects, a suggestion reinforced by other researchers (Williams, 1987).

Researchers have also shown interest in the relationship between severity of psychiatric disorder and CHD severity. Kurosawa, Shimizu, Nishimatsu, Hirose and Takano (1983) studied 163 post-infarction patients using psychiatric assessments and psychometric testing. The

investigators identified some form of psychiatric disorder in 64 per cent of the sample. The breakdown of the individuals into specific diagnostic categories was as follows: anxious state (25.9%), depressive state (18.4%), demented state (6.7%), manic state (4.3%), problematic behaviour (3.7%) and a variety of other disorders (4.8%). Another very interesting finding in this study was the significant correlation between severity of the psychiatric disorder and the physical severity of the MI, as assessed by Killip's classification. These results indicate the possible importance of psychological factors in the maintenance of physical health. Other authors examined this relationship and indicate that individuals with pre-operative depression have higher mortality rates (Levenson & Friedel, 1985).

In an examination of medical complications among patients undergoing coronary angioplasty, researchers found that psychological variables influenced outcome (Shaw et al., 1986). Coronary angioplasty is an invasive procedure which widens the coronary artery. The authors found increased complications among patients whose coping style was characterized by the repression of anxious feelings and among those who had mood disturbances, poor social functioning, and were more anxious during their hospital stay. Carney et al. (1988) examined a sample of 52 patients undergoing cardiac catheterization. The authors found that

major depressive disorder, as assessed by the Diagnostic Interview Schedule, was the best single predictor of major cardiac events (myocardial infarction, death, bypass surgery and angioplasty) during the twelve months following catheterization. Silverstone (1987) found that depression in males in the first 24 hours after myocardial infarction increased the chances of reinfarction or death. According to Petty (1987) 30 per cent of MI patients have depression. Among patients undergoing cardiac surgery, 27 per cent have preoperative depression and 75 per cent have mood disturbances post-operatively, 33 to 62 per cent of patients are emotionally distressed while in coronary care unit and 22 to 58 per cent of MI patients are judged depressed (Levenson & Friedel, 1985). These results emphasize the importance of examining the presence of depression among coronary heart patients.

Within this same vein, Carney, Freedland and Jaffe (1990) examined the presence of insomnia and depression prior to a myocardial infarction. These investigators, using a slightly modified DIS interview, found that 23% of MI patients met criteria for a major depressive episode and 39% reported insomnia. Interestingly, 81% of those meeting criteria for major depressive episode also reported insomnia, compared with 26% without major depressive episode. These results accent the importance of researching the clinical relationship between depression and CHD.

In a review of the relationship between physical disease and mental disorder Tsuang, Perkins and Simpson (1983) examined the relationship between schizophrenia and cardiovascular disorders. They review some findings in the area that point toward a significant excess of heart disease and mortality due to cardiovascular disease among schizophrenic patients. They also examined the relationship between depression and cardiovascular disease. Findings indicated higher mortality rates due to diseases of the circulatory system and increased rates of hypertension and arteriosclerosis among depressed individuals.

Neshkes and Jarvik (1982) suggest that individuals with major depression had the highest mortality following cardiac surgery and that older patients appear to have high rates of psychiatric disorder. The authors stress the need for mental health-care staff to monitor drug reactions in elderly patients and the importance of psychiatric treatment, a caution reinforced by other researchers (Busse, 1982). Yates and Wallace (1987) found that bipolar affective disorder patients have increased systolic blood pressure, hypertension and use of cigarettes. These behaviours place this population at greater risk for cardiovascular disease. The authors indicate that this finding conforms to the consistent link found between affective disorders and high cardiac mortality.

As mentioned above, many coronary heart patients suffer

from anxiety (Kurosawa et al., 1983). Some researchers indicate that of all anxiety disorders, panic disorder has the greatest likelihood of being related to cardiovascular problems, especially mitral valve prolapse (Dunner, 1985). Schocken, Greene, Worden, Harrison and Spielberger (1987) examined male patients and found a positive association between trait anxiety and chest pain with no MI or CAD. The researchers found high prevalence of trait anxiety among younger males and, thus, consider it a risk factor to chest pain. Beitman et al. (1989) found panic disorder among 34% of patients who complained of chest pain but have normal or near normal coronary arteries. Among this type of patient, other researchers found that 20% had panic disorder and 58% were diagnosed with generalized anxiety disorder (Kane, Harper & Wittles, 1988). Investigators have suggested that 59% of persons with atypical or nonanginal chest pain and no CAD have panic disorder (Beitman et al., 1987).

Research also indicates that roughly 10 to 30% of patients referred to the cardiologist have normal or near normal coronary arteries (Beitman, Mukerji, Flaker & Basha, 1988; Stern & Tesar, 1988). According to Jefferson (1988) physicians tend to ignore anxiety when dealing with coronary patients. Researchers have pointed out that there is an overlap between many of the symptoms associated with anxiety disorders and heart disease. This overlap causes problems in accurate diagnosis (Dager, Comess, Saal & Dunner, 1986).

Strain (1981) indicates that physicians who have no psychiatric training identify psychiatric illness in 10 per cent of their cases, whereas, those with such training identify psychiatric illness in 40 per cent of cases. These results emphasize the need of cardiologists to be aware of the possibility that psychological state may affect physical sensations. If this is taken into consideration then the patient could avoid invasive diagnostic procedures which are expensive, painful and usually require intense supervision. In fact, some clinicians are using psychological characteristics in screening candidates for heart transplants (Frierson & Lippmann, 1987).

Anxiety disorders have also been linked to complications and higher mortality among coronary heart patients. In a 35-year follow-up of male patients who have panic disorder, researchers found significantly higher mortality due to cardiovascular disease (Coryell, Noyes & Clancy, 1982). A 12-year follow-up by these researchers initially showed an even stronger relationship between anxiety disorders and mortality due to cardiovascular disease. This relationship reduced to that of the general population, once the effects of suicide was removed (Coryell, Noyes & House, 1986). Coryell (1988) indicates that hypertension, hypercoagulability or hypercholesterolemia may be mediating factors of excessive mortality in panic disorder. Another possible explanation of higher mortality rates found among

this group is that low anxiety individuals are better able to identify symptoms and respond properly (Coryell, 1988).

Siegmán, Dembroski and Ringel (1987) examined the role of hostility in the severity of CAD. They found a positive correlation between non-neurotic hostility scores and severity. However, neurotic hostility was negatively correlated with CAD severity. A possible explanation for this finding is that neuroticism induced angina is not associated with physical changes in the coronary arteries (Siegmán, Dembroski & Ringel, 1987). Many of the neurotic patients continued to complain of chest pain after the procedure, suggesting a psychological mechanism may be responsible for CAD-free angina symptoms. Tennant and Langeluddecke (1985) found that hostility was not significantly related to CAD but the suppression of anger, trait anxiety and trait tension were significantly related. These findings further emphasize the importance of psychological testing among patients who may have coronary artery disease.

Siegel (1984) investigated the role of anger as a risk factor for cardiovascular disease among 213 adolescents. Anger was defined using a 19-item anger index made up of self-report and observer ratings of anger as a coping mechanism. The author found a positive relationship between anger and type A behaviour, test anxiety, low self-esteem, negative life events and high blood pressure. She concludes

that cardiovascular risk may come from one of two routes: its association with high blood pressure or its association with heart disease, via type A behaviour. In their meta-analysis, Booth-Kewley and Friedman (1987) indicate anger/ hostility/ aggression variables have also shown a consistent relationship with CHD in both prospective and cross-sectional studies.

Sime, Buell and Eliot (1980) examined physiological reactions to emotional stress among a sample of MI patients. They found significantly higher diastolic pressure and a significantly lower response in heart rate for this group. Cardiovascular reactivity to laboratory stress has also been linked to genetic factors (Carmelli, Chesney, Ward, & Rosenman, 1985). In a study comparing physiological reaction to stress among monozygotic and dizygotic twins, investigators found that identical twins show greater similarity in stress reaction from both physical and psychological stressors. The authors point out that cardiovascular reactivity plays a role in the course of heart disease, thus, different reactions to stress can influence the course of the illness. It has also been shown that male survivors of MI who have a high degree of life stress and are socially isolated have four times the risk of death of men who have low levels of stress and isolation (Ruberman, Weinblatt, Goldberg & Chaudhary, 1984). Alfredsson, Spertz and Theorell (1985) indicate that males

who rated their work as hectic and having little opportunity to learn new things were hospitalized more frequently for a MI than their counterparts in less stressful jobs.

Many studies that examine life stress focus on measures of life change as a major variable are investigations on health status. Bradburn and Caplovitch (1965) analyzed data from 548 mail questionnaires investigating the hypothesis that health habits, psychological well-being and social assets temper health changes associated with life change. Support was not found for this hypothesis, the strongest relationship was the association between health status and life change. However, they did find that these variables did have some mediating effect on the health of the individual. These findings indicate that regardless of individual resources, life change can have a dramatic effect on the individual health status. In fact, some researchers have shown a positive correlation between individuals with a high degree of life-change and mortality (Rahe, McKean & Arthur, 1966). In related research, life change, such as a retirement, has been associated to increased mortality due to coronary heart disease (Casscells et al., 1980).

Hallstrom, Lapidus, Bengtsson and Edstrom (1986) investigated 1462 Swedish women over a twelve year period to identify the relationship between psychosocial risk factors and risk for CHD. Standardized personality inventories were used to assess the sample. High scores on passive

dependency, neuroticism, experience of strain, extent of mental disorder and severity of depression were predictive of angina pectoris. However, low ratings of guilt feelings and neurotic self-assertiveness were predictive of myocardial infarction. The authors indicate that the psychosocial risk factors are probably not identical for men and women. However, they emphasize that differences in psychosocial predictors relate to different clinical manifestation of CHD.

In conclusion, the importance and complexity of the relationship between coronary heart disease and psychological factors cannot be minimized. Both prospective and retrospective studies continue to find a relationship between these two factors. It is apparent that the original formulation of type A behaviour pattern is in need of revision. Efforts to explain the psychological dimension of coronary-prone behaviour have broadened to include new dimensions, such as stress, anxiety, depression, anger/hostility and other psychological dimensions. Alternative measures of psychiatric disorders and personality characteristics are being investigated to obtain a more thorough explanation of the relationship between psychological functioning and heart disease. However, a need for accurate assessment of psychiatric disorders among this population remains.

Research Difficulties

It is very difficult to obtain an accurate estimate of psychiatric disorder rates for coronary heart patients. There are definitional problems at all levels, as well as drug and illness variables that further obscure the issue. Strain (1981) examined the difficulties of assessing psychiatric illness among the physically ill. He points out that DSM-III is probably the best criteria available in the assessment of mental illness among a physically ill population. However, Strain (1981) also suggests that depression is often overlooked by the medical staff who interpret it as resulting from the burden of the physical illness. Some authors view depression as a "grief reaction" caused by hospitalization and the illness itself (Lipowski, 1983). Klerman (1981) also makes this distinction, viewing depression as a normal reaction to illness. The debate over whether depression represents a normal reaction or a pathological syndrome causes a great deal of confusion. This confusion hinders the proper assessment of the prevalence of depression among the medically ill. Depending on the stringency of the criteria used, prevalence rates of depression among medical patients ranges from 13 to 40 per cent (Strain, 1981; Carney, Rich, teVelde, Saini, Clark & Jaffe, 1987). Many researchers have also delineated the difficulties associated with distinguishing between various psychiatric disorders (Stein & Uhde, 1988; Winnokur, 1988).

In addition to criteria difficulties in examining psychiatric variables, there are also problems in defining CHD. Strain (1981) indicates that, compared with autopsy results, the clinical cause of death specified by the physician is incorrect in 30 per cent of the cases. This causes problems from an epidemiological point of view because one can never be entirely confident that the cause of death has been accurately assessed. In the case of CHD, it is difficult to make generalizations because the coronary heart patient population is extremely heterogeneous. Even within an MI population there is a great deal of heterogeneity. Accurate psychiatric diagnosis becomes even more complex with the addition of confounds presented to medical diagnoses by psychiatric illness.

Another obstacle that faces researchers in this area is the overlap of physical and psychiatric symptomatology (Strain, 1981). The vegetative symptoms of depression, such as appetite change, weight loss, insomnia, lethargy, fatigue, restlessness and reduced sex drive, may simply be the result of the illness or even the hospital stay. Confusion may also result because of side-effects from either cardiac or anti-depressant medication. Goldman, Alexander, and Luchins (1986) examined various anti-depressant medications for cardiac side-effects and found that therapeutic doses of certain anti-depressants increase heart rate, prolong cardiac conduction and lower

blood pressure. Rosenthal (1987) presents a case study of an 87 year old woman given isosorbide dinitrate to manage heart disease. This drug produced visual hallucinations, which in turn caused depression because she thought she was becoming senile. The physician discontinued the medication and the hallucinations stopped, this reduced her depression and anxiety, returning her to a normal state. However, there was a strong possibility of misdiagnoses if the drug regime had not been taken into consideration.

Another drug examined for psychiatric side-effects is lidocaine, a drug used to control abnormal heart rhythms (Saravay, Marke, Steinberg and Rabiner, 1987). The authors indicate that 6 to 20 per cent of people experience side effects such as dizziness, drowsiness, muscle twitching, visual disturbances, seizures, coma, respiratory problems and other difficulties. They found that 47 per cent of the patients in their survey were affected. In this sample, 80 per cent reported a mood change of anxiety and/or depression, 73 per cent "doom" anxiety, a condition defined by the authors as a pathologic feeling of impending doom or fear of death, 53 per cent were confused and disoriented, 40 per cent had hallucination and delusions and 27 per cent had persistent anxiety that they had been on the verge of death. The authors suggest that the results may be biased because the study was not blind. Another criticism of the study is the use of a small sample of selected subjects which could

seriously bias the results. However, there was a connection between the use of the drug and the psychiatric symptoms.

Other investigators have researched the effects of reserpine, a drug associated with the serotonergic hypothesis of depression. Researchers found that 20 per cent of patients taking reserpine were pseudo-depressed (Jefferson, 1983). When the criteria were made more stringent, placing less emphasis on the vegetative signs of depression, the rate dropped from 20 per cent to 6 per cent. Such findings emphasize the importance of specialized criteria for dealing with depression among those under drug treatment or the physically ill. Carney, Rich, teVelde, Saini, Clark, and Freedland (1987) examined depression as a side-effect of various drug therapies among patients undergoing cardiac catheterization. According to DSM-III criteria, a diagnosis of depression was assigned to 21 per cent of patients using beta-blockers and 33 per cent of those using other cardiac medication. Given this relationship, it is necessary to use caution when examining rates of psychiatric illness among heart patients undergoing drug treatment. Thus, the study of the prevalence and incidence of psychiatric illness among coronary heart patients is a very difficult task, and must consider the effects of the physical illness and the treatment. However, irrespective of whether the depression was drug induced, illness induced or existed before the physical illness the

affective component is still extremely important to proper treatment (Levine et al., 198; Finnegan & Suler, 1985).

The Diagnostic Interview Schedule (DIS)

Lee Robins and John Helzer, at Washington University in St. Louis, developed the Diagnostic Interview Schedule by request from the Division of Biometry and Epidemiology of the National Institute of Mental Health (NIMH) in the United States. The interview was employed in a series of large-scale epidemiological studies, the Epidemiological Catchment Area (ECA), to examine psychiatric disorders among the general population (Robins, Helzer, Croughan, and Ratcliff, 1981). The ECA was to provide the NIMH with information concerning: 1) prevalence rates of various mental disorders, as defined by DSM-III; 2) a breakdown of prevalence into community resident and institutionalized population rates to represent the total population; 3) longitudinal data on the incidence, recurrence, remission and course of various psychiatric disorders; 4) data on the use of physical and mental health services in the United States; 5) an assessment of the utility of DSM-III; and 6) a demonstration of the effectiveness of standardized methods with regard to replication (Regier et al., 1984).

Investigators required a large sample size to obtain an accurate estimation due to the low prevalence of most psychiatric disorders in the general population. Stratified

sampling was used to ensure a representative sample and to simplify logistics (Regier et al., 1984). This resulted in the most extensive investigation of psychiatric disorders in the general population to date. The study included roughly 20,000 subjects drawn from five sites: Baltimore, New Haven, North Carolina, St. Louis and Los Angeles (Robins & Regier, 1991). The study fulfilled the goals outlined by the NIMH and also produced a large collection of normative data that can be utilized for comparative purposes.

The DIS was designed to be administered by lay-interviewers, thus avoiding the high cost of employing trained psychiatrists or other health-care workers in this research. The interview is highly structured and the questions are read verbatim to ensure standardization and reduce error variance. All questions are closed ended, with severity and causal information acquired through probing. This permits a complete evaluation of each symptom, providing greater validity and avoiding questions irrelevant to the particular individual's symptoms. The structured atmosphere does not require the lay-interviewer, untrained in psychiatric diagnostics, to make clinical decisions. Structured interviewing is also superior to interviews by various psychiatrists in that it avoids error arising from differences in the application of criteria. The DIS makes psychiatric diagnostic decisions by utilizing criteria from three sources: 1) DSM-III (American Psychiatric

Association, 1980), 2) Feighner criteria (Feighner, Robins, Guze, Woodruff, Winokur and Munoz, 1972) and 3) the Research Diagnostic Criteria (RDC) (Spitzer, Endicott and Robins, 1978).

Robins et al. (1981) examined the validity of the DIS by comparing results from the lay-interviewer administration of the DIS to results obtained from a psychiatrist interview. The concordance between the two interviews was very good, all but one kappa values were above 0.50. The authors conclude that procedural validity ratings of the DIS are excellent when compared with reliability ratings obtained when studying other instruments. Helzer, Robins, McEvoy, Spitznagel, Stoltzman, Farmer and Brockington (1985) also compared clinical results and DIS results and obtained even better concordance. Thus, studies comparing the DIS and traditional psychiatric methods support the validity of the DIS as administered by lay-interviewer.

However, researchers found less encouraging results when comparing these two methods in examinations of a community sample. Anthony et al. (1985) obtained concordance rates below the minimum cut-off value for all diagnoses covered by the DIS. The authors point to both methodological difficulties in the study and instrument confounds as explanation for the marked difference between their study and previous studies. They conclude that caution is warranted when using the DIS in studying

community samples.

The DIS has been compared to the Schedule for Affective Disorders and Schizophrenia - Lifetime (SADS-L) to examine concordance on diagnosis common to the two instruments (Hesselbrock, Stabenau, Hesselbrock, Mirkin and Meyer, 1982). They found the concordance between the two instruments to be 0.66 and above, indicating agreement on common diagnoses. Hasin and Grant (1987) compared these two instruments among a population of drug abuse patients and obtained kappa values ranging from 0.04 to 0.67. The authors suggest that criterion differences between the two instruments may account for the discrepancies. Therefore, despite some drawbacks, the DIS offers an effective, efficient and cost-effective method of assessing psychiatric disorders among a variety of populations.

Computerized Testing

Computerized versions of psychological tests have met with varying degrees of acceptance. The use of computer interviews in obtaining medical information has become an accepted practice. Slack and Van Cura (1968) found that computerized interviews established a rapport with the patient and that the patient preferred the computer when the questions were of a personal nature. Greist, Van Cura and Kneppreth (1973) examined the use of computerized interviews in emergency rooms. These authors found that patients tend

to have a positive view of the interview and that the computer offers the benefits of remembering all questions and answers and of relieving boredom in the waiting room. Some researchers feel the use of a computer, in combination with a clinician, will yield a more accurate and reliable psychiatric diagnosis (Griest et al., 1984). Skinner and Pakula (1986) emphasize this benefit by pointing out that the computer provides a standardized testing situation, provides accurate scoring and gives immediate feedback.

Lieff (1987) indicates that the lack of professional standards in computerized administration of psychological tests may result in improper use and misdiagnosis. Computer files are easier to access than paper files, thus, breeches of confidentiality and unauthorized tampering are possible. Matazarro (1983) indicates some negative aspects of computerized testing such as the improper use of such instruments by untrained individuals. However, he points out that as long as people are cognizant of the limitations of such instruments many problems can be avoided.

Lucas, Mullin, Luna and McInroy (1977) examined the ability of the computer to interview patients and concluded that the computer was at least as accurate as the clinician in eliciting information related to alcohol problems. Skinner and Allen (1983) compared computerized administration with face-to-face and self report methods of gathering information and found that the use of the computer

did not influence the quality of information obtained. Carr, Ghosh and Ancill (1983) found that, in comparison to a psychiatric team, the computer was very accurate in obtaining a psychiatric history.

Greist et al. (1987) examined the concordance between a computerized version of the DIS and lay-interviewer administered DIS. The authors found that both methods of interviewing yield equally accurate results but suggest that neither compare to a clinician. Although the computer interview took an hour longer the inpatients did not feel it was too long. The computer also offers the advantages of fast scoring, cost effectiveness and reduction of patient anxiety.

The Computerized Version of the DIS (C-DIS)

A fully self-administered computerized version of the DIS (C-DIS) was developed at the Ottawa Civic Hospital by Dr. Arthur Blouin (Blouin, Perez and Blouin, 1988). The C-DIS presents the individual with the question on the computer screen and then prompts the individual for a response. The computer stores the individual's response then continues to the next question. The standardized format of the DIS allows the computer to use the same logic as a lay-interviewer to probe and skip certain areas, as they pertain to the individual.

Blouin et al. (1988) examined the test-retest

reliability of the C-DIS among a sample of 80 patients and 20 normals. The authors found that the majority of categories yielded kappas above 0.40, with an average kappa value of 0.57. There was no substantive difference between these results and those reported by similar studies with the DIS (Robins et al., 1981; Helzer et al., 1985). To examine actual symptom change between the two administrations, the authors administered the Hopkins Symptom Checklist (SCL-90). They found a significant decrease on measures of interpersonal sensitivity, depression, anxiety and paranoid ideation among the in-patient sample. Psychiatric outpatients scored lower on measures of obsessive-compulsive and psychoticism. Test-retest reliabilities on the subscales range from .78 to .90 (Derogatis, 1983). These results indicate the possibility of underestimation of the C-DIS reliability because any true change in diagnostic status would register as error (Blouin et al., 1988).

The Computerized Attitude Scale assessed the effect of the C-DIS on subject attitudes (Blouin, Blouin, Seidel and Perez, 1986). Patients indicate more resentment toward and intimidation by computers than normal controls. The C-DIS did reduce this dimension among the normals. A positive effect of C-DIS administration was felt among the patients with regard to self-report measures of ability levels. Patients also reported that the C-DIS instructions were clear, operation was easy and questions were easy to

understand (Blouin et al., 1988). Thus, it appears that the C-DIS administration is a positive experience and has a positive influence on computer attitudes.

Investigators used a sample of psychiatric inpatients to examine the validity of the C-DIS. The C-DIS administration was compared to the administration of a standardized DSM-III symptom checklist administered by a psychiatric resident student. At the beginning of the study it was decided that a minimum of six individuals must have a positive diagnoses in a specific category for it to be included in the analysis. Ten diagnoses met this criterion. Of these ten diagnoses the average concordance was 0.43 with a range of 0.17 to 0.61. These results, although below the concordance found in the C-DIS reliability study, are on par with results found in more recent DIS studies (Helzer et al., 1985; Greist et al., 1987) and above community studies (Anthony et al., 1985). The authors suggest that small sample size, improper application of criteria in the administration of the symptom checklist and methodological differences may have caused discrepancies in concordance. With respect to attitudes towards computers, there was a significant decrease among patients in resentment toward and intimidation by computers after the administration of the C-DIS. This result conforms to the results which found that computerized interviews are a positive experience (Slack and Van Cura, 1968; Greist, Van Cura and Kneppreth, 1973;

Skinner and Allen, 1983; Blouin et al. 1988). The authors conclude that the C-DIS has acceptable validity but indicate the need for future investigations to clarify the issue.

Blouin et al. (1988) point out that the computerized administration of the DIS is superior to the lay-interviewer administration in the control of variance due to consistency of administration. It is well known that interviewer characteristics can influence a subject's response and introduce error. Interviewer characteristics such as sex, age, tone of voice, speed of administration, unconscious expression can influence the respondent. The computer does not react to the answers, providing the same administration every time and has the added feature of not making mistakes in skip logic or misreading questions. Thus, the computer offers a non-judgmental atmosphere and a reduction of error that should result in improved reliability and validity.

Rationale

According to DSM-III-R a major depressive episode is characterized by either depressed mood, loss of interest or pleasure in all, or almost all, activities, and associated symptoms for a period of at least two weeks (APA, 1987). Associated symptoms include appetite disturbance, weight change, sleep disturbances, psychomotor agitation or retardation, decreased energy, feelings of worthlessness and guilt, difficulty concentrating, thoughts of death and

suicidal ideation. Anxiety disorders include panic disorder (with and without agoraphobia), social phobia, simple phobia, obsessive compulsive disorder, post-traumatic stress disorder and generalized anxiety disorder. These behaviours are characterized by symptoms of anxiety and avoidance behaviour and are distinguished from one another in terms of the apparent cause of the anxious feelings (APA, 1987).

The main focus of the current study was on anxiety and depressive disorders among myocardial infarction patients. Previous research on the psychological characteristics of coronary patients has uncovered a positive association between, on the one hand, depression and anxiety and, on the other, high blood pressure, mortality due to myocardial infarction and chest pain (Neshkes & Jarvik, 1982; Yates & Wallace, 1987; Ruberman, Weinblatt, Goldberg & Chaudhary, 1984). The vegetative symptoms of depression and anxiety such as appetite disturbances, sleep problems, decreased energy and difficulty concentrating can influence treatment success. Thus, the identification of these disorders among coronary patients is very important. Further research shows that depressive symptoms in post-coronary patients has an attenuating influence on exercise and weight loss which hinders effective rehabilitation (Finnegan & Suler, 1985). Other researchers indicate that depression and anxiety reduce treatment compliance (Levine et al., 1986).

Many researchers have suggested that physicians

untrained in psychiatric diagnoses fail to diagnose, or ignore, the psychiatric characteristics of their patients (Ormel, Koeter, van den Brink & van de Willige, 1991; Silverstone, 1987; Jefferson, 1988; Dager et al., 1986; Strain, 1981). There is substantive research supporting the influence of psychological characteristics on heart patients, from both predictive and retrospective sources (Carney et al., 1988; Yates & Wallace, 1987; Hallstrom et al., 1986; Shaw et al., 1986; Levenson & Friedel, 1985; Kurosawa et al., 1983; Tsuang et al., 1983; Neshkes & Jarvik, 1982; Coryell et al., 1982). These two findings provide empirical support for the use of psychological screening among heart patients. In fact, such psychological screening is already practised in some centres (Frierson & Lippmann, 1987).

There is a lack of a well-tested, efficient and effective method of identifying psychiatric disorders among myocardial infarction patients. The use of psychiatrists has inherent time and financial difficulties as well as reliability problems (Robins, 1985). A possible alternative to the psychiatrist are standardized psychiatric interviews on microcomputer. Computerized interviews have been used to obtain medical information for many years and are particularly effective when acquiring personal information (Greist, Van Cura & Kneppreth, 1973; Slack & Van Cura, 1968). Research suggests that a computerized interview

offers standardized testing with little error, accurate scoring, and immediate feedback (Greist et al., 1987; Skinner & Pakula, 1986; Carr, Ghosh & Ancill, 1983; Skinner & Allen, 1983; Lucas et al., 1977; Greist, Van Cura & Kneppreth, 1973). Griest et al. (1984) suggest that a clinician who uses computerized interviews provides more accurate and reliable psychiatric diagnosis than one who relies on other methods.

It is beyond the methodology of the present investigation to comment on the nature or direction of the relationship between psychiatric disorders and heart disease. Instead, this study concerns itself with the identification and rates of said disorders among the coronary patient population. This investigation is a pilot study which addresses the lack of an accurate, cost-effective and easily administered method of assessing psychiatric disorders among heart patients. To accomplish this goal the study has two main components which assess the feasibility and utility of using computerized psychiatric screening with MI patients. The primary component consists of an examination of the prevalence of certain specific psychiatric disorders among a population of myocardial infarction patients. This component assesses whether there is a large enough number of disorders to warrant general psychiatric screening. The second component examines the concordance between the lay-administered DISR and the

computer-administered DISR among a sample of MI patients. This component focuses on whether the use of a computerized interview is a feasible method of acquiring psychiatric information from MI patients.

Method

Subjects:

The subjects (69 male, 5 female) were referred to the researcher by the staff of the University of Ottawa Heart Institute. Subjects included in the study had to: 1) be under 75 years of age; 2) have suffered a myocardial infarction in the previous 12 months; 3) have a creatine kinase level above 180 at time of MI (Seyle, 1970); 4) be well enough to attend testing sessions; 5) able to speak and read English and 6) be able to travel to the Heart Institute.

Materials:

1. Diagnostic Interview Schedule - Revised (DISR): The DISR is a psychiatric interview designed to be administered by lay-interviewers. The questions are highly structured and read verbatim to ensure standardization and reduce error variance. The questions are closed ended with severity and causal information acquired through probing. Through branching the interviewer may probe for more information when relevant or ignore irrelevant questions to conform to

the individual's symptoms. This permits a complete evaluation of each symptom, providing greater validity and avoiding questions irrelevant to the particular individual's responses. The structured atmosphere does not require the interviewer, untrained in psychiatric diagnostics, to make clinical decisions. The DISR contains nineteen sections which examine DSM-III-R, axis 1 diagnoses and assess both current and lifetime prevalence. The interview was administered by a research assistant who underwent a one-week training session and has administered over one hundred DIS interviews. For the purposes of this study, some sections of the DISR interview were excluded. The following disorders were addressed: anxiety disorders (7), affective disorders (12), alcohol disorders(3), drug disorders(11) and tobacco use disorder(1).

2. Computerized Diagnostic Interview Schedule - Revised (CDISR): The CDISR is a computerized version of the NIMH DISR interview. Each item on the CDISR will be presented on the screen in the same form as appears in the DISR. Closed-ended answer probes are below the question, and the subject is prompted for a response. Once an answer is selected, the computer highlights the response for one second so the subject can check their answer. The computer will then automatically advance to the next appropriate question. The computer is programmed to branch through the interview using the same criteria as DISR. At any time the

subject can move back to a previous question to check his/her answer by pressing the backspace key. One section was deemed unsuitable for computer administration (the Organic Brain Syndrome section) and was administered by an interviewer, assisted by the computer. For the purposes of this study the entire CDISR was administered to examine the prevalence of disorders addressed in the DISR, as well as other diagnostic categories included in the complete interview (somatization disorders, post-traumatic stress disorder, eating disorders, schizophrenic disorders, antisocial personality disorder, pathological gambling, organic brain syndrome).

3. Recent Life Changes Questionnaire (RLCQ): The RLCQ is a 55 item self-report measure organized into five sections: health, work, home and family, personal and social and financial. Subjects report events they have experienced in the last two years. The impact of events is assessed by the use of three different life change scores. The first score, using a unit scaling method, is simply the frequency of life change events in the last year. The second method used the objective measure of change experienced in the past two years. Third, the subjective life change unit (SLCU) is used to obtain a rough estimate of the subject's ability to cope with life change. Scores can range from zero to over one thousand.

4. Hopkins Symptom Checklist (SCL-90): The SCL-90 is a 90-

item self-report questionnaire designed to reflect psychological symptoms of psychiatric and medical patients (Derogatis, Lipman, Rickels, Uhlenluth, & Corr, 1974). The subject assigns each item a severity rating, answering the question "How much were you bothered by (symptom)?". Severity ratings can range from 0 ("not at all") to 4("extremely"). The SCL-90 yields nine factors including depression, anxiety, hostility, phobic anxiety, paranoid ideation, obsessive-compulsive, somatization, interpersonal sensitivity and psychoticism. These factors were selected based on clinical significance and empirical verification.

Procedure:

Each subject was a patient from the University of Ottawa Heart Institute who has recovered from a myocardial infarction in the previous 12 months. The researchers contacted the subject, explained the purpose for the study and an appointment was arranged. When the subject arrived for the testing session, the researcher explained the purpose and procedure of the study again, answered any questions and obtained his/her informed consent. The subject was randomly assigned to one of two groups when the appointment was arranged. In the first session, Group 1 was administered the partial face-to-face DISR by a trained interviewer. Upon completion of the DISR, the RLCQ and the SCL-90 were administered using standard instructions. After a minimum of one week, the subject returned to complete the

CDISR. Group 2 was administered the CDISR in the first session, with a research assistant available to answer any questions. Upon completion of the CDISR, the RLCQ and the SCL-90 were administered using standard instructions. After a minimum of one week, the subject returned to complete the partial face-to-face DISR. The interviewer was blind to the CDISR diagnoses.

Data Analyses:

1. Prevalence Estimates. The rates of psychiatric disorders, as assessed by the DISR and CDISR, were reported as percentages of the entire sample and compared to normative data from the ECA Studies using chi-square (adjusting for low cell frequencies when appropriate). The disproportionate percentage of males in the present study prohibited confidence in using the total prevalence rates from the ECA study for comparative purposes. To make the two samples more comparable, the prevalence rates from the ECA study were weighted based on gender. The data was transformed using the following steps: 1) the male and female rates were multiplied by their respective sample sizes in the ECA study, 2) the results were multiplied by the respective proportion they represented in the present study and 3) these two frequencies were summed to obtain a comparable total frequency, and 4) the total frequency for the particular disorder was divided by the similarly adjusted frequency for the total sample to obtain the total

rate. For example, the lifetime prevalence rates for alcohol abuse\dependence for males is 23.83, for females is 4.57 and for the total sample is 13.76. To calculate a weighted total rate, the process advanced as follows:

$$\text{Males: } 0.2383 \times 8211 = 1957$$

$$1957 \times 0.932 = 1824$$

$$\text{Females: } 0.0457 \times 10971 = 501$$

$$501 \times 0.068 = 34$$

$$\text{Total: } 1824 + 34 = 1858$$

$$1858/8399 = 22.1$$

Therefore, the total comparable prevalence rate was 22.10 instead of 13.76.

In the case of major depressive episode, the results were also examined removing the females from consideration to obtain an estimate of the total and age-related rates for males only. Symptom reporting was not also adjusted for age, as the ECA data was unavailable. The DISR, CDISR and ECA rates were compared using chi-square and McNemar Test (SPSSX, 1983).

2. Diagnostic Agreement. Chance corrected concordance between the CDISR and DISR diagnoses were calculated using the kappa (k) statistic (Cohen, 1961) and Yule's Y (Spitznagel & Helzer, 1985). Concordance statistics were not calculated for cells containing zeros.

The kappa statistic was originally conceptualized by Jacob Cohen in 1960. The kappa is a chance-corrected

coefficient of agreement statistic which is used on nominal data. Alternatively, it is the proportion of agreement after chance agreement is removed. It is used when one has two or more independent judges categorizing a sample of units and one wishes to determine the degree, significance and sampling stability of their agreement. No one judge is considered "correct"; they are seen as equally competent to make correct decisions.

The following assumptions are made when using the kappa statistic (Cohen, 1961):

- 1) the units are independent,
- 2) the categories of the nominal scale are independent, mutually exclusive and exhaustive and,
- 3) the judges operate independently.

The computational formula for kappa (Cohen, 1961), expressed in frequencies, is:

$$k = \frac{f_o - f_c}{N - f_c}$$

where f_o = the number of cases in which the judges agreed

f_c = the number of cases for which agreement is expected by chance

and N = the number of cases.

According to Fleiss (1981) kappa values between 0.40 and 0.75 are considered good concordance, values 0.75 and above are considered excellent.

Although Cohen's kappa is more commonly used in research examining inter-rater agreement, it is very sensitive to changes in sensitivity, specificity and base rate (Spitznagel & Helzer, 1985). It has been shown that when sensitivity and specificity are held constant at .95 and the base rate is lowered from 50% to 1%, kappa values drop from .81 to .14 (Grove, Andreason, McDonal-Scott et al., 1981). Spitznagel and Helzer (1985) suggest that Yule's Y is more independent of the base rate. Thus, Yule's Y is more appropriate when examining groups with low base rates and can be interpreted the same as a kappa. They indicate that Yule's Y "can be interpreted as an approximation of the largest value k can achieve for a given level of sensitivity and specificity, but it is effectively independent of prevalence within the range of prevalence rates typical in psychiatry." (Spitznagel & Helzer, 1985:727). The base rate problem associated with the kappa statistic argues strongly for the use of Yule's Y as the main index of concordance in the present study.

The formula for Yule's Y is expressed as follows:

$$Y = \frac{\text{SQRT } A*D - \text{SQRT } B*C}{\text{SQRT } A*D + \text{SQRT } B*C}$$

Where $A*D$ = agreement

and $B*C$ = disagreement

To further examine the agreement of DISR and CDISR the subjects were divided into two groups depending on the presence or absence of the specific disorder and the

compared on the relevant SCL-90 sub-scale score using MANOVA and t-tests. For example, subjects with depression (according to the DISR and CDISR respectively) were compared on scores obtained in the Depression sub-scale of the SCL-90.

3. Life Change. The RLCQ data was used to create three separate Life Change scores: Number of events in the year preceding MI (NUM), a Subjective score (SUB) for total events in the past two years and an objective score (OBJ) for the past two years. These life change measures were analyzed using Pearson correlations with the frequencies of disorders according to the DISR and CDISR and to the symptom frequencies of the DISR and CDISR. To further examine the agreement of DISR and CDISR, subjects obtaining a positive diagnosis (excluding nicotine dependence) on the DISR and CDISR were compared to those obtaining a negative diagnosis in terms of RLCQ using MANOVA and t-tests.

RESULTS

Sample Characteristics

The number of subjects interviewed was 74 (69 males, 5 females) with a mean age of 56.00 (sd=11.06; range= 26 to 74). Three did not attend the second session, 4 did not complete the full CDISR and 1 did not complete the DISR. Fifty-four individuals refused to participate. The reasons volunteered for non-participation were: time constraints

(50.0%), participation in another study (38.8%) and uninterested (11.1%). Fifteen individuals could not be contacted.

Demographic information in Table 1 compares the marital data from the MI patients to marital information from Canada and Ontario (Statistics Canada, 1987) for ages ranging from 55 to 59. Table 1 also includes the prevalence of smoking in the 45 to 64 age group in Canada (Miller, 1988).

Table 1

Demographic Information on MI Patients

Variable	MI Patients	<u>Comparison</u>	
		Canada	Ontario
Married	81.1%	81.1%	83.2%
Widowed	1.4%	7.2%	7.0%
Separated	1.4%	na	na
Divorced	9.5%	5.1%	4.6%
Never Married	6.8%	6.6%	5.2%
Smokers	73.0%	61.9%	na
Never Smoked	27.0%	38.1%	na

Table 2 indicates that the number of positive lifetime diagnoses yielded from partial CDISR is slightly lower and has a smaller range than the partial DISR, this difference

is not significant ($t=1.23$, $df=67$). The inclusion of all diagnostic categories (full CDISR) increases the mean number of diagnoses. The mean time for completing the full CDISR was 85.3 minutes. Differences in sample size are caused by individuals who did not attend the second session, incomplete CDISR or incomplete DISR. There were no significant difference in mean number of diagnoses with respect to the order of the testing sessions. The partial DISR and partial CDISR include affective, phobic and substance use disorders. The full CDISR includes all available diagnostic categories.

Table 2

Mean Number of Diagnoses by Interview Method

Interview *	N	Mean	SD	Range
Partial DISR	73	1.38	1.46	0 to 6
Partial CDISR	72	1.12	1.09	0 to 5
Full CDISR	71	1.56	1.35	0 to 6

Prevalence Estimates

Tables 3 and 4 contain the prevalence rates for lifetime diagnoses comparing ECA study (Robins & Regier, 1991), DISR interview and CDISR interview. Lifetime prevalence rates for many of the diagnostic categories among MI patients are not significantly different (using chi-square) from these for the normal population. Notable exceptions are: major depressive episode as measured by the

DISR (chi-square= 8.77, df=1, $p<0.01$) and simple phobia as measured by the CDISR (chi-square= 4.53, df=1, $p<0.05$). Significantly more individuals were diagnosed with simple phobia by the DISR than the CDISR (McNemar chi-square= 6.00, df=1, $p<0.05$). There was no significant differences in the prevalence rates for Somatization disorder (ECA: 0.04%; CDISR: 0.0%) and mild organic brain syndrome (ECA: 5.6%; CDISR: 1.4%) (not included in tables). Prevalence rates for the following three disorders were only available from the CDISR interview: somatiform pain disorder (35.2%), bulimia nervosa (1.5%) and post-traumatic stress disorder (5.8%) (not included in tables).

Table 3

Lifetime Prevalence Rates for Substance Use Disorders: ECA vs. DISR vs. CDISR

Diagnosis	ECA	DISR	CDISR	.05	.01	NS
Nicotine dependence	--	53.4	59.2			c
Alcohol abuse/dep.	22.1	19.4	15.9			abc
Drug abuse/dep.	7.5	2.8	1.4			abc
Cannabis abuse/dep.	4.4	1.4	0			abc
Amphetamine abuse/dep.	1.7	1.4	0			abc
Sedative abuse/dep.	1.2	1.4	0			abc
Cocaine abuse	0.2	1.4	1.4			abc

a= ECA vs. DIS; b= ECA vs. CDISR; c= DISR vs. CDISR

Table 4

Lifetime Prevalence Rates for Anxiety and Affective Disorders: ECA vs. DISR vs. CDISR

Diagnosis	ECA	DISR	CDISR	.05	.01	NS
Panic disorder	1.0	1.4	1.4			ab,c
Agoraphobia	3.5	1.4	0			abc
Social phobia	2.6	5.5	5.6			abc
Simple phobia	8.3	11.0	1.4	bc		a
Generalized anx. dis.	4.7	2.7	5.6			abc
Major dep. episode	4.1	11.0	8.5		a	bc
Depression (single)	--	2.7	2.8			c
Depression (recurrent)	--	5.5	5.6			c
Depression (NOS)	--	5.5	5.6			c
Depression (Mel.)	--	2.7	4.2			c
Dysthymia	2.4	2.7	1.4			abc
Manic episode	0.7	1.4	0			abc
Hypomania	--	4.1	0			c
Bipolar (NOS)	--	2.7	0			c
Atypical Bipolar dis.	0.4	1.4	0			abc

a= ECA vs. DIS; b= ECA vs. CDISR; c= DISR vs. CDISR

Neither the DISR nor the CDISR identified any positive diagnoses for the following categories: agoraphobia with panic attacks, obsessive-compulsive disorder, grief

reaction, bipolar disorder, prescription drug abuse/dependence, heroin abuse/dependence, opiate abuse/dependence, PCP abuse/dependence, hallucinogen abuse/dependence, inhalant abuse/dependence.

Table 5 illustrates the rates of major depressive episode among males, subdivided by age group. Both the DISR and CDISR yield an overall rate of 8.7%, and show a similar pattern of rates across the age groups.

Table 5

Age Rates of Major Depressive Episode: Males

Age	DISR	CDISR
18 to 44	8.3	8.3
45 to 64	10.5	11.1
65 and above	5.5	5.5
Total Rate	8.7	8.7

Table 6 compares lifetime rates of specific depressive symptoms among the normal population (ECA data) (Robins & Regier, 1991) and the MI sample (DISR and CDISR). McNemar tests (SPSSX, 1983) failed to find statistically significant differences between symptom prevalence as assessed by the DISR and CDISR. Statistically significant differences were found between the MI group and the normal population in the following symptom categories: Appetite change (DISR: chi-

square= 10.09, df=1, $p<0.01$; CDISR: chi-square= 9.61, df=1, $p<0.01$) and thoughts of death (CDISR only: chi-square= 8.75, df=1, $p<0.01$) were significantly lower and loss of interest was significantly higher among the MI group (DISR: chi-square= 32.53, df=1, $p<0.01$; CDISR: chi-square= 13.25, df=1, $p<0.01$).

Table 6

Lifetime Prevalence Rates for Depressive Symptoms: ECA vs. DISR vs. CDISR

Symptom	<u>Normal Pop.</u>	<u>MI Patients</u>		<u>Sig</u>	
	ECA	DISR	CDISR	.01	NS
Dysphoria	27.9	28.8	25.4		abc
Appetite Change	20.5	5.5	5.6	ab	c
Sleep Change	20.3	15.1	14.1		abc
Psychomotor Change	8.0	5.5	5.6		abc
Loss of Interest	4.8	19.2	14.1	ab	c
Fatigue	14.0	6.8	12.7		abc
Guilt	8.5	8.2	7.0		abc
Diminished Concentr.	11.4	12.3	11.3		abc
Death Thoughts	25.1	16.4	9.9	b	ac

a= ECA vs. DIS; b= ECA vs. CDISR; c= DISR vs. CDISR

Table 7 compares the frequency of simple phobia symptoms, as assessed by the DISR and CDISR. Comparable

rates from the ECA study were unavailable. There were no significant differences in prevalence between the two interview methods.

Table 7

Lifetime Prevalence Rates for Simple Phobia Symptoms: DISR vs. CDISR

Symptom	DISR	CDISR
Phobic Situation/Object		
Height	15.0	9.9
Flying	4.1	5.6
Seeing Blood	1.4	2.8
Insects	4.1	9.9
Animals	9.6	16.9
Storms	4.1	4.2
Injection/Dentist	6.8	7.0
Open Spaces	0.0	1.4
Being in Water	8.2	8.5
Severity Measures		
Nervous/Panicky	20.1	16.9
Anxiety	19.2	16.9
Interferes with Life	8.2	5.6

Diagnostic Agreement

Tables 8 and 9 provide the chance-corrected concordance rates on lifetime diagnoses between the lay-person and

computer administered DIS. The kappa values for all diagnoses range from 0.21 to 0.66 with the mean kappa falling within the acceptable range ($k=0.45$). Yule's Y values for all diagnoses are all within acceptable parameters, ranging from 0.45 to 0.78 and the mean Yule's Y is also within the acceptable range ($Y=0.64$).

Table 8

Concordance Statistics Comparing DISR and CDISR For Substance Use Disorders

Diagnosis		2 X 2 Table		Kappa(SE)	Yule's Y
		CDISR yes no			
Nicotine Dependence	DIS	yes	34 4	0.66 (0.09)	0.67
		no	8 25		
		CDISR yes no			
Alcohol Abuse Dependence	DIS	yes	6 7	0.39 (0.14)	0.66
		no	5 50		

Table 9

Concordance Statistics Comparing DISR and CDISR For Anxiety
and Affective Disorders

Diagnosis	2 X 2 Table		Kappa (SE)	Yule's Y
		CDISR yes no		
Major Depressive Disorder	DIS	yes 4 4 no 2 60	0.52 (0.17)	0.69
		CDISR yes no		
Major Depression Single	DIS	yes 1 1 no 1 67	0.49 (0.31)	0.78
		CDISR yes no		
Major Depression Recurrent	DIS	yes 1 3 no 3 63	0.21 (0.21)	0.45
		CDISR yes no		
Major Depression Not Otherwise Sp.	DIS	yes 1 3 no 3 63	0.21 (0.21)	0.45
		CDISR yes no		
Social Phobia	DIS	yes 2 1 no 1 66	0.65 (0.23)	0.78

Using MANOVA, statistically significant differences were identified in SCL-90 subscale-scores (depression, anxiety, phobia) for individuals who rate positive for any combination of depression/generalized anxiety/simple phobia versus those who rate negative (DISR: $F=10.46$, $df=3$, $p<0.00$; CDISR: $F=9.34$, $df=3$, $p<0.00$). These specific diagnostic categories were chosen because of their theoretical relevance and the one-to-one relationship between the DISR, CDISR and SCL-90 categories. Univariate F-tests identified statistically significant differences with respect to all three diagnostic categories, irrespective of type of administration (DISR: Anxiety: $F=26.54$, $p<.000$; Depression: $F=19.70$, $p<.000$; Phobia: $F=11.33$, $p<.001$; CDISR: Anxiety: $F=14.50$, $p<.000$; Depression: $F=25.61$, $p<.000$; Phobia: $F=11.11$, $p<.001$).

Figure 1 illustrates differences in SCL-90 sub-scale scores for various diagnostic categories using t-tests. There are statistically significant differences between the two groups with respect to depression using the DISR ($t=3.22$, $p=.007$) and a trend using the CDISR ($t=2.38$, $p=.034$). A statistically significant difference was also found in anxiety scores for the CDISR administration ($t=2.56$, $p=.012$). The DISR did not identify a sufficient number of positive cases of anxiety to calculate significance.

Figure 1: CDISR and DISR Diagnosis vs. SCL-90 Sub-scale Scores

INTERVIEW-DISORDER

Life Change

As indicated in Table 10, the life change measures and the diagnostic and symptom frequencies for the two interview methods are intercorrelated. Number of events in the year preceding MI (NUM), subjective score (SUB) and objective score (OBJ) are strongly intercorrelated. These life change measures show significant correlation with the frequencies of disorders according to the DISR [#DISR(d)] and CDISR [#CDISR(d)] and to the symptom frequencies of the DISR [#DISR(s)] and CDISR [#CDISR(s)]. The one exception is the non-significant correlation is between the frequency of diagnoses according to the DISR and the number of events in the year preceding infarction. The CDISR coefficients consistently outperform the DISR coefficients with respect to life change measures. Only coefficients with a significance of $p < .05$ are included.

Table 10

Pearson Correlations Among Life Change and Diagnostic Variables

	NUM	SUB	OBJ	#DISR(d)	#CDISR(d)	#DISR(s)	#CDISR(s)
NUM		.64	.71	ns	.24	.23	.25
SUB			.86	.24	.40	.39	.51
OBJ				.21	.31	.39	.44
#DISR diagnosis					.57	.71	.54
#CDISR diagnosis						.62	.67
#DISR symptoms							.83

Significant differences were identified, using MANOVA, in life change scores for individuals who have no positive diagnosis and those who have one or more positive diagnoses (excluding nicotine dependence) (DISR: $F=3.50$, $df=3$, $p<0.05$; CDISR: $F=4.36$, $df=3$, $p<0.01$). Table 11 contains the results of t-tests for each of the life change scores. Regardless of diagnostic method, the group with no positive diagnosis scored significantly lower on all measures of life change.

Table 11

Diagnostic Status According to DISR and CDISR by Life Change

Inter. Method	Change Score	Diag. stat.	Mean	SD	t	df	sig
DISR	NUM	Neg.	1.98	2.53			
		Pos.	4.48	4.60	2.89	66	.05
DISR	SUB	Neg.	291.19	283.88			
		Pos.	536.93	408.61	2.93	66	.01
DISR	OBJ	Neg.	250.17	205.75			
		Pos.	373.59	192.46	2.48	66	.05
CDISR	NUM	Neg.	2.17	2.52			
		Pos.	4.76	5.05	2.81	65	.05
CDISR	SUB	Neg.	291.32	271.76			
		Pos.	601.90	473.35	3.56	65	.01
CDISR	OBJ	Neg.	205.24	179.74			
		Pos.	403.00	228.75	2.96	65	.05

Discussion

The present investigation assessed the feasibility and utility of using computerized psychiatric assessment with MI patients. To accomplish this goal the study's focus was on the rates of specific psychiatric disorders and on the concordance between the lay-administered DISR and CDISR among a sample of patients who had suffered a myocardial infarction. The results suggest that computerized psychiatric interviewing may offer a cost-effective and accurate means of screening MI patients for psychiatric disorders, and even outperforms personal interviews in some instances.

The DISR and CDISR yielded comparable rates for most of the psychiatric diagnoses examined. Significant differences were found between the normal population and the MI sample with respect to anxiety and depressive disorders, the main diagnostic focus of the investigation. It is beyond the methodology of the present investigation to comment on the nature or direction of the relationship between these disorders and heart disease. The current study concerns itself with the identification and prevalence of said disorders among the coronary patient population.

The results from this investigation indicate that patients who have survived a myocardial infarction are significantly more likely to have a major depressive episode (MDD) at some point in their life than those in the normal

population. The DISR assessed the lifetime prevalence of MDD at 11.0%, which is significantly higher (chi-square= 8.77, df=1, $p<0.01$) than the rate found in the ECA study (4.1%). The CDISR rate fell between the ECA and DISR estimates, resulting in a non-significant trend above the normal population (8.5%).

Major depressive disorder is characterized by dysphoria, loss of interest in activities and associated symptoms for a period of at least two weeks (APA, 1987). Associated symptoms include appetite disturbance, weight change, sleep disturbances, psychomotor change, decreased energy, feelings of worthlessness, concentration problems, thoughts of death and suicidal ideation. The present study found no statistically significant differences between the DISR and CDISR with respect to symptomatology. There were significant differences between the normal population and the MI population with respect to depressive symptom reporting. The MI patients (as assessed by DISR and CDISR) had significantly lower rates of appetite change than was found in the normal population. One possible explanation for this finding relates to sampling differences. The ECA sample included a larger proportion of females than the present study. Myocardial infarction patients may also attribute any appetite change to physical illness, medication or to dietary restrictions imposed by treatment. Research indicates that the overlap of physical and

psychiatric symptomatology poses a large problem in these types of investigations (Levenson & Friedel, 1985; Strain, 1981). Loss of interest for at least two weeks was significantly higher among the MI group than in the normal population, when assessed by either computer or lay-interviewer. Levenson and Friedel (1985) indicate that perhaps as many as 62% of MI patients experience emotional distress while in hospital, and as many as 88% after leaving hospital. Many investigators view such emotional distress as a natural reaction to hospitalization and illness (Lipowski, 1983; Klerman, 1981). This emotional reaction may include a loss of interest in their normal work or hobbies.

An unexpected finding was the significantly lower rate of thoughts of death as measured by the CDISR in comparison to the ECA rate. The DISR rate fell between the CDISR and ECA rate. Intuitively, it would seem obvious that a near death experience, such as a heart attack, would force a person to focus on their mortality. There is substantive research relating to the ability of heart patients to repress and internalize emotions (Shaw et al., 1986; MacDougall et al., 1985; Lovallo & Pishkin, 1980). Generalizing from this previous research, it is possible that patients may also be repressing the seriousness of the event, thus, under-report thoughts of mortality.

Carney et al. (1988) found that major depressive

disorder, as assessed by the DIS, was the best single predictor of major cardiac events during the twelve months following coronary artery catheterization. Research on the psychological characteristics of coronary patients has uncovered a positive association of depression and anxiety with high blood pressure, chest pain and death due to myocardial infarction (Neshkes & Jarvik, 1982; Yates & Wallace, 1987; Ruberman, Weinblatt, Goldberg & Chaudhary, 1984). The increased depression rates found within this study, coupled with results from previous investigations, stress the importance of psychiatric screening for this population. Levine et al. (1986) indicate that depression and anxiety have a negative impact on treatment compliance. The vegetative symptoms of depression and anxiety such as appetite disturbances, sleep problems, decreased energy and difficulty concentrating can also influence treatment success. Research shows that depressive symptoms in post coronary-patients has a negative influence on exercise, weight loss and treatment compliance which, in turn, hinders rehabilitation (Finnegan & Suler, 1985).

Other investigators have delineated the relationship between age and depression (Koenig, Meador, Cohen & Blazer, 1988; Neshkes & Jarvik, 1982). Weissman, Bruce, Leaf, Florio and Holzer (1991) examined the normal population (ECA) and concluded that rates of affective disorders decline as the individuals ages. The present investigation

of MI patients found that males in the 45 to 65 age group showed the highest rate of depression (DISR: 10.5; CDISR:11.1) among the three age groups examined. Thus, male MI patients do not exhibit the same pattern of decline as the normal population. In fact, Weissman et al. (1991) found that males in the 45 to 65 age group exhibited a lifetime prevalence for all affective disorders (depressive and manic disorders) of only 3.6. This rate for all affective disorders among male normals, in this age group, is far below the rate among male MI patients for major depressive disorder alone. Weissman et al. (1991) did not examine depression by age and sex, however, the rates of depression (including females) show a similar pattern as affective disorders. The prevalence rate for both sexes in this age group was reported as 4.0 (Weissman et al., 1991), which is below the rate found among the male MI patients. These comparisons suggest that the significantly higher rate of MDD found among male MI patients is not merely a function of sampling differences between the two studies. When one considers the previous research, the significant difference found in the present investigation is likely because of variations in health status.

The lifetime prevalence rate for MDD in the present study is lower than previously reported. Petty (1987) reported that MI patients have over a 30 per cent chance of developing secondary depression. Carney, Freedland and

Jaffe (1990), using a slightly modified DIS interview, found that 23% of MI patients met criteria for a major depressive episode. There are some important differences between the present study and Carney et al. (1990) which explain the difference in rates for MDD. The likely cause of the different estimates relate to exclusion criteria and sample characteristics. First, the present study included few females (6.8%), whereas, twenty-four per cent of the Carney et al. (1990) sample were female, accounting for 50 percent of the MDD cases. The removal of females causes the rate of MDD in the present research to readjust to 8.7% (both DISR and CDISR) and to 15.7% in Carney et al. (1990). Sex ratio differences may also explain why the estimate of MDD is lower in the present study than estimates from other studies (Petty, 1987; Levenson & Friedel, 1985; Kurosawa et al., 1983).

The Carney et al. (1990) study interviewed patients very soon after they entered hospital, increasing the likelihood of depression caused by hospitalization confounding the results (Lipowski, 1983; Klerman, 1981). These investigators also interviewed individuals who had no previous MI which increases the potential of a reactive depression colouring their retrospective data (Levenson & Friedel, 1985). Finally, Carney et al. (1991) modified the affective disorder section of the DISR which reduces its comparability to the standard affective disorder section

used in the present study.

The current study used a very conservative definition of depression, requiring that all DSM-III-R criteria be met before assigning the diagnosis of depression. Strain (1981) indicated that DSM-III was probably the best criteria available in the assessment of psychiatric disorders among a physically ill population. The DISR interview is designed to disregard any positive symptoms that the patient attributes to physical illness, taking drugs, alcohol, medicine or only has a minor influence on his/her life. The present estimates may be rather conservative since patients may attribute their psychiatric symptoms to physical illness or medication, unlike those of other studies (Kurosawa et al., 1983). Depending on the stringency of the criteria used, rates of depression among medical patients range from 13 to 40 per cent (Strain, 1981; Carney, Rich, teVelde, Saini, Clark & Jaffe, 1987). Levenson and Friedel (1985) indicate that studies estimate 22 to 58 per cent of MI patients are judged depressed. Other investigators have made estimates of below 20% for depression in a sample of MI patients (Schleifer et al., 1989). These differences in prevalence estimates may be more a reflection of methodology and exclusion criteria than true variations in depression rates in the MI patient population (Levenson & Friedel, 1985).

The CDISR assessment of the rate of simple phobia was

1.4% which is significantly lower than the rate found in normal samples ($\chi^2 = 4.53$, $df=1$, $p<0.05$). The CDISR assessed rate was also significantly lower than the rate obtained using the DISR (McNemar $\chi^2 = 6.00$, $df=1$, $p<0.05$). Simple phobias are characterized by a persistent fear of a specific object or situation (ie. heights, animals, blood etc.). This fear generates symptoms of anxiety and avoidance behaviour which significantly interfere with the individual's life. The individual recognizes the persistent fear as being unreasonable (APA, 1987). The rate of simple phobia as assessed by the DISR was above the ECA rate, 11.0 and 8.3 respectively. The difference was non-significant. However, this trend conforms to results found in previous research on anxiety disorders and coronary disease (Beitman et al., 1989; Schocken et al., 1987; Kurosawa et al., 1983). The DISR assessed consistently higher rates of severity, such as nervousness or panic, anxiety and interference with life. Although the differences in severity were non-significant, the severity aspect of simple phobia is an essential element in the attribution of the diagnosis (APA, 1987).

One explanation of the discrepancy between the DISR and CDISR assessment of phobic disorders is that the computerized administration has affected the attribution of the disorder. However, there is some evidence relating to the unreliability of this diagnosis within the DIS. In the

original ECA study, Dryman & Weissman (1991) found a substantial amount of inter-site variation in the diagnosis of simple phobia. A number of studies found that the reliability of simple phobia, as assessed by the DIS, was low or the lowest of all sections in the interview (Erdman et al., 1987; Hasin & Grant, 1987; Robins et al., 1981). The present investigation found no significant differences between the DISR and the CDISR with respect to phobic symptoms. Considering the previous literature on the Simple Phobia section of the DIS, as well as data in the present study, it is very difficult to present a simple explanation of the differences.

Changes in diagnostic criteria in the period between the ECA study and the present study may influence the present results. The ECA study took place in the early nineteen-eighties and used criteria partially based upon DSM-III criteria. The present investigation utilized the revised version of DSM-III (DSM-III-R) which is slightly different from the original 1980 formulation (APA, 1980; APA, 1987). Although there are minor differences in criteria, there are no major changes for those diagnoses felt to be of major importance in this study. The early DIS studies compared their prevalence rates with previous studies that used different psychiatric criteria and found the results to be comparable (Myers et al., 1984). This supports the argument that any differences between the

DIS/DSM-III and DISR/DSM-III-R diagnostic criteria should have only a minor influence on the comparability of the two datasets.

While overall the rates of psychiatric disorders were similar using the two methods the important issue is concordance. The present study obtained generally acceptable levels of concordance between the lay-administered DISR and the CDISR. Of the diagnoses considered, kappa values ranged from 0.21 to 0.66 (mean kappa of 0.45) and Yule's Y ranged from 0.45 to 0.78 (mean Y of 0.64). The low base-rate for many of the diagnoses has a great influence on the confidence we have in the kappa statistic (Spitznagel & Helzer, 1985; Grove et al., 1981), therefore, we can only have confidence in the kappa values for nicotine dependence and alcohol abuse\ dependence.

The base rate problem associated with the kappa statistic argues strongly for the use of Yule's Y as the main index of concordance in the present study. Spitznagel and Helzer (1985) indicate that Yule's Y and the upper limit of kappa are comparable when base rates are high but diverge as base rates fall. The present data illustrate this principle, the prevalence rate for nicotine dependence is 53.4% (DIS) or 59.2% (CDISR) and the difference between the kappa and Yule's Y is 0.01. However, as the base rate falls the two concordance estimates diverge until we have a situation, such as major depression (single episode), where

there is a 0.29 difference. The low rate of psychiatric illness in the present sample supports the use of Yule's Y as the main estimate of concordance.

In comparison to the C-DIS test-retest reliability study conducted by Blouin et al. (1988), the present study shows a general lowering of kappa values. The kappa values in Blouin et al. (1988) ranged from 0.37 to 0.86 with a mean kappa of 0.57. The mean kappa value in the current study falls within the acceptable range ($k=0.45$). Yule's Y values in the present investigation are all within acceptable limits as is the mean Yule's Y ($Y=0.64$). The problem of low base rate was not as marked in the reliability study (Blouin et al., 1988) because of the use of a clinical population. Yule's Y values in the present study and kappa values from the reliability study (Blouin et al., 1988) are very similar. This finding also supports the argument of the base-rate influencing the kappa values. In fact, Helzer et al. (1985) obtained kappa values similar to the current findings when examining the prevalence of psychiatric illness in a community sample. They suggested that discrepancies on threshold diagnoses may cause a lowering of concordance. It is also plausible that differences in base rate have an attenuating influence on the kappa values.

The present investigation found that the DISR and CDISR yielded a similar pattern of results with respect to SCL-90 sub-scale scores. The inter-correlations of the DISR

and CDISR symptoms and diagnosis shows a large degree of overlap. These similar results argue that the practical differences between the two methods may be minimal. The choice of method can rely on other research considerations. The CDISR offers a cost-effective, consistent, and unbiased method of assessment which would increase the internal validity of a study, controlling for many interviewer confounds. The patient administered CDISR would be inappropriate for individuals with attention problems, sight problems or who are illiterate. The DIS, however, does not have these limitations and has been shown to be resistant to interviewer bias (Helzer, Spitznagel & McEvoy, 1987; Robins, Helzer, Ratcliff & Seyfried, 1982; Robins et al., 1981). In other words, arguments support both the use of a properly administered DISR interview and the use of the CDISR. The choice depends on one's confidence in the DISR interviewer and in the computer and on the particular population of interest. The present study suggests that for most diagnoses the DISR and CDISR operate similarly among a sample of MI patients.

Many investigations focus on measures of life change as a major variable in relation to health status (Casscells et al., 1980; Bradburn & Caplovitch, 1965; Rahe, McKean & Arthur, 1966). Ruberman et al. (1984) found that MI patients who have a high degree of life stress and are socially isolated have four times the risk of death. The

inter-correlations of life change measures and number of diagnoses and number of positive symptoms were all positively significant. The one exception was a non-significant relationship between frequency of life change events in the past year and number of DISR diagnoses. These coefficients emphasize the positive relationship between life change and psychological stress.

Through a closer examination of the specific correlation coefficients one observes consistently higher correlations between CDISR and life change measures. Given that the CDISR consistently outperforms the DISR, there is an argument that the CDISR has greater construct validity for this population. These findings conform to models that postulates a connection between life stress, psychological reaction and coronary heart disease (Smith & Anderson, 1986; Krantz & Manuck, 1984). Thus, the computerized administration offers an added benefit over a face-to-face interviewer, it demonstrates a stronger relationship to external validators relating to stress.

In examining patients with and without any psychiatric disorder (excluding nicotine dependence), significantly higher life change scores are found among those who have a positive diagnosis (DIS: $F=3.5$, $df=3$, $p<0.05$; CDISR: $F=4.36$, $df=3$, $p<0.05$). This relationship is maintained using subjective, objective and frequency estimates of life change. However, subjective assessments

of how much adjustment the subject had to undergo show the highest significance ($p < 0.01$).

A caveat in the interpretation of the results relates to sampling error. These results are sensitive to sampling error because of the low base-rate for most diagnoses. Thus, the inclusion of an individual patient could alter the rates to a great degree. This problem has been examined previously and the inclusion of Yule's Y as a measure of concordance counters some of the difficulty. The second aspect of the caveat relates to the selection of subjects. Subjects were drawn from University of Ottawa Heart Institute patients who had a heart attack in the previous year. However, the Institute has a policy that patients can only participate in a limited number of research projects at the same time (usually two). Also, there are two major studies that contact these patients first and any refusals may go into other studies. At the time of the present study, there were roughly eight other studies examining this same population. Although the present sample is drawn from patients unsuitable for other investigations, no other study specifically addressed psychiatric issues. Physical characteristics, such as drug reactions or heart arrhythmia were the reasons for exclusion, not psychiatric attributes. However, this method of sampling is not representative as some individuals were never given the option to participate. The voluntary aspect of this type of study also influences

the resulting sample. Only certain individuals have the time, inclination or interest to attend two research sessions which examine psychiatric disorders. It is important to note that 96% of the sample returned for the second session.

Conclusions

The present study supports the use of computerized psychiatric screening among MI patients. Many researchers have indicated that physicians untrained in psychiatric diagnoses fail to diagnose, or ignore, the psychiatric characteristics of their patients (Jefferson, 1988; Dager et al., 1986; Strain, 1981). The use of psychiatrists to diagnose MI patients has inherent time and financial difficulties as well as reliability problems (Robins, 1985). The present study supports previous studies claim that computerized interviews offer standardized testing with little error, accurate scoring, and immediate feedback (Greist et al., 1987; Skinner & Pakula, 1986; Carr, Ghosh & Ancill, 1983; Skinner & Allen, 1983; Lucas et al., 1977; Greist, Van Cura & Kneppreth, 1973). The present research supports the position of Griest et al. (1984) who indicated that computerized interviews, in conjunction with a clinician, provides more accurate and reliable psychiatric diagnosis.

The computerized administration of the DISR offers an

effective method of psychiatric screening among myocardial infarction patients. The chance-corrected concordance measures between the DISR and CDISR were assessed to be at acceptable levels. The computerized interview was also comparable to lay-interview with respect to external validators. With respect to life change, the CDISR outperformed the lay administered DISR. Out of over thirty possible diagnostic categories, the two methods showed only one significant difference with respect to diagnostic assessment. These results support the use of this screening method with individuals who have suffered a heart attack.

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Appendices

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OTTAWA CIVIC HOSPITAL

STUDY:

Feasibility of Psychiatric Screening Among Coronary Patients

INVESTIGATOR(S):

Dr. J. Marquis (phone: 761-4919), Dr. A. Bloelin, J. HULL

INFORMED CONSENT

STUDY CHARACTERISTICS

The purpose of the study is to investigate the use of computerized interviews to examine psychological factors among patients who have had a heart attack.

- The extent of my participation in the study will be completing the computerized interview on one occasion and an in-person interview on a second occasion. The computer interview will take about 1.5 hours and the in-person interview will take approximately 20 minutes. There will also be two paper-and-pencil questionnaires which, in total, will take approximately 40 minutes to complete.
- The computerized interview is basically a series of questions presented on a computer screen with multiple choice answers.
- I will use the computer myself. A research assistant will be available if I need help or instructions.
- My participation in this study will not affect my treatment in any way. My physician will not be informed of the results unless it is felt that they will impact on treatment success.
- If I am interested, a third meeting can be arranged to discuss the results of interviews and questionnaires.

- I understand that my participation is completely voluntary and that I can withdraw at any time without prejudice to my treatment at the Heart Institute or my relationship with anyone or any service at the Ottawa Civic Hospital.
- To guarantee confidentiality, my name will not be entered into the computer. Instead, my answers will be coded with an identification number known only to the investigators carrying out the study.
- When the study is completed and the results are eventually published in a scientific journal, all subjects will remain anonymous and unidentifiable as individuals.
- If I have any questions on any of the matters discussed in this form, or any other matters relating to this study, I can contact Dr. J. Marquis at the Heart Institute.
- I have read this consent form carefully and having understood clearly what my participation in this study will involve.
- I, _____, an outpatient at the Ottawa Civic Hospital Heart Institute, agree to volunteer and participate in a study investigating the feasibility of using a computer interview to examine the psychological characteristics of coronary patients.

Signature :

Date :

Witnessed :

Date :

END

21.12.92

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