

PSYCHOLOGICAL STRAIN FOUR MONTHS FOLLOWING THE
ST HELENA MINING DISASTER

Ilana Edelstein

A dissertation submitted to the Faculty of Arts,
University of the Witwatersrand, Johannesburg,
in partial fulfilment of the requirements for the
degree of *Master of Arts in Clinical Psychology*.

Johannesburg, 1988

I hereby declare that this dissertation is my own work and that I have not submitted it for the Degree of Master of Arts in Clinical Psychology to any other University.

I. Edelstein

I. EDELSTEIN

ACKNOWLEDGEMENTS

My supervisor, Dr. Stephen Blum, for his ongoing encouragement, patience and support. Ben and I managed to achieve my objectives.

Members of the YW, who assisted for the research and were eager to help with the project, were: first of all, those YW members who willingly gave up their time to help with the project.

As a condition of its financing, the project's completion, the Government of the Republic of the Philippines expressed its concern regarding the project's completion.

On 11 April 1998, the FBI received a letter from the American Friends of the World Court, and Bureau for anti-terrorism, which was apparently misdirected, despite their belief that the letter was for the FBI's anti-terrorism division.

[illegible]

Figure 1. The effect of the concentration of the inhibitor on the rate of polymerization of α -methylstyrene in the presence of SnCl_4 at 25°C .

The author wishes to thank the financial assistance from the National Union of Mineworkers and the Human Sciences Research Council. Opinions expressed and conclusions reached are those of the author and in no way reflect the opinions of the National Union of Mineworkers or Human Sciences Research Council.

ABSTRACT

Although the typical stress symptoms following exposure to a disaster are known, there remains uncertainty as to their extent and nature. The aim of this study was to assess psychological functioning following an acute technological disaster in the St Helena gold mine, in which 83 miners were killed and four others were injured. Furthermore, the study aimed to investigate whether social support offered by supervisors and a trade union moderated the stress-strain relationship.

The disaster occurred less than 24 hours after the three-week National Union of Mineworkers (NUM) strike ended on August, 30th, 1987. Hence, it occurred when industrial relations (IR) was at a dramatic level in the mining industry. Therefore, to obtain a clearer understanding of the disaster-post disaster illness process, and to eliminate the potential for obtaining spurious results, negatively perceived IR events were controlled for in the present study.

The experimental group consisted of 21 miners who were on site when the disaster occurred. A control group of 46 miners was selected from two other gold mines in the same geographical area. All 67 respondents were black, underground miners, members of the NUM, between the ages of 20 and 52 and with no known psychiatric history. Data were collected four months after the disaster.

Multivariate analysis of covariance followed by univariate analysis of covariance was used to assess whether there were any between-group differences.

After controlling for negatively perceived IR events, no significant between-group differences were found for the five dependent variables, namely, psychological distress, somatic symptoms, anxiety, social dysfunction and depression. Failure to find any difference was attributed

to the nature of the specific disaster, and the high levels of ongoing stress suffered by the minors.

Supervisor support was inversely associated with psychological distress, anxiety and depression, but not significantly associated with somatic symptoms or social dysfunction. Furthermore, supervisor support significantly moderated the relationship between the disaster and measures of anxiety and depression.

Trade union support was inversely associated with psychological distress, somatic symptoms, anxiety and depression, but not significantly associated with social dysfunction. Furthermore, trade union support failed to moderate the relationship between the disaster and any of the five measures of psychological functioning.

Conceptual and methodological reasons for the findings were provided. Finally, implications of the present study were discussed and future research guidelines were suggested.

TABLE OF CONTENTS

Chapter	Page
1. AN HISTORICAL PERSPECTIVE OF DISASTERS	1
History and Development of Disaster Research	2
Overview	5
2. DISASTER RESEARCH	6
Theoretical Issues pertaining to Disaster Research	7
Dimensions of a Disaster	8
Qualitative properties of disasters	8
Spatial properties of disasters	10
Temporal properties of disasters	11
Methodological Issues pertaining to Disaster Research	14
Sampling of Subjects	15
Level of Data Collected	15
Case Identification	16
Time of Follow-up	16
Conclusion	17
3. THE STRESS PROCESS	18
Objective Nature of the Stressor	19
Subjective Appraisal of the Stressor	23
Coping with Stress	23
Consequences of Stress	24
Psychological consequences	24
Physical consequences	28
Behavioural consequences	29
Organisational consequences	30
Moderators of the Stress-Strain Relationship	30
Psychological moderators	31
Situational moderators	31
Demographic moderators	34
Conclusion	35
4. DISASTER-PSYCHOLOGICAL ILLNESS MODEL	37
Rationale for Present Study	37
A Model of the Disaster-Psychological Illness Process	38
Independent Variable	40
Dependent Variables	40
Moderator Variables	42
Covariates	44
Hypotheses	46
5. METHOD	48
Setting	48
Subjects	48
Design	52
Measuring Instruments	52
Dependent Variables	52
Psychological ill-health	52
Moderator Variables	54
Social support from supervisors	54
Social support from trade unions	55
Covariates	56
Industrial relations stress	56
Procedure	56
Statistical Analysis	58

Chapter	Page
6. RESULTS	64
Results of Assumptions Tests	64
Reliability of the Instruments	64
Tests for Multicollinearity	64
Results of the Multiple and the Univariate	
Analyses of Covariance	68
Results for the Group x Supervisor Support Model	68
MANCOVA Findings	70
ANCOVA Findings	71
Psychological distress	71
Somatic symptoms	71
Anxiety	71
Social dysfunction	72
Depression	72
Results for the Group x Trade Union Support Model	74
MANCOVA Findings	74
ANCOVA Findings	74
Psychological distress	74
Somatic symptoms	74
Anxiety	76
Social dysfunction	77
Depression	77
7. DISCUSSION OF RESULTS	78
Discussion of Results	78
Presentation of Findings	78
Psychological distress	78
Somatic symptoms	79
Anxiety	79
Social dysfunction	80
Depression	80
Consequences of Disaster Stress	81
Social Support offered by Supervisors	85
Social Support offered by Trade Unions	89
Theoretical Implications of the Study	92
Practical Implications of the Study	95
Limitations of the Study	100
The Sample	100
The Design	101
Measurement	101
The measuring instruments	102
Overall research strategy	102
Statistical issues	104
Implications for Future Research	104
The Measurement of Disaster Stress	104
Outcomes of the Disaster Stress Process	105
Moderators of the Disaster Stress Process	106
Future Research Strategy	107
Summary and Conclusion	108
REFERENCES	111
APPENDIX 1	128
Covering letter	129
Demographic Questionnaire	130
Supervisory Support Scale	133
Trade Union Support Scale	134
Industrial Relations Event Scale (Short-form)	136
General Health Questionnaire-28	138
Disaster Victim Questionnaire	142

LIST OF TABLES

Table	Page
3.1 Psychological symptoms that commonly occur following exposure to a disaster	26
4.1 Classificatory dimensions of the St Helena disaster	41
4.2 Responses to the stressor	41
5.1 Demographic details of the sample	50
5.2 Means, standard deviations, and t-test scores for the two control sub-groups	51
6.1 Descriptive statistics and internal consistencies of the measuring instruments in the combined, experimental, and control groups	65
6.2 Pearson's correlations of dependent, moderator, covariate and demographic variables in the experimental and control samples	66
6.3 Pearson's correlations of dependent, moderator, covariate and demographic variables in the combined sample	67
6.4 Summary table of the MANCOVA's and ANCOVA's to assess the relationship between disaster and non-disaster groups, and supervisor support, with the five measures of psychological ill-health	69
6.5 Summary table of the MANCOVA's and ANCOVA's to assess the relationship between the disaster and non-disaster groups, and trade union support, with the five measures of psychological ill-health	75

LIST OF FIGURES

Figure	Page
3.1 The Stress Process	20
4.1 A model of the Disaster-Psychological Illness Process	39
6.1 Diagrammatic representation of significant interaction for the anxiety dependant variable	73
6.2 Diagrammatic representation of significant interaction for the depression dependent variable	73

CHAPTER 1

AN HISTORICAL PERSPECTIVE OF DISASTERS

Catastrophic events of both natural and "man-made" origin have plagued entire communities since the beginning of recorded history (Melick, Logue, & Frederick, 1982).¹ Ancient documents reveal that tidal waves and earthquakes were particularly devastating occurrences. Flooding, in particular, has been noted in ancient religious and mythological texts as a problem from earliest times (Melick *et al.*, 1982). Numerous contemporary disasters have also been recorded. Dworkins (1973) and Hewitt and Sheehan (1969) reported on natural disasters in which one hundred or more people were killed or injured, or at least one million U.S. dollars worth of damage was incurred. From 1947 through 1973, they recorded 836 natural disasters (excluding drought), an average of 31 disasters per year. However, these figures grossly underestimate the number of disasters which occurred during this period and the number of lives lost, since they do not include data from half the globe (reports were not available from Northern Europe, the U.S.S.R., much of Africa, and, during part of the period, China). Additionally, the figures provided refer only to disasters of natural origin. Natural disasters, however, comprise only about half of the major disasters that occur even in a world of peace (Glesser, Green, & Winge 1981).

Thus, it is apparent that disasters are ubiquitous. Their consequences are manifold. Disasters impact on at least three levels (i.e., environmental, societal and individual; Quarantelli, 1979). Environmental changes following a disaster are many and varied (Cuny, 1983). Changes in building styles, methods and materials can often be traced back to an event such as an earthquake or hurricane. A further form of environmental change resulting from a disaster pertains to the form of

¹ Even prior to recorded history the occurrence of disasters may be inferred from geological and archaeological evidences (Charles *et al.*, 1963).

settlements. The loss of economic opportunities or the need to find alternative sources of income have often caused small scale migrations of skilled workers from rural areas into the cities. For example, such a migration occurred following an earthquake in Guatemala (Duny, 1983).

Disasters have also had profound consequences on the functioning of entire societies. The psychological trauma generated by the plagues of the fourteenth century contributed to significant changes in European culture (Langer, 1958). The "black death" plagues of 1348 and 1361 were followed by an age of misery, depression, anxiety and impending doom. For the survivors, the uncertainty as to why the catastrophes occurred, how they could be prevented, and the great loss of life, were extremely unsettling (Mangelsdorff, 1985).

Disasters also impact on an individual level. Deterioration of functioning can be anticipated to occur amongst disaster victims. Research (e.g., Raphael, 1986; Parker, 1977) indicates that exposure to a disaster often has deleterious effects on the psychological health of victims. The present study will address this level of disaster consequences. Specifically, the psychological effects of exposure to a technological disaster (i.e., an underground fire in a mine) will be researched.

History and Development of Disaster Research

Although large scale disasters have been recorded since the birth of civilisation, research on their consequences for individuals began only in the 1940's (Williams, 1954). Disaster research programmes began to form after the second world war, largely in response to its consequences (Baker & Chapman, 1962). These studies resulted in the notion that the psychological symptoms which followed exposure to a stressful situation occurred only in constitutionally predisposed persons and/or were only temporary in nature. Hence, there was little concentration on the psychological needs of victims as it was thought that their symptoms would arrest spontaneously (Mangelsdorff, 1985). A shift in this conception

occurred as a result of findings from later studies. These studies (e.g., Grinker & Spiegel, 1945; Swank, 1949) showed that, as a result of exposure to war, victims had sustained long-term psychological impairment. This resulted in the formulation of theories on the existence of "traumatic war neurosis" and the "combat personality" (Grinker & Spiegel, 1945). These studies, however, were devoid of systematic theory, lacked rigour in their design, and remained primarily descriptive in nature (Williams, 1954).

The research interest on the effects of "man-made" disasters was mirrored in the domain of natural disasters. After the Coconut Grove fire in 1942 (in which almost 500 people perished), an account of crisis management of victims of the disaster was published (Lindemann, 1944). In the early 1950's, a series of studies conducted by the National Academy of Sciences - National Research Council in the United States highlighted the medical and psychological needs of disaster victims (Melick *et al.*, 1982). By 1952, there was an official psychiatric term for conditions following severe stress situations, namely, "gross stress reactions" (Chamberlin, 1980).

In the early post-war period, some progress occurred regarding conceptual issues relating to disasters. Researchers began conceptualising disasters as processes occurring over a period of time. Various models (e.g., Powell, 1954; Tyhurst, 1951) were proposed to describe the overlapping stages that individuals pass through prior to, during, and following exposure to a disaster. However, although the models delineated a post-traumatic period, researchers generally focused on the period spanning the time immediately prior to the disaster, to two-to-four weeks post-disaster (Melick *et al.*, 1982). The long-term psychological consequences of disasters were not considered.²

² In this dissertation, "long-term" will be used to describe consequences which are evident more than ten weeks after the disaster has occurred (Raphael, 1986).

Despite the recognition of the effects and stages of psychological reactions to a disaster, the general field of enquiry loosely encompassed by the term "disaster" had not yet found an established position in the psychiatric domain (Kinston & Rossar, 1974). Hocking (1965) identified the following theoretical reasons for this: (a) the subject overlapped with other disciplines (notably sociology); (b) it challenged the existence of a boundary between illness and health; and (c) it was seen to be relatively remote from traditional psychiatric approaches such as organic psychiatry, experimental psychology and psychoanalysis. Lifton (1967) offered a further reason for the delay in incorporating disaster research into the accepted psychiatric field: Researchers were often to be affected by the human suffering they encountered that they ceased research and dedicated themselves to the much needed social welfare programmes.

It was not until the early 1970's that the psychological aspects of major disasters received any significant attention from health researchers and service providers (Frederick, 1977; Mangelsdorff, 1985). The events which precipitated this attention included an earthquake in California's San Fernando Valley in 1971, flooding from Hurricane Agnes in Pennsylvania, heavy rains in both Rapid City, South Dakota, and Buffalo Creek, West Virginia in 1972, and the nuclear accident at Three Mile Island in Middletown, Pennsylvania in 1979 (Melick *et al.*, 1982). Studies of these events (e.g., Bromet, Parkinson, Schulberg, Dunn, & Gondak, 1980; De Navi, 1977; Erikson, 1976; Logue, 1978; Melick, 1976; Rangel, 1976; Stern, 1976; Wert, 1979) highlighted the uniquely stressful nature of disasters with their frequent debilitating psychological consequences for victims. These studies further revealed that the prevalence and duration of psychological symptomatology following exposure to a disaster differed markedly from one disaster to another.

Factors other than the varied methodologies employed by researchers contributed to these discrepancies (Barton, 1969). To understand this phenomenon, more rigorous examination of the nature of disasters was

undertaken. Baum, Fleming, and Davidson (1983) and Barron, Beigel, and Gertner (1980, 1986) pointed out that responses to disasters could best be understood when the important characteristics that differentiate disasters from each other were considered. They developed classificatory systems for disasters which identified the various dimensions to be considered when undertaking disaster research.

These disaster research developments resulted in the incorporation of the concept of stress into traditional psychiatric nomenclature (Mellick *et al.*, 1982). Both the DSM-III (American Psychiatric Association, 1980) and the ICD-9 (World Health Organization, 1978) include diagnostic categories which allow for the psychiatric coding of stress reactions. The DSM-III provides for "post-traumatic stress disorder" while the ICD-9 includes "acute stress reactions".

Overview

This Chapter has provided an overview of the history and development of disaster research. In Chapter 2 theoretical and methodological issues pertaining to disasters will be discussed. The concept "disaster" will be clarified and a framework will be provided in which disasters can be evaluated and compared. In Chapter 3 the "stress process", specifically, the relationship between exposure to a severe stressor and illness, will be discussed. The stress process will be examined with particular emphasis on its application to disasters. In Chapter 4 the rationale for studying a disaster, specifically, a technological disaster on a South African gold mine, will be provided. A model of the disaster-psychological illness process will be formulated so that the psychological consequences of the disaster can be effectively assessed. In Chapter 5 the method used to empirically test this model will be described. In Chapter 6 a statistical analysis of the results will be presented. In Chapter 7 these findings will be discussed in relation to the literature, and their theoretical and practical implications will be addressed. Finally, directions for future research will be suggested.

CHAPTER 2

DISASTER RESEARCH

Over the past decade, research on the epidemiology of disasters, particularly their psychological consequences, has emerged as an area of special interest (Green, 1982; Logue, Melick & Hansen, 1981). However, as Perry and Lindell (1978) have pointed out, this research has largely developed in the absence of formal theory. There has been no framework to guide scientific enquiry.

It is therefore understandable that contradictory conclusions have been reached regarding the nature and prevalence of the psychological consequences of disasters (Vitaliano, Maiuro, Bolton, & Armsden, 1987). Reports range from the observation that psychiatric morbidity resulting from exposure to a disaster is common and long-lasting, to the view that negative psychological consequences are rare or non-existent (McFarlane, 1986). These discrepant findings can be attributed to the diverse nature of disasters and different methodologies employed in disaster research (Green, 1982; Logue *et al.*, 1981).

There is a need to synthesise disaster data in order to compare findings meaningfully across studies. Therefore, a theoretical paradigm to investigate systematically the psychological effects of disasters must be developed.¹ In order to achieve this, the theoretical properties and methodological factors of disasters will be examined. This is intended to clarify what is meant by the concept "disaster" and to provide a framework in which disasters can more accurately be evaluated and compared.

¹ Attempts have been made to develop models. These models, however, are incomplete. For example, Berren *et al.* (1986) ignore experimental methodology, while Green (1982) does not address theoretical aspects.

Theoretical Issues pertaining to Disaster Research

The term "disaster" is commonly used to denote overwhelming events and circumstances that test the adaptational responses of a community of individuals beyond their capabilities, and leads, at least temporarily, to massive disruptions of functioning for the community or individual (Raphael, 1986). The word "disaster" is derived from the Latin "astrum" or star and means literally "ill-starred", connoting the powerful disturbances attributed to heavenly bodies (Raphael, 1986). At present, no standardised definition exists of what constitutes a disaster. However, most definitions of disasters do have common aspects. A survey conducted by Vitaliano *et al.* (1987) of the definitions of disasters have highlighted the following characteristics: (a) disasters have a relatively rapid onset and are concentrated in space (Fritz, 1961); (b) they affect an identifiable subsystem of a society (e.g., community or neighbourhood) by creating severe danger and/or destruction (Fritz, 1961); (c) they disrupt the ability of the system to provide expected conditions of life to its members (Barton, 1969); and (d) they occur in a context in which there is a consensus over the meaning of the situation, the norms and values that are appropriate, and priorities that should be followed (Barton, 1969; Quarantelli, 1979). These criteria will be used as a definition of a disaster in this dissertation.

A wide variety of catastrophic events have met these criteria. Research on disasters has included, among others, *cyclones* (Grant, McNamara, & Bailey, 1975; Milne, 1977a, 1977b; Parker, 1975); *earthquakes* (Anderson, 1969; Janney, Nasuda, & Holmes, 1977); Popovic & Petrovic, 1964); *explosions* (Barling, Bluen, & Fain, 1987); *fires* (Abe, 1976; Cobb & Lindemann, 1944; Lundin, 1984); *floods* (Abrahams, Price, Whitlock, & Williams, 1976; Lorraine, 1954; Nash, 1984; Okura, 1975; Richard, 1974); *hurricanes* (Bates, Fogelman, Parenton, Pittman, & Tracey, 1963); *mining disasters* (Beach & Lucas, 1960; Lucas, 1969; Ploeger, 1977); *nuclear accidents* (Bromet *et al.*, 1980; Chisholm & Kasl, 1982; Chisholm, Kasl, & Mueller, 1986; Munsonrider & Flynn, 1980; Parkinson & Bromet, 1983; Wert, 1979);

tornadoes (Moore, 1958a, 1958b; Panick, Powell, & Sienk, 1976; Taylor, Ross, & Quarantelli, 1976; Wallace, 1956; Zarle, Hartsough, & Ottinger, 1974); volcanic eruptions (Shore, Tatum, & Vollmer, 1986) and war-related events (Archibald, Long, Miller, & Tuddenham, 1963; Kardiner, 1959; Klein, Zellermeier, & Shanahan, 1963; Lifton, 1967; Prince, 1968; Strom, 1968).

Although all these disasters have impacted on the psychological well-being of their victims, their consequences have varied. This has primarily been attributed to their differing natures. In an attempt to refine the disaster research area, theorists (e.g., Barton, 1969; Baum et al., 1983; Berren et al., 1980) have begun to delineate the dimensions that differentiate disasters from each other.

Dimensions of a Disaster

Three primary properties of disasters (i.e., qualitative, spatial and temporal) will be discussed in this section. This will enable the diverse nature of disasters to be classified and, therefore, facilitate understanding of the disaster investigated in this study.

Qualitative properties of disasters

A comprehensive classificatory system of disasters is provided by Berren et al. (1980). They describe five primary factors that can be used conceptually to distinguish one disaster from another, namely: (a) type of disaster; (b) duration of disaster; (c) degree of personal impact; (d) potential for occurrence; and (e) control over future impact.

(a) Type of Disaster

Natural disasters are distinguished from technological disasters. The former are considered "acts of God" such as earthquakes and floods, whereas the latter are attributed to the "forces of man" such as nuclear

and industrial accidents. This typology has received some confirmation in that research has demonstrated that the psychological consequences following exposure to natural and technological disasters differ; technological disasters appear to yield more severe consequences (Baum *et al.*, 1983).

Although Borron *et al.* (1980) distinguish between natural and technological disasters, they point out that most disasters are the result of events that fall somewhere between the two extremes (e.g., the Buffalo Creek flood following the collapse of a dam; Erikson, 1976).

(b) *Duration of Disaster*

Most disasters are *acute*, and last for only a few seconds or minutes. Some, however, are *chronic*, and continue for an extended period, even years. An example of an acute disaster, is the major destruction caused by the Coconut Grove fire (Lindemann, 1944) which lasted less than an hour. An example of a chronic disaster, is the Sahel famine of the 1970's (Cuny, 1983). Chronic disasters appear to produce greater psychological effects among victims than do acute disasters (Frederick, 1977). Hence, it is important to consider the duration of the disaster under investigation.

(c) *Degree of Personal Impact*

Victims are all affected in varying degrees by a disaster. Some victims may experience only a temporary inconvenience. For others, the same disaster may result in significant material and/or personal losses. Research (e.g., McFarlane, 1986; Weisaeth, 1983) indicates that the risk of developing psychological symptomatology following a disaster is influenced by the extent of personal and property loss, whereas exposure to a disaster alone, without sustaining any significant loss, may not be a potent stressor. Hence, any study of psychiatric morbidity following

a disaster should make detailed comment about the extent and type of losses experienced by the victims under study.

(d) Potential for Occurrence

Certain types of disasters occur regularly within specific geographic regions (e.g., spring tornadoes in Texas; Berren *et al.*, 1980). Prior knowledge that a particular type of disaster may occur has been found to reduce its psychological impact. When the individual or community is able to prepare for the disaster, some measure of mastery over it can be obtained (Fritz & Marks, 1954).

(e) Control over Impact

Some disasters may be prevented from recurring or at least their potential devastating consequences may be reduced (e.g., by limiting air force flights over populated sections of the city; Berren *et al.*, 1986). Where prevention or reduction of impact is feasible, the necessary steps should be implemented.

Spatial properties of disasters

Green (1982) provides a useful geographical classificatory system of disasters: (a) peripheral; (b) intermediate; and (c) central. This distinction has particular salience in defining the population impacted by the disaster.

(a) Peripheral Disasters

Peripheral disasters happen to a group of people who have come together by chance (e.g., aeroplane crash, nightclub fire). Survivors return to their respective geographic communities where the physical setting and social support networks are still intact.

(b) *Intermediate Disasters*

Intermediate disasters occur to a group of people within a community (e.g., mine disaster, factory fire) and hence, affect the whole community in some sense. However, not all members of the community are affected and the physical setting (i.e., homes, neighbourhoods) remains unchanged.

(c) *Central Disasters*

In central disasters (e.g., flood, tornado), the whole physical and organisational structure of the community is changed because homes are destroyed and people are relocated. Green (1982) contends that this type of disaster has the highest probability of serious long-term psychological consequences.

Temporal properties of disasters

Disasters involve a time sequence. Stage-based disaster models (e.g., Powell, 1954; Tyhurst, 1951) have provided a valuable and coherent means to understand the psychological phenomena experienced by victims. The reactions of victims vary according to the particular time phase or stage in the disaster process. Stage-based models enable researchers and service workers to contextualise and locate behaviour at various points in the disaster process. These models, by providing the researcher and service-worker with greater insight into disaster processes, enhance the planning of appropriate disaster intervention strategies and treatment programmes (Fain, 1987).

Models that designate stages of disasters have been provided by Powell (1954) and Tyhurst (1951). Powell (1954) divides disasters into seven stages: (a) warning; (b) threat; (c) impact; (d) inventory; (e) rescue; (f) remedy; and (g) recovery. Tyhurst (1951) divides disasters into three stages: (a) impact; (b) recoil; and (c) the post-traumatic period. Powell's (1954) model has been predominantly employed by researchers and

service-workers focusing on the period immediately prior to the disaster, to two-to-four weeks thereafter (Pick et al., 1982). When investigating the long-term effects of a disaster, the fine distinctions provided by Powell (1954) for the period immediately surrounding the disaster, become less relevant. Tyhurst's (1951) model is therefore more appropriate to the study of the long-term effects of a disaster and is outlined below.

(a) *Impact*

The impact phase begins when the disaster stressors commence and continues until they are no longer operant. Its duration is typically less than an hour. This is the period of maximum direct stress (Tyhurst, 1951).

Research has indicated that, during the impact phase, fear and anxiety are the dominant responses (Raphael, 1986). These responses are adaptive, preparing the victims for action (i.e., "fight or flight"). Most victims initially attempt to escape the threatening forces. To achieve this, victims often exhibit power, strength and speed far beyond their usual levels (Raphael, 1986). Also, altruistic and humanitarian urges have led victims to display unusual courage and perform heroic actions to assist family, friends or even total strangers (Siporin, 1976). Additionally, victims often display affiliative behaviour, gaining emotional reassurance and comfort from others (Raphael, 1986).

Some victims (approximately 10-25%; Tyhurst, 1951) display inappropriate responses, including panic, paralysing anxiety and hysterical behaviour. Such behaviour is most prevalent among victims who are unable to escape (Clapman, 1962; Cohen & Ahearn, 1980), or in situations of extreme personal isolation (Quarantelli, 1954).

When victims are unable to escape or feel that their actions may not ensure survival, feelings of powerlessness and abandonment may prevail

(Wolfenstein, 1957). In situations where the impact of the disaster is prolonged, victims have reported hoping for death as an end to fear and suffering (Raphael, 1986).

The victims' behaviour during impact influences their subsequent perception of, and adaptation to, the disaster. While some victims may view their behaviour positively, others may experience a sense of shame and failure (e.g., if they abandoned others). This will affect their recovery (Raphael, 1986).

(b) *Recoil*

The period of recoil is usually characterised by the suspension of initial stressors and begins when the direct effect of the initial stressor has terminated (Tyhurst, 1951). During this period, some secondary stressors may emerge (e.g., gangrene after a blizzard). However, the intensity and nature of their effects are often less than the primary stress of the disaster itself (Melick *et al.*, 1982).

Activities during the recoil stage typically involve taking stock of the effects of the disaster. During this period of "inventory" (Powell, 1954), victims become aware of the extent of their injuries and the devastation that has occurred. They mobilise and start with the initial rescue work (Cohen & Ahoarn, 1980), and are soon assisted by outside rescue workers, who converge on the scene of the disaster (Raphael, 1986).

In response to the release and relief from the tension of the disaster, a variety of reactions have been observed. Individuals experience notable mood reactions, for example, quiet elation, overt rejoicing, disinhibition and hysteria (Raphael, 1986). Physiological responses that have been noted include vomiting, headaches, breathing difficulty, palpitation, dizziness and exhaustion (Chapman, 1962; Parker, 1977). These reactions have been associated with severity of exposure and may

be brief or may evolve and merge into an ongoing post-disaster morbidity (Raphael, 1986).

(c) The Post-Traumatic Period

The post-traumatic period begins after the victim is secure from initial stresses and resumes daily living (Tyhurst, 1951). Further stresses arise during this stage, typically associated with the experience of the disaster itself and with the process of adjustment to its consequences.

The prevalence, duration and nature of the post-traumatic affect of exposure to a disaster varies both across and within disasters. For some victims, the challenge of disaster, even though distressing, leads to a new and positive process of life adaptation (Raphael, 1986). Others, however, experience high levels of ongoing stress which lead to impairment, disorder or illness. The duration of such dysfunction is brief and reactive for some, settling in the early days or weeks following the disaster experience. For others, symptomatology continues for extended periods, in some cases for the remainder of the victims' lives (Tyhurst, 1951).

As has been shown, the psychological outcome of a disaster will vary depending on the qualitative, spatial and temporal dimensions of the disaster. Researchers must therefore consider the dimensions of a disaster when attempting to evaluate psychological outcomes accurately. Concomitantly to this, methodological issues pertaining to data collection also need to be addressed.

Methodological Issues pertaining to Disaster Research

In this section, an attempt will be made to describe factors in data collection methodology in disaster studies, which influence conclusions about levels of impairment among victims. Factors covered are those

delineated by Green (1982), namely, sampling of subjects, level of data, case identification, and time of follow-up.

Sampling of Subjects

One methodological aspect of disaster research which affects estimates of impairment concerns which victims are studied. Disaster victims may include only those people directly and personally affected through being exposed to the impact of the disaster (Melick *et al.*, 1982). More broadly, however, the definition of a disaster victim may include individuals indirectly affected (e.g., lost loved ones, property and/or livelihood; Raphael, 1986).

Disaster studies have varied in their sample populations. Some studies have concentrated only on particular subpopulations involved in the event. For example, Cobb and Lindemann (1943) reported only on hospitalised victims of the Coconut Grove fire. Others have examined a random sample from all those living in a community where a disaster occurred, whether or not they were directly involved (Green, 1982). Samples have also been selected somewhat fortuitously. For example, the Buffalo Creek sample consisted of all plaintiffs in a lawsuit (Titchener & Kapp, 1976). Most studies have used a volunteer population (Green, 1982). Hence, sampling variation between different studies makes comparison of results difficult. Unless greater uniformity in sampling procedures is adopted, the characteristics of the sample under investigation should be clearly specified.

Level of Data Collected

Data collection procedures have included in-depth psychiatric interviews (e.g., Titchener & Kapp, 1976), telephone interviews (e.g., Huerta & Horton, 1978), mail questionnaire surveys (e.g., Eisdson & Quarantelli, 1981), standardised psychological questionnaires (e.g., Barling *et al.*, 1987), observations (e.g., Boman, 1979) and hospital reports (e.g.,

Bennet, 1970). These varied approaches to data collection have contributed to the discrepancies in psychopathology found in different studies. As Dohrenwend (1975) has pointed out, certain formats are more likely to uncover pathology. Specifically, Dohrenwend (1975) contends that in-depth psychiatric interviews are more conducive to disclosure about problem areas than are other forms of data collection. Until more information accrues regarding the appropriate data collection procedures to be used, it seems most suitable to distinguish between clinical and non-clinical approaches and degree of involvement with the subjects (Green, 1982).

Case Identification

A related issue is that of defining which criteria of morbidity should be used to assess psychological symptomatology. An approach that measures degree of distress along a continuum is most appropriate in a disaster situation as it describes the natural course of psychological response to a disaster (Green, 1982).

Time of Follow-up

The duration of the post-impact phase is poorly defined. For example, Tyhurst (1951, p. 766) describes the post-impact phase as lasting from a few days to "the remainder of a person's life". Attempts have been made to differentiate between short- and long-term symptomatology. However, to date, no clear criteria have been provided as cut-off points. Research findings have suggested that a notable decline of symptomatology occurs in the ten weeks following a disaster (Raphael, 1986). Symptoms which persist beyond this period will be referred to, in this dissertation, as "long-term".

Conclusion

This review of disaster research has illustrated that a "disaster is a situation of massive collective stress" (Kinston & Rosser, 1974, p. 438). As such, a disaster has the potential to be both personally and collectively disruptive (Vitaliano *et al.*, 1987). Indeed, the literature confirms that exposure to a disaster often has deleterious long-term effects on the psychological health of victims (Nash, 1984). Findings, however, pertaining to the severity and prevalence of symptomatology among victims remain contradictory (Glesser *et al.*, 1978, 1981). It is argued that these discrepant findings have emerged owing to the different natures of disasters and different methodologies employed in disaster research. In order to redress these difficulties, a framework was suggested in which disasters can be more accurately evaluated and compared.

In this framework, theoretical properties and methodological factors of disasters were examined. Theoretical properties were systematised into dimensions which describe the nature of a disaster. These factors are crucial in disaster research in order to ascertain the extent to which impairment of victims is related to the nature of the disaster. The methodological factors refer to the procedures adopted in conducting a disaster study. The approach used to obtain data affects the degree of impairment detected (Green, 1982). Hence guidelines were provided regarding the factors to be considered when a study is designed.

The framework described is not exhaustive. Additional factors may effect the consequences of a disaster. An attempt has been made, however, to highlight the primary factors to be considered in disaster research.

In any disaster, certain victims are at a greater risk than others to developing symptomatology. In order to explain this, the stress process itself must be understood. In the next Chapter, therefore, the relationship between exposure to a severe stressor and illness will be examined.

CHAPTER 3

THE STRESS PROCESS

Stress experienced in a disaster is a special case of stress in general, in that a disaster constitutes a single severe stressor (Vitaliano *et al.*, 1987). In this chapter, therefore, stress in general will be examined with particular emphasis on its application to disasters.

In recent years, there has been a burgeoning interest in the field of "stress" (Holroyd & Lazarus, 1982; Holick *et al.*, 1982). Despite the bulk of research, the concept of stress still remains vague, ambiguous and poorly defined (Cox, 1978; Levine & Scotch, 1970). The absence of a clear, universal definition can primarily be attributed to the conflicting semantic use of the term "stress".

Three primary conceptualisations of stress prevail (McGrath, 1970). First, both the original engineering concept of stress, and the life-event paradigm, conceptualise stress as an environmental stimulus that acts on the individual and causes strain (e.g., Dohrenwend & Dohrenwend, 1974, 1978; Holmes & Rahe, 1967). Second, the medically-orientated approach views stress as a physiological response to environmental demands (e.g., Selye, 1956, 1974). Third, the person-environment interaction approach conceptualises stress as a process whereby prevailing stress levels are mediated by environmental and individual characteristics and, as such, will be unique for each circumstance (e.g., Cox, 1978; Lazarus, 1966). Hence, disagreement exists regarding whether stress is a stimulus, a response, or an interaction.

To overcome this difficulty, various researchers (e.g., Chalmers, 1981; Cobb, 1974; Cox, 1978) conceptualise stress as a process comprising "the stimuli producing stress reactions, the reactions themselves and the various intervening processes" (Lazarus, 1966, p. 27). More specifically, Cobb (1974) views the stress process as comprising: (a) the ob-

jective nature of the stressor; (b) its meaning for the individual; (c) the individual's mode of coping with the stressor; (d) the mediating role of psychological, situational, and demographic resources; and (e) the resultant strain produced by the stress experience¹ (see Figure 3.1). Cobb's (1974) model of the stress process, has been adopted in this study.

Objective Nature of the Stressor

Researchers adopting the stimulus-based approach to stress (e.g., Holmes & Rahe, 1967; Sarason, Johnson, & Siegel, 1978) have specified the kinds of situations which can be stressful for most individuals. These are termed "stressors". Stressors to which most people are exposed in varying degrees during the natural course of life, are referred to as life-events (Dohrenwend & Dohrenwend, 1974). Disasters, however, are not part of the natural course of events.

Life-event researchers have aimed at establishing the link between life-events experienced, and onset of illness (Rabkin & Streuning, 1976). Similarly, disaster researchers have focused on the link between exposure to a disaster and onset of illness. Thus, parallels exist between these two areas of stress research. In fact, much of the disaster theory has been influenced by developments in the field of life-event research (Vitoliano *et al.*, 1987). Therefore, developments in the field of life-event research will be discussed where applicable.

Life-events are life changes that require some form of adjustment (e.g., divorce, being fired from work). Adjustment efforts become hampered when excessive changes are required, and result in strain (Bluen, 1986; Rabkin & Streuning, 1976). Life-event scores were initially calculated simply by totalling the number of events experienced. However, it was soon realised that the amount of adjustment associated with different events

¹ These factors should be regarded as interrelated, rather than discrete entities. For example, feedback occurs at all stages in the stress process and at all levels (Gox, 1976).

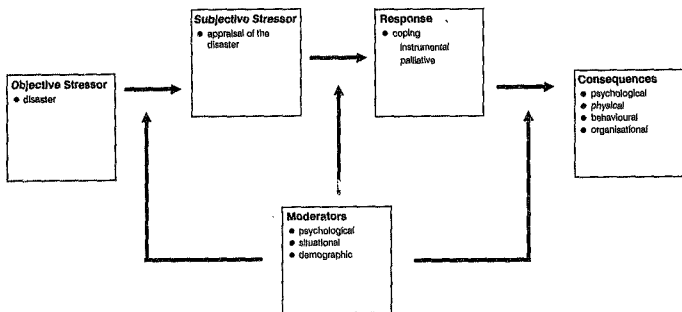


Figure 3.1: The Stress Process [derived from Cobb (1970)].

(e.g., trouble with boss versus death of a spouse) varied dramatically. Consequently, standardised weighting was assigned to specified events (Helmes & Rahe, 1967). Although this approach to the scoring of life-events *did offer significant refinements and was seen as an advancement* over the earlier method (Dohrenwand, 1973), the stress-illness relationship continued to yield inconclusive findings. Researchers working within this static paradigm failed to take cognizance of the importance of the individual's appraisal of the stressor, when predicting outcome.

Developments in disaster research in many ways reflected the above sequence of ideas. Initially, the nature of the disaster was not considered. It is now widely recognised that the psychological outcome of a disaster varies in accordance with its nature (Logue *et al.*, 1981). Furthermore, researchers also recognise the importance of the meaning that an individual attributes to the disaster (Vitaliano *et al.*, 1987).

Subjective Appraisal of the Stressor

Appraisal refers to the evaluative process that imbues a situational encounter with meaning for the person (Holroyd & Lazarus, 1982). Lazarus (1977) identifies two types of appraisal processes which people engage in when facing environmental demands, namely, primary and secondary appraisal. Primary appraisal focuses on the demand characteristics of the situation (i.e., the perceived harm or loss, threat or challenge, which the situation evokes). In contrast, secondary appraisal refers to the individual's evaluation of his/her coping strategies to deal with the demand. Factors considered during secondary appraisal include relevant past experience, generalised beliefs about oneself and one's environment, and the availability of personal and environmental resources (Lazarus, 1977). The two forms of appraisal are closely related. For example, if people believe that their coping resources are no longer effective, they may reappraise a challenge as a threat. Hence, reappraisal involves an ongoing feedback loop between appraisal of the stressor, the indi-

vidual, the individual's coping resources and strategies, and resulting changes in the stressful situation.

It is clear therefore that both the subjective appraisal and the objective nature of a stressor affect the stress process. As Zimmerman (1983, p. 353) states: "The amount of stress produced by a life-event cannot be accurately determined without assessing the meaning of the event to the individual who experiences it or the context in which it occurs".

Models that account for both subjective and objective measures of a stressor have been found to offer a more accurate explanation of the consequence of exposure to a stressor and to provide the researcher with a means to estimate the person's adjustment to the stressor (Vitaliano *et al.*, 1987).

In disaster research, the importance of victims' appraisal of the stressor has been shown. The same experience may be highly threatening to some victims, and innocuous to others. Parker (1975, 1977) found that initial psychiatric morbidity of victims of Cyclone Tracey correlated most closely with their perceived view of the threat/danger to which they were exposed. Similarly, Perry (1983) found that perceived threat/danger was the most important reason why some residents evacuated areas around Three Mile Island, Mount Saint Helen and the Santa Clara Basin.

Furthermore, differences between objective and subjective assessments of the environment provide estimates of the victims' contact with reality, and accuracy of self-assessment (Vitaliano *et al.*, 1987). If a victim has been exposed to high risk in a disaster, but perceives low exposure, denial or hypovigilance may be operating. Likewise, if a victim has not been exposed to much risk but perceived great danger, a significant premorbid level of distress may be indicated (Vitaliano *et al.*, 1987).

Coping with Stress

The coping strategies adopted by an individual to deal with stress influence subsequent health. In the last decade, health outcomes have increasingly been attributed to affective coping, rather than the existence or absence of stress (Holroyd & Lazarus, 1982).

Coping is the behaviour designed to prevent, alter, avoid or manage tension or stress (Cohen & Ahearn, 1980). It may be facilitated, hampered or prevented by an individual's resources and can take place at numerous stages in the stress process. Hence, the meaning of the stress situation for the individual, and the level of stress involved in each stage of the stress process, alter according to the coping procedures adopted.

In general, two types of coping may be distinguished: instrumental and palliative (Lazarus, 1977). Instrumental (or direct) coping entails dealing with the actual source of stress (i.e., modifying the stressor). Attempts are made to manipulate or change the relationship between the person and the stressor by fleeing, altering the setting, or removing the stressor (Bluen, 1986). In contrast, palliative coping involves accommodating to (rather than manipulating) the stressful situation by changing one's internal environment (i.e., regulating emotions). Palliative modes of coping include intrapsychic methods such as the mobilisation of ego defences and selective attention, and somatically orientated methods such as taking tranquillisers, alcohol or other drugs, or engaging in techniques such as meditation or biofeedback therapy (Chalmers, 1981). Palliative forms of coping, therefore, focus on the possible ways of reducing the effective, visceral or motor disturbances of the person rather than attempting to change the environmental situation itself.

In disaster situations, most victims usually invoke instrumental coping by attempting to escape the threatening forces (Raphael, 1986). In situations where victims are unable to escape or feel that their actions

may not ensure survival, palliative modes of coping may prevail (Chapman, 1962). The coping strategies adopted may influence subsequent health (Fain, 1967).

Consequences of Stress

Although consequences of stress are not inevitably negative (Quarentelli & Dynes, 1977), the focus of this section is on maladaptive or undesirable responses to stress that detract from health and effectiveness. There are two major theories concerning the relationship between stress and strain which manifests in illness. Proponents of the "specific" model (e.g., Lazarus, 1977) maintain that there are specific links between stress factors and specific illness, while proponents of the "general" model (e.g., Cassel, 1976) argue that stress increases susceptibility to all illnesses. Although there is probably some truth in both these standpoints, in this study responses to stress are assumed to be non-specific, manifesting in a variety of forms (Selye, 1956).

It is the aim of this section to outline briefly the many forms that strain can take. For the sake of clarity, these responses will be discussed under four separate categories: psychological, physical, behavioural, and organisational consequences. In reality, however, considerable overlap exists between these responses (Bluen, 1986; Mellick *et al.*, 1982).

Consequences of stress have been extensively researched (Beuhr & Newman, 1978; French & Caplan, 1973; Selye, 1956). However, since the focus of this study is on disasters, only those findings pertaining to disaster stress will be discussed.

Psychological consequences

Raphael (1986) posits that, over the first few weeks following exposure to a disaster, 20% to 70% of disaster victims can be expected to show

psychiatric symptoms, and that the severity of these symptoms correlates with the severity of the experience. It is further estimated that 10% of disaster victims may be so acutely disturbed as to require immediate specific intervention (Kinston & Rosser, 1974). Levels of symptomatology are highest immediately after the disaster. After ten weeks, symptomatology has usually dropped significantly, with a gradual further decrease occurring over the first year (Raphael, 1986). Studies in the past decade have, however, demonstrated the persistence of residual long-term psychological effects in both natural and technological disasters (e.g., Abrahams *et al.*, 1976; Leopold & Dillon, 1963; Logue, 1978; Ploeger, 1972; Price, 1978; Titchener & Kapp, 1976).

The severity of symptomatology varies from individual to individual and from disaster to disaster (Vitaliano *et al.*, 1987). However, the nature of the symptoms remains fairly consistent. A review of the disaster literature reveals that the psychological symptoms which typically result from exposure to a disaster can be classified under four primary dimensions: somatic symptoms, anxiety, social dysfunction and depression² (see Table 3.1). Depending on the nature and severity of the symptoms experienced, different psychiatric diagnoses are made. Since this study concentrates on psychological symptomatology, the diagnostic psychiatric nomenclature applicable to psychological response to a disaster will be introduced. According to Horowitz (1986), under the DSM-III classificatory system, the diagnoses most frequently made for pathologically intense reactions to stressful experiences are: post-traumatic stress disorder, adjustment disorder, and brief reactive psychosis.

Post-traumatic stress disorder (PTSD) is diagnosed when "a recognisable stressor that would evoke significant symptoms of distress in almost everyone" exists (American Psychiatric Association, 1980, p. 238). Symptomatic diagnostic criteria for this disorder include intrusive

² These four dimensions are used in this study to assess psychological symptomatology.

Table 3.1

Psychological symptoms that commonly occur following exposure to a disaster

CLASSIFICATION OF SYMPTOMS	DISASTER STUDIES
Somatic Symptoms	
Decreased concentration	McCaughy, 1985; Wort, 1979;
Memory lapses	Lifton & Olson, 1976;
Dizziness	Archibald <i>et al.</i> , 1962;
Headaches	Boman, 1979.
Anxiety	
Persistent intense fear and anxiety	Abrahams <i>et al.</i> , 1976; Adler, 1963; Boman, 1979; Glosser <i>et al.</i> , Lifton & Olson, 1976; Parker, 1973; Penick <i>et al.</i> , 1976; Titchener & Kapp,
Vivid memories and dreams of the disaster	Boman, 1979; Lifton & Olson, 1976;
Sleep disturbances	Abrahams <i>et al.</i> , 1976; Archibald <i>et al.</i> , 1963; Boman, 1979; Lacey, 1972; Wort, 1979;
Social dysfunction	
Constricted living patterns	Lacey, 1972; Lifton & Olson, 1976; Titchener & Kapp, 1976;
Depression	
Survivor guilt*	Boman, 1979; Lifton & Olson, 1976; McCaughy, 1985; Nash, 1984;
Psychic numbing	Lifton, 1967; Lifton & Olson, 1976; Nash, 1984;
Despair	Kasl <i>et al.</i> , 1981; Lifton, 1967; Lifton & Olson, 1976;
Apathy and aimlessness**	Lifton, 1967; Lifton & Olson, 1976;
Depression	Abrahams <i>et al.</i> , 1976; Boman, 1979; Glosser <i>et al.</i> , 1978; Titchener & Kapp, 1976;

* Survivor guilt does not strictly belong in any of the categories delineated. However, since it often perpetuates a depression it was placed under that dimension (Gloderland, 1981).

** The four symptom dimensions identified overlap somewhat. For example, apathy and aimlessness applies to both the social dysfunction and the depression dimensions (Freeman, Kaplan, & Sadock, 1978).

thoughts or dreams, social withdrawal, heightened vigilance, increased autonomic arousal, sleep difficulty and memory impairment. Associated factors include symptoms of depression, anxiety, irritability and aggressive behaviour, impulsive behaviour, headaches and vertigo (American Psychiatric Association, 1980, p.237). A latency period of months, or even years, may intervene between the stressful event and the maximum symptomatic response. When the symptoms begin within six months of the traumatic event and endure for less than six months the disorder is considered acute. If more than six months have elapsed between the event and the emergence of symptoms, the reaction is considered delayed. If the symptoms have lasted six months or more, the disorder is considered chronic (American Psychiatric Association, 1980). Delayed or chronic disorders are usually difficult to treat (Horowitz, 1986).

Adjustment disorder is a residual category for stress reactions which are less severe and less clearly defined than those of PTSD (Gibson, 1986). It is defined as a maladaptive reaction to an identifiable psychosocial stressor that occurs within three months of the onset of the stressor (American Psychiatric Association, 1980). Signs and symptoms include a variety of disturbances in interpersonal and work functioning as well as maladaptive extremes of anxiety, depression, rage, shame, and guilt (Horowitz, 1986). Adjustment disorders are subclassified in terms of predominant symptoms (i.e., depressed or anxious mood, mixed emotional features, disturbed conduct, mixed disturbance of emotions and conduct, work inhibition, withdrawal or atypical features). They generally have a milder course and a better prognosis than PTSD's (Gibson, 1986).

Brief reactive psychosis has a sudden onset immediately following exposure to a stressful event and may last from a few hours to no more than two weeks (American Psychiatric Association, 1980). The clinical syndrome includes emotional turmoil and at least one gross psychotic symptom (a criterion that primarily differentiates this condition from PTSD and

adjustment disorder). Epidemiological studies suggest that brief reactive psychoses are less common than PTSD's (Horowitz, 1986).

It is apparent, therefore, that exposure to a disaster may result in adverse psychological consequences. These consequences may be transient or they may endure, affecting the remainder of the victim's life.

Physical consequences

Various physical consequences have been assessed in post-disaster populations. While some of these are direct consequences of the disaster (e.g., burns resulting from a fire) others arise as an indirect consequence of the disaster (e.g., myocardial infarctions arising from stress). The distinction between direct and indirect consequences is not always clear (Melick *et al.*, 1982).

Physical consequences of disaster that have been investigated include: mortality rates (Sennet, 1970; Cicco & Thompson, 1961; Lorrain, 1954); myocardial infarction (Eitinger, 1971; Faich & Rose, 1979); liver dysfunction (Nailor, Tarlton, & Cassidy, 1978); rates of leukemia (Mannrich, Stark, Greenwald, Burnett, Jacobson, & McCusker, 1981); respiratory problems (Eitinger, 1971); gastritis, constipation and bladder trouble (Logue, 1978); cancer (Sennet, 1970); and spontaneous abortions (Nailor *et al.*, 1978).

Post-disaster illness behaviour has also been studied. Data have been obtained of office visits to physicians, hospital referral and admission rates, and surgical rates before and after a disaster (Melick *et al.*, 1982).

To date, however, no study has succeeded in presenting a comprehensive analysis of physical illness resulting from a disaster. An overview of the literature indicates that the nature of the disaster has to be taken into account when attempting to understand the physical consequences.

For example, in a nuclear disaster, high rates of leukaemia, birth defects and cataracts can be anticipated (e.g., Lifton, 1967). A further factor affecting the physical symptoms or illness found, is the interval between the disaster and the assessment of its effects (Melick *et al.*, 1982). For example, 25% of Parker's (1977) post-cyclone respondents indicated physical illness 10 weeks after the disaster, while only 11% indicated this situation 14 months after the cyclone. Similarly, the majority of Takuma's (1978) sample of earthquake victims complained of ill-health shortly after the quake, but their symptoms ceased over a seven week period.

Despite the fact that the physical consequences of exposure to a disaster have been found to decline over time, physical symptomatology has been observed amongst disaster victims many years after a disaster. For example, Logue (1978) found that a large number of subjects still exhibited ill-health four years after the Hurricane Agnes flood. Thus the physical consequences of a disaster may be chronic.

Behavioural consequences

Research has indicated that, in the immediate post-disaster period, disinhibited and antisocial behaviour may occur (e.g., looting, stealing, aggression, promiscuity, and heavy drinking). Most behaviour of such a nature reverts rapidly to increased social control and stricter moral standards (Raphael, 1986). Behavioural consequences which have been found to endure, however, are: increased usage of drugs (Abrahams *et al.*, 1976; Taylor *et al.*, 1976); excessive consumption of alcohol (Farberow, 1978); marital and family discord (Panick *et al.*, 1976); and developmental problems amongst children (Miline, 1977b; Titchener & Kapp, 1976). Thus, disasters have been found to lead to self-destructive behaviour, to impair interpersonal relationships, and to interfere with personal development.

Organisational consequences

Investigations into organisational consequences of disasters have included work attitudes, productivity, absenteeism, labour turnover and company climate (e.g., Baum *et al.*, 1983; Chisholm, Kasl & Ekenazi, 1983). The findings pertaining to organisational stress responses have thus far been inconclusive. In the TMI disaster, victims' were found to have experienced negative work-related effects in comparison with control groups. Increased demoralisation, job dissatisfaction and role strains were still evident amongst TMI workers 30 months after the explosion (Chisholm & Kasl, 1982; Chisholm *et al.*, 1983; Chisholm *et al.*, 1986). In contrast, a recent study of an acute disaster in a South African explosives factory found no significant between-group differences in job satisfaction, organisational commitment, and psychological distress in the two month period following the blast (Barling *et al.*, 1987).

Organisational consequences of a disaster may be related to the nature of the disaster. If further investigation in the field produces more conclusive results in this regard, appropriate measures can be introduced.

Moderators of the Stress-Strain Relationship

The assumption that mere exposure to stressful events may precipitate distress and illness has been challenged. Rabkin and Streuning (1976) note that interindividual and intraindividual differences exist in subjects' responses to stressors and that these variations must be accounted for in the relationship between stress and illness. For this reason, more recent stress research has focused on determining those personal and socioenvironmental variables that modify the impact of stressful experiences (Vitaliano *et al.*, 1987).

In the stress literature, the range of potential moderator variables is virtually infinite (Bluen, 1986). However, as the focus of this study

is on disasters, only those moderators adjudged as central to the disaster stress-strain relationship will be discussed. They will be considered under three classes: psychological, situational and demographic moderators.

Psychological moderators

Psychological moderators refer to the inner personality resources that the individual possesses (Ganellen & Blaney, 1984). The personality characteristics reflect the person's general attitude towards life. They influence how any given stressful situation is interpreted and coped with, and thereby modify the ultimate impact which an event has on a person's psychological well-being (Kobasa, 1982).

In the disaster literature, few studies have investigated such factors as locus of control, introversion-extroversion, "Type A" behaviour patterns and personality hardiness (Vitaliano *et al.*, 1987). The absence of focus on such factors may relate to the finding that, in the short-term, the severity and totality of a disaster supersedes the personality predisposition of a person as a determinant of a neurotic stress response (Chamberlin, 1980; Hocking, 1965, 1970; Lifton & Olson, 1976). Although this finding may accurately represent the immediate post-disaster situation, its applicability to the long-term recovery of the individual has not yet been shown. Indeed, in a study conducted two weeks and two months after an explosion, personality hardiness was not found to have exerted any significant effects on psychological and organisational functioning (Barling *et al.*, 1987).

Situational moderators

Social support is recognised as the central situational moderator in the stress-strain relationship (Bluen, 1986). Much has been written about the ability of social support to "moderate" or "buffer" the impact of psychosocial stress on physical and mental health (e.g., Cassel, 1976;

Cobb, 1976). That is, deleterious effects of psychosocial stress on health may be lessened or even eliminated in the presence of social support, while remaining strong for individuals who have little or no support (La Rocco, House, & French, 1980).³ In this regard, two primary hypotheses attempt to describe the possible health-related effects of social support factors. First, it is hypothesized that social support systems function as a buffer against stressful events, so that individuals with strong social support systems are less susceptible to physical and psychological problems when confronted by a significant stressor (e.g., Dohrenwend & Dohrenwend, 1974). Second, it is hypothesized that individuals with strong social support systems are generally better adjusted psychologically and physically as a direct function of the social support in their environment (e.g., Rabkin & Straus, 1976). These theories are referred to as the "buffering" and the "main" effect hypothesis, respectively (Aneshensel & Stone, 1982). Although there appears to be general consensus regarding the role of social support, some research findings are inconsistent (La Rocco & Jones, 1978; Lin, Ensel, Smeone, & Kuo, 1979). This has been attributed to the divergent views concerning the constituent elements and mechanisms of social support (Garfield & Baney, 1984; Vitaliano *et al.*, 1987). The primary areas of contention have involved the content, source, and structure of support acts.

In the early work, social support was treated as a unitary factor. Later research (e.g., House, 1981; Kahn & Antonucci, 1980), however, has pointed to its multifactorial nature (Jacobson, 1986). House's (1981) classification, described as "the most useful typology of support content" (Tardy, 1985, p.189) comprises four types of support: emotional, instrumental, informational, and appraisal. Emotional support (the most universally recognised; House, 1981) involves the provision of empathy,

³ The psychological mechanisms involved in this process are not discussed in this dissertation. Interested readers are referred to the works by Bowlby (1969, 1973, 1980) which elucidate upon the essential role that human attachment plays in sustaining positive adjustment.

caring, love and trust. Instrumental support refers to acts in which direct aid or assistance (e.g., financial assistance) is given to the person in need. Informational support involves the giving of advice or information to help a person cope with the stressful situation (e.g., telling an unemployed person about job vacancies). Appraisal support also involves transmitting information, in this case, information relevant to self-evaluation (e.g., a supervisor telling a subordinate how his/her work is progressing) (Bluen, 1986). The various support acts may involve some overlap (Leavy, 1983). For example, giving money to someone (instrumental support) may be a sign of caring (emotional support).

Jacobson (1986) contends that different kinds of support may be more effective in different stressful situations. Furthermore, social support can be provided by a variety of sources, such as family members, friends, co-workers, supervisors and trade unions. Researchers (e.g., Beahr, 1985) have noted that some sources of support are more appropriate than others in reducing particular types of stress. For example, in occupationally-induced stressful situations, work-related sources of support have been found to be more effective than family support (Le Rocco *et al.*, 1980). It remains an unresolved issue, however, as to which source of work-related social support is the most effective (Bluen, 1986).

Researchers have differed in their measurement of social support structure. Support structure entails the make-up of, size, accessibility and reciprocity of interpersonal relationships (Leavy, 1983). Some researchers (e.g., Barrera & Ainlay, 1983) have focused on the measurement of the availability of support (i.e., the quality and quantity of available support). Others (e.g., Tardy, 1985) have focused on support enactment (i.e., the actual utilisation of support resources). Yet others (e.g., Procidano & Heller, 1983; Sarason *et al.*, 1983) have focused on the respondent's perception of the adequacy of available support.

However assessed, the importance of social support has frequently been emphasised (Jacobson, 1986).

In disaster situations, social support has been found to be important both during and after the time of the disaster. For example, in the Brisbane floods, there was a significant difference in health outcomes between those victims who felt that the response of their broad social network had been helpful and those who felt that it had not (Barnet, 1970). Persistent and widespread psychic morbidity has often been found in communities where social systems have broken down following a disaster (e.g., the Buffalo Creek disaster; Erikson, 1976). Conversely, low levels of psychological disturbance have been reported in communities where a strong sense of social cohesion has been maintained (Rownsley & Loudon, 1964). Similarly, the survival value of belonging to an integrated group has been shown for captives in both prisoner-of-war (Ford & Spaulding, 1973) and concentration camps (Chudoff, 1963; Dimsdale, 1974).

Solomon, Mikulincer & Hobfoll (1986) found that lack of social support from officers was related to greater likelihood of combat stress reactions in soldiers. Thus, the importance of social support from both superiors and peers has been shown in the disaster literature.

Demographic moderators

Levine and Scotch (1970) remark that it is difficult to think of a single disorder that is not distributed unequally among different segments of the population. This is not surprising, given that one's interpretation of events and situations, and subjective stressfulness, are largely dependent on the context of one's life (Glesser *et al.*, 1981). Kessler (1979) contends that the social environment can modify the impact of stress by influencing both coping strategies and access to resources that can be useful in dealing with stress.

Numerous demographic variables have been suggested in the literature as possible predictors of distress in response to disaster. However, findings regarding these variables have been inconclusive or contradictory. For example, Kinston and Rosser (1974) found that children rarely need formal psychiatric treatment following exposure to a disaster, whereas Torr (1981) reported the prevalence of severe emotional impairment amongst children following exposure to a disaster. Baldi (1974) and Friedsam (1962) have argued that the aged have added risks for adverse reactions to disaster. However, Huerta and Horton (1978) and Klijanek and Drabek (1979) suggest that these groups may not be more vulnerable than younger groups.

Raphael (1986) contends that no obvious gender differences in health susceptibility have been found to prevail in disaster studies nor have differences in levels of education. However, until greater clarity is obtained, studies should control for possible effects of demographic variables.

Conclusion

Disaster research is a special category of stress research since the experience of disaster impacts on many factors usually considered in the area of general stress research (Fain, 1987; Helick *et al.*, 1982). Hence, in order to understand the consequences of a disaster, the general stress process has been examined with particular emphasis on its application to disasters.

The stress process was conceptualised as an interactive process incorporating the stimuli producing stress reactions, the reactions themselves and the various intervening processes (Lazarus, 1966). Specifically, the objective stressor (the disaster) impinges on the victims. Subjective perceptions of the disaster will be influenced by the victims' unique set of moderating characteristics, which includes their personal (e.g., hardiness), situational (e.g., social support), and demographic (e.g., age) resources. Similarly, the coping strategies (i.e., instrumental

and palliative) adopted by victims are facilitated, hampered or prevented by their resources. The consequences of the stress process are therefore determined by the combination of the stressor, subjective perceptions of the stressor, resources of the victims and coping responses. Consequences can manifest in a variety of forms such as psychological (e.g., anxiety), physical (e.g., bladder trouble), behavioural (e.g., drug abuse), and organisational (e.g., job dissatisfaction) (Bluen, 1986; Cobb, 1974). Feedback occurs at all stages in this process and is instrumental in shaping the outcome of each stage.

Although the consequences of a disaster on its victims can be understood when the stress process is examined, little certainty exists as to the extent and nature of symptomatology to be anticipated amongst disaster victims (Green, 1982). Thus the need for further research in this area is apparent. In this study, a specific disaster will be examined in an attempt to redress some of these difficulties, and hence to further the understanding of the negative psychological consequences of a disaster.

CHAPTER 4

DISASTER-PSYCHOLOGICAL ILLNESS MODEL

This Chapter has two objectives. First, the rationale for studying a disaster, specifically, a technological disaster on a South African gold mine, will be provided. Second, so that the consequences of the disaster to be investigated can be effectively assessed, a model of the disaster-psychological illness process will be formulated. During the course of this formulation, motivation for choice of components will be provided.

Rationale for Present Study

Although the typical stress symptoms following exposure to a disaster are known, there remains uncertainty as to their extent and nature. Specifically, the severity of stress symptomatology has been found to vary across disasters as well as intraindividually within a disaster (Vitaliano *et al.*, 1987). Further research on disasters is required to predict the impact of a specific disaster and to enable "high-risk" victims to be identified. Such information would facilitate the implementation of appropriate treatment programmes.

Most research has focused on disasters of natural origin (Fain, 1987). However, research on technological disasters is necessary, since the consequences of such disasters differ from those of natural disasters (Baum *et al.*, 1983; Barron *et al.*, 1980). Also, the incidence of technological disasters is likely to rise, as technology becomes increasingly complex, and is associated with toxic by-products and other health hazards (Logue *et al.*, 1981).

The nature of South Africa's revenue producers, that is, the highly industrialised and labour intensive organisations, yields an ever-present potential for technological disasters (Fain, 1987). In particular, the

mining industry, which provides one of the largest sources of employment in South Africa (Golding, 1988), has been plagued by accidents and disasters.¹ There is thus a need for research in this area. The present study is further justified in that, with few exceptions (e.g., White, 1982), to date there has been little published research on the psychological health of South African mineworkers.

Furthermore, the "context" in which a disaster occurs has not been adequately addressed by previous researchers. Stress levels prevailing among victims prior to the disaster have not been taken into account. It is suggested, however, that the context of a disaster will have bearing on its psychological consequences. Hence, in this study an attempt will be made to contextualise the disaster.

Additionally, previous studies of disasters have not considered all relevant causes of the dependent variables in their analysis. By considering these and hence eliminating the potential for obtaining spurious results, this study will be able to contribute to the understanding of the psychological effects of disasters of a similar nature.

A Model of the Disaster-Psychological Illness Process

The disaster-psychological illness model (DIN) presented in this study, is based on the disaster and stress literature previously reviewed. Some variables have, however, been omitted, or modified for inclusion so as to enable a more effective investigation of disaster stress. Additionally, negatively perceived industrial relations (IR) events, which have not yet been discussed, but are of particular relevance to the disaster under investigation, are included in this model. The model is depicted diagrammatically in Figure 4.1.

¹ Since 1900 more than 46 000 workers have died in gold mine accidents and hundreds of thousands have been seriously injured (Leger, 1985).

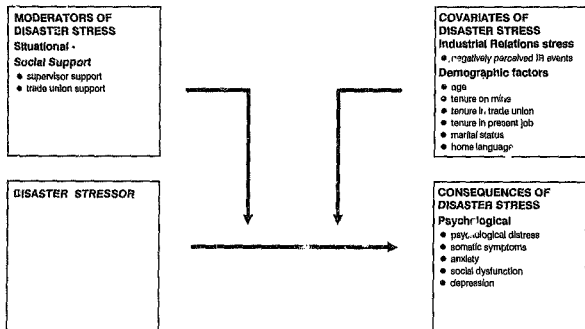


Figure 4.1: A Model of the Disaster-Psychological Illness Process

Independent Variable

The disaster investigated was a methane explosion in the Number 10 Shaft of the St Helens gold mine, which occurred on August, 31st, 1987. The objective nature of the disaster (from the limited information available) is presented in Table 4.1 using the classificatory system of Berren *et al.* (1980). As background information aspects of victims' responses are presented in Table 4.2.

The independent variable in this study is exposure (versus non-exposure) to the disaster. Specific information was underground in Number 10 Shaft and is to be considered as a direct result of the explosion is considered.

Dependent Variables

Research has clearly illustrated that a disaster has potentially debilitating consequences for its victims (Glesser *et al.*, 1978; Leopold & Dillon, 1963; Hellick *et al.*, 1981). In this study only psychological consequences are considered. Previous disaster studies have assessed psychological consequences in a variety of ways. Some studies (e.g., McFarlane, 1985) have assessed psychiatric morbidity of victims on the basis of psychiatric cases. Other studies (e.g., Barling *et al.*, 1987) have used an approach that measures degree of distress along a continuum, since this describes the natural course of psychological response to a disaster (Green, 1982). Yet other studies (e.g., Shore *et al.*, 1986) have focused on particular symptomatology.

The psychological symptoms which have been found to be most prevalent among disaster victims (see Table 3.1) are somatic symptoms, anxiety, social dysfunction and depression. Although these symptoms are conceptually and empirically related to each other, as well as to overall psychological distress (Banks, 1983), their relationship varies both intrindividually and interindividually (Vitaliano *et al.*, 1987).

Table 4.1

Classificatory dimensions of the St Helena disaster.

<i>Properties</i>	<i>Details</i>
Type of Disaster	Technological (mining)
Duration	Acute
Impact physical personal geographical	63 miners killed; 4 miners injured 40% of the interviewees reported losing "someone close to them" Intermediate (Green, 1982)
Reoccurrence	From 1982 to 1987, 15 methane explosions resulted in fatalities on South African gold mines affiliated to the Chamber of Mines (Golding, 1988)
Controllability	Three factors are responsible for methane explosions i.e., faulty ventilation, failure to monitor presence of gas and an ignition source. Strict safety precautions should prevent these factors. Hence such a disaster need not occur (Pine, 1987)

Table 4.2

Responses to the stressor

<i>Factors</i>	<i>Response of Victims</i>
Appraisal of Situation	95% thought they would die 5% thought they might be injured
Reactions	5% fled 5% helped others 5% felt helpless 85% felt confused
Assessment of Behaviour	20% felt they managed well 80% felt they had let themselves down
Sense of Preparedness	95% reported feeling unprepared for the disaster

The present study attempts to comprehensively assess psychological symptomatology amongst disaster victims. Therefore, separate measures are included for each of these primary symptoms, as well as for overall psychological distress. Specifically, overall psychological distress is treated as a composite of somatic symptoms, anxiety, social dysfunction and depression.

Moderator Variables

Research findings (e.g., Barling et al., 1987; Baehr, 1985; Ganster, Fusilier & Mayes, 1986; Kobasa & Puccetti, 1983) indicate that the efficacy of a support system is greatest when consistent with the nature of the stressor. La Rocco et al. (1980) have indicated that work-related sources of social support are most effective in reducing psychological strain in occupationally-induced stressful situations. Although the moderating role of supervisor support in occupationally-induced disaster situations has previously been investigated (e.g., Barling et al., 1987; Chisholm et al., 1986), the moderating role of trade union support in disasters has not previously been examined. However, trade unions are also a crucial potential source of work-related support (Bluen & Howse, 1988; Howse, 1981; Howse, 1987; Shifon & Kirmeyer, 1988; Shostak, 1985). Therefore, both supervisor and trade union sources of social support are included in the model.

Supervisor support. In the organisational stress literature, there is considerable evidence that supervisor support moderates the harmful consequences of stress under "normal" conditions (Howse, 1981; House & Wells, 1978; La Rocco et al., 1980). However, few studies of disasters have empirically investigated the impact of supervisor support on psychological well-being. Two disaster studies (i.e., Barling et al., 1987; Chisholm et al., 1986) which have considered the role of supervisor support provide minimal support for its utility, possibly because only emotional support from supervisors was assessed. In this study, however, informational support is considered in addition to emotional support,

thus enabling a more comprehensive assessment of the efficacy of supervisor support in industrial "crisis" situations.

Piron, Ruman and Rajah (1983) contend that, in South Africa, the labour-management interface has come to represent the black-white interface. This is particularly evident in the mining industry where the "minor in charge" had, until recently, to be a "scheduled person" as defined by the Mines and Works Act of 1956.² In this study, a supervisor is defined as the white minor in charge of the "gang".

Trade union support. The objectives of a trade union vary in accordance with the type of union it is, and the function that workers expect their union to perform (Bluen & Fullagar, 1986). Nevertheless, all unions strive to give workers a sense of being part of a community (Tannenbaum, 1951) and to enhance worker empowerment and self-esteem (Shostak, 1985). These objectives clearly illustrate the suitability of a trade union to provide work-related social support to its members.

Bluen and Howse (1988) suggest that unions are particularly well placed to provide three interrelated types of social support, namely, emotional, informational and instrumental support.

Freeman and Hedoff (1984) found that unions provide emotional support to workers, thereby improving worker morale and cooperation. Shostak (1980) suggests that union officials often fulfil the role of lay counsellors for members' personal problems. Regarding informational support, Shostak (1980, 1985) reports that unions educate members of their legal rights, and inform members of available resources. Unions can provide instrumental support by eliminating stressful working conditions (Bluen and Howse, 1988). Research suggests that unions are instrumental in improving industrial safety (Vendling, 1977).

² The Mines and Works Act (1956) defined scheduled persons as Europeans, "Cape Coloureds", or "Cape Malays", or the descendants of "Hauritius Greoles or St Helena persons" (A12(2)(a)).

In an organisation, the interests of workers and management frequently diverge (House, 1981). Trade union officials have been found to be more concerned with the welfare of the workers than have supervisors or employers (McLean, 1979; Shostak, 1980). It has therefore been suggested that support offered by a trade union may be more effective than that offered by the employer organisation (House, 1987).

In the South African gold mining industry various trade unions exist. The majority of miners, however, belong to the NUM.² Therefore, in this study, the NUM is used as the union from which the moderating role of trade union support will be considered. Emotional, informational, and instrumental support will all be assessed (see Bluen & House, 1986).

Covariates

Industrial relations stress. Industrial relations (IR) refer to the "power relations between labour and capital which are regulated and institutionalised at the workplace with a view to managing conflict" (Golding, 1988, p.2). There are two major ideological viewpoints concerning conflict within the IR process, namely, the unitary and the pluralist perspectives (Fox, 1974). The unitary perspective views conflict as unnecessary and unnatural, arising largely from the influence of agitators or faulty communication (Bluen & Barling, 1987). In contrast, the pluralist perspective suggests that there is a structural conflict of interest between workers and management (Bluen, 1986). This conflict is exacerbated in the South African situation by macroenvironmental sources of conflict and change (e.g., the State's repressive na-

² The NUM is the largest trade union in South Africa. Furthermore, it is the only union in the mining industry with unskilled and semiskilled members, which has entered into formal collective bargaining with the Chamber of Mines. This relationship began in June 1983 when the NUM was granted formal recognition on eight gold mines. The NUM has since been granted recognition on over 50 mines most of which are affiliated to the Chamber of Mines (Golding, 1988).

ture). In the South African situation, the pluralist perspective approximates reality most closely (Bluen & Barling, 1987).

The IR stressors to which both management and workers may be exposed are innumerable. For example, IR stressors are associated with labour disputes (MacBride, Lancee & Freeman, 1981), joint decision making (Sagovis & Bhagat, 1981) and implementing IR decisions (Bluen, 1986). IR stressors are also associated with aspects of organisational stress (e.g., role stress, dealing with people; Bluen & Barling, 1988). Certain IR practices particularly prevalent in South Africa are also stressful. Examples are unfair labour practices, resistance to change, victimisation, intimidation and injustice (Bluen, 1986). Hence, IR stress factors cover diverse IR practices.

In the South African mining industry, the two primary parties involved in the IR process are the Chamber of Mines and the NUM. Although some agreements have been reached (e.g., shaft steward recognition and annual wage reviews) the relationship between the two parties remains primarily antagonistic. It can therefore be anticipated that IR stress has affected many people in the mining industry.

Research (e.g., Wood & Pedlar, 1978) suggests that the nature of a strike is tremendously stressful. Incidents reported in strikes in South Africa (Baskin, 1982) include the locking out of strikers from company premises, threatening strikers with permanent job loss in the industry, assaults, evictions, arrests, forcing strikers at gunpoint to return to work, and deportation. Non-striking workers have also been faced with stressors, such as being confronted with hostile pickets on attempting to enter the premises (Wood & Pedlar, 1978). Following a 22-day strike of white collar union members, Barling and Milligan (1987) found that negatively perceived IR events were associated with psychosomatic symptoms and a lack of psychological well-being. Unfavorable changes in psychological well-being over the next two and six months followed prior negatively perceived IR stressors.

The disaster investigated in this study occurred less than 24 hours after the three-week NUM strike was called off. Hence, it occurred when IR was at a dramatic level in the mining industry.^{*} It has been theoretically (Bluen & Barling, 1988) and empirically (Bluen, 1986) shown that IR stress causes psychological strain. James, Mulaik and Brett (1983) contend that all relevant causes of the dependent variable must be included in the analysis. Therefore, to obtain a clearer understanding of the disaster stress process, and to eliminate the potential for obtaining spurious results, negatively perceived IR events are included as a covariate in the model.

Demographic Variables. Demographic variables such as age, gender and education level have been suggested as possible predictors of distress in response to stressors (Leedsam, 1962; Kinston & Rosser, 1974; Raphael, 1986). Stress levels amongst miners have been related to demographic factors such as job tenure and ethnicity (White, 1982). Furthermore, demographic factors such as age, education, organisational tenure, union tenure and wages have been associated with union-related behaviours (Barling & Milligan, 1987; Shirom & Kirmeyer, 1988). Thus, to reduce the risk of spuriousness, age, tenure on mine, tenure in trade union, tenure in present job, home language and marital status are included as covariates.

Hypotheses

Having presented the model, the specific findings anticipated need to be outlined. Based on the disaster and stress research, three hypotheses have been made:

^{*} During the strike, 50 000 miners were fired, 500 arrested, hundreds injured and ten killed (Work in Progress, Oct/Nov 1987).

Hypothesis 1: After controlling for negative IR stress, the experimental group (i.e., disaster victims) will have greater psychological strain (in terms of psychological distress, somatic symptoms, anxiety, social dysfunction and depression) than the control group (i.e., miners not exposed to the disaster).

Hypothesis 2: After controlling for negative IR stress, supervisor support will be inversely associated with psychological strain (in terms of psychological distress, somatic symptoms, anxiety, social dysfunction and depression) and will moderate the effects of the disaster on psychological strain.

Hypothesis 3: After controlling for negative IR stress, trade union support will be inversely associated with psychological strain (in terms of psychological distress, somatic symptoms, anxiety, social dysfunction and depression) and will moderate the effects of the disaster on psychological strain.

CHAPTER 5

METHOD

Setting

St Helens, a Gencor owned gold mine, is situated in Welkom, Orange Free State. At 7.15 a.m., on August, 31st, 1987, a methane explosion occurred at its Number 10 Shaft. It occurred as thousands of black miners were returning to their jobs, following the NUM three-week strike (Sowetan, 1.9.87). The blast, which caused extensive damage to the Number 10 Shaft, resulted in the death of at least 63 miners: 53 miners were killed when the service lift in which they were travelling plummeted to the bottom of the 1367m deep shaft; nine miners were killed at the pump station, where the explosion occurred, and one of five injured miners died in hospital (Citizen, 19.12.87).

More than 400 workers were underground at the time of the blast. Most were evacuated by crossing through excavation tunnels to the parallel Number 8 Shaft. Five miners needed to be rescued from the pump station, 695m below surface. Rescuers reached these miners, who had suffered first degree burns, 11 hours after the disaster. It took a further three weeks before the bodies in the cage could be recovered. The bodies were all decomposed beyond recognition, hence, there is some uncertainty as to the exact death toll in the disaster (Molefe, 1987).

Subjects

The subjects interviewed ($N = 67$) were black, underground miners with no known psychiatric history. They were all members of the NUM and were working on one of three gold mines in the Orange Free State region at the time of the St Helens disaster. Participation in the study was voluntary. Two groups of subjects were selected: an experimental and a

control group. Demographic details of these samples are presented in Table 5.1.

Experimental Group

The experimental group ($n = 21$) consisted of miners who were exposed to the St Helena disaster (i.e., miners who were underground in Shaft 10 and needed to be evacuated when the blast took place). Miners in closest proximity to the area of impact (i.e., the pump station 695m below surface) were selected for inclusion in the study.

Control Group

The control group ($n = 46$) consisted of miners who had never been exposed to a mining disaster. They were employed at two different gold mines in the Orange Free State region, namely, Unisel ($n = 24$) and Harmony ($n = 22$).¹ These two mines were chosen because of the similarity between their safety records and that of St Helena (see The Reef, January, 1967).

It was decided to include subjects from two different mines so as to improve the generality of the findings (Cook & Campbell, 1976). No significant differences were found between these two control groups on all factors considered, namely, the covariates, moderators, dependant and continuous demographic variables ($p > .05$) (see Table 5.2). Furthermore, no significant differences were found between the two control groups for the discrete demographic variables of language ($\chi^2(3) = 1.25; p > .05$) and marital status ($\chi^2(2) = 1.49; p > .05$). Because of the homogeneity of the two groups, the control group data were amalgamated.

¹ Unisel, like St Helena, is owned by Gencor, whereas Harmony is owned by Rand Mines.

Table 5.1

Demographic details of the sample and statistical comparisons between the experimental and control groups.

Demographic Variables (Continuous)	Combined		Experimental		Control		t
	N	SD	N	SD	N	SD	
Age ¹	30,07	6,56	29,86	6,73	30,17	6,56	30,07
Tenure on mine ²	103,79	78,30	81,48	66,10	113,98	81,92	103,79
Tenure in trade union ²	25,40	17,09	25,57	22,48	25,25	10,88	25,40
Tenure in job ²	60,78	48,94	49,33	47,12	66,00	49,36	60,78

Demographic Variables (Discrete)	Combined		Experimental		Control		χ ²
	n	%	n	%	n	%	
Language							
Xhosa	28	41,8	8	38,1	20	43,5	
Sotho	32	47,8	10	47,6	22	47,8	
Other	7	10,5	3	14,5	4	8,7	
Total	67	--	21	--	46	--	5,01
Marital status							
Single	18	26,9	5	23,8	13	28,3	
Married	47	70,1	15	71,4	32	69,6	
Separated	2	3,0	1	4,8	1	2,2	
Total	67	--	21	--	46	--	0,44

¹ Age measured in years.

² Tenure on mines, tenure in trade union, and job tenure measured in months.

Note: none of the t-tests or χ² tests revealed significant differences between the experimental and control groups ($p > ,05$).

Table 5.2

Means, standard deviations, and *t*-test scores for the two control sub-groups

	Control group 1 (Harmony)		Control group 2 (Unisel)		
	<i>N</i>	<i>SD</i>	<i>N</i>	<i>SD</i>	<i>t</i>
Covariate					
Negative IR Stress	31,05	17,43	27,33	13,56	0,81
Moderators					
Supervisor Support	7,27	4,27	7,42	4,45	-0,11
Trade Union Support	28,45	5,56	28,79	2,41	-0,26
Dependent Variables					
Psychological Distress	52,91	16,00	60,75	17,30	-1,59
Somatic Symptoms	13,41	5,15	16,04	5,62	-1,65
Anxiety	14,91	5,51	16,21	5,50	-0,79
Social Dysfunction	14,32	3,09	15,79	2,96	-1,65
Depression	10,27	4,43	12,71	5,34	-1,68
Continuous Demographic Variables					
Age ¹	30,09	7,71	30,25	5,46	-0,08
Tenure on mines ²	114,32	96,73	110,00	67,48	0,34
Tenure in trade union ²	23,67	10,66	24,56	11,86	0,24
Job tenure ²	66,73	56,06	65,33	43,55	0,09

¹ Age measured in years.

² Tenure on mines, tenure in trade union, and job tenure measured in months.

No differences were recorded between control groups 1 and 2 for any variables ($p > .05$)

Design

A cross-sectional, quasi-experimental design was used in this study (Cook & Campbell, 1976). Subjects in both the experimental and the control groups were selected according to the specified criteria.

There was one independent variable in this study, namely, exposure (versus lack of exposure) to a mining disaster; five dependent variables, namely, psychological distress, somatic symptoms, anxiety, social dysfunction, and depression; two moderator variables, namely, supervisor support and trade union support; and one covariate, namely, negatively perceived IR events.

Measuring Instruments

The questionnaire contained four scales validated in previous studies both overseas and in South Africa. In addition, the questionnaire included some biographical questions and some questions pertaining to disasters (see Appendix 1). The questionnaire was translated into the predominant languages spoken on the mines of interest (i.e., Xhosa and Sotho). The accuracy of the translations was checked by means of the blind, back-translation method (Hulin & Mayer, 1986; White, 1982).

Dependent Variables

Psychological ill-health. To assess psychological ill-health, the *General Health Questionnaire-28* (GHQ-28), a scale designed to measure current psychological ill-health in community settings, was used (Goldberg, 1978). As the questionnaire is concerned with measuring current severity of disturbance, it focuses on symptoms rather than traits. The GHQ-28 measures two aspects of psychological ill-health. First, it provides an overall score of psychological distress. Second, it provides scores for four primary aspects thereof (i.e., somatic symptoms, anxiety, social

dysfunction and depression). In each scale, high scores reflect greater psychological ill-health.

In the present study, the four-point Likert response format was used (i.e., 'Less than usual' (1), 'No more than usual' (2), 'Rather more than usual' (3), & 'Much more than usual' (4)). This scoring format was chosen in preference to the original dichotomous scoring format of the GHQ to overcome potential problems associated with truncated ranges (Neale & Liebert, 1980). Banks, Clogg, Jackson, Kemp, Stafford, and Wall (1980) report that the Likert scoring format of the GHQ provides a more acceptable distribution of scores than the dichotomous method, for use in parametric statistical analysis. Goldberg (1972) found that the GHQ yields comparable reliability and validity characteristics for both scoring formats.

Goldberg (1972) reports that the GHQ exhibits temporal consistency over a six-month period: of the 114 patients included in the test-retest analysis, 65 suggested that their condition had remained the same. Of the 87 test-retest patients examined by doctors, 51 were rated about the same on both occasions. Further six-month time consistency tests of the GHQ yielded reliability coefficients of .51 (dichotomous scoring) and .58 (Likert scoring). Also, split-half reliability coefficients of .95 (dichotomous scoring) and .96 (Likert scoring) were reported for a sample of 853 subjects (Goldberg, 1972).

For the sake of parsimony, the GHQ-28 was chosen in preference to the GHQ-60. Furthermore, the scale was felt to be superior to the other versions of the GHQ (e.g., GHQ-30, GHQ-20 and GHQ-12), as it provides more information than a single severity score.

Goldberg (1978) reports a sensitivity of 85.6% and a specificity of 85.8% for the GHQ-28. These refer respectively to the test's ability to "identify" those who are psychologically ill, and to "classify" those who are psychologically ill. Taking misclassification rates and sensi-

tivity and specificity values into account. Banks (1983) found the validity of the GHQ-28 to be superior to that of both the GHQ-12 and the GHQ-30 for a sample of 200 17-year olds. With a cutting score of 5/6, the misclassification rate of the GHQ-28 was 15%, the sensitivity was 100% and the specificity was 84.5% (Banks, 1983).

The GHQ-28 has been validated against established scales (e.g., Present State Examination; Wing, Cooper, & Sartorius, 1974) that measure psychological symptoms ($p < .001$; Banks, 1983). Furthermore, the correlation between total score on the GHQ-28 and overall clinical assessment by psychiatrists is high ($r = .76$; Goldberg, 1978). The scale is a useful screening instrument of psychiatric morbidity for neurological inpatients (Bridges & Goldberg, 1986). Other populations on which the GHQ-28 has been used as a screening device include adolescents (Banks, 1983), multiple sclerosis patients (Rabin & Brooks, 1981) and general practice patients (Goldberg & Hillier, 1979).

Other versions of the GHQ have been used effectively in disaster studies. Barling *et al.* (1987) administered the GHQ-12 to victims of an acute industrial disaster in South Africa. Also, Parker (1975; 1977) administered the GHQ-30 to survivors of a natural disaster and found that the questionnaire was sensitive to the more specific psychological disorders that occurred among them.

The GHQ-28's ability to measure multiple aspects of psychological ill-health, and its psychometric adequacy, make it particularly suitable for use in this study.

Moderator Variables

Social support from supervisors. The *Supervisory Support Scale* used in this study, forms part of the Survey of Organizations (Taylor & Bowers, 1972). The scale is designed to assess perceived supervisor approachability in offering social support to subordinates. Because the

scale only contains three items, the original five-point Likert-type response format (i.e., 'To a very little extent' (1), 'To a little extent' (2), 'To some extent' (3), 'To a great extent' (4), and 'To a very great extent' (5)) was retained to prevent range truncation (Neale & Liebert, 1980). High scores reflect greater levels of supervisor support.

Coefficient alpha's of .91 and .94 have been reported for a sample of 202 nursing staff and 325 oil refinery workers, respectively (Bedeian, Armenakis, & Curran, 1981; Taylor & Bowers, 1972). Also, Spearman-Brown reliability coefficients of between .90 and .93 were recorded for a sample of 1048 subjects selected from seven types of organisations (Taylor & Bowers, 1972).

Bedeian *et al.* (1981) found significant ($p < .01$) partial correlations of the Supervisory Support Scale with measures of role ambiguity (-.27) and role conflict (-.32). The scale has also been used successfully in assessing changes in worker perceptions of leadership in samples of female assembly-line operators (Koch, 1979), and shop-floor supervisors (Koch, 1978).

The Supervisory Support Scale has been utilised in a study by Bluen (1986) in South Africa on 452 people involved in diverse aspects of IR practice. Using Cronbach's alpha, the internal consistency of the scale was calculated and coefficients of .80 (Time 1) and .93 (Time 2) were obtained. Test-retest reliability was satisfactory ($r = .45$, $p < .001$; Bluen, 1986) over a six-month period. Consequently, the Supervisor Support Scale was seen to be psychometrically sound and suitable for inclusion in the present study.

Social support from trade unions. To assess trade union support, the *Trade Union Social Support Scale* (TUSSE), devised by Bluen and Howse (1988), was used. This 25-item scale, was designed to assess emotional, informational, and instrumental support (House, 1981). It was standardised on a sample of black, South African members of the Motor

Industry Combined Workers Union (ICWU). A three-point Likert-type response format (i.e., 'Yes', 'Maybe', 'No') was adopted. High scores reflect low levels of trade union support.

Reliability results indicate good internal consistency scores (Cronbach's $\alpha = .91$ and split-half reliability = .88) (Bluen & Howse, 1988). Similarly, suitable indicators were obtained for the validity of the scale. Concurrent validity was established by correlating the TUS with three other conceptually related measures (i.e., trade union instrumentality, trade union commitment and social support from friends). These measures all correlated significantly and in the predicted direction with the developed scale ($p < .05$). Also, construct validity was established by using a known-group difference and factor analysis. Results indicated that the scale differentiated between conceptually different groups (i.e., race and education). Factor analysis results confirmed the existence of a unidimensional scale. The suitability of the TUS and its psychometric adequacy makes it appropriate for use in this study.

Covariate

Industrial relations stress. The Industrial Relations Event Scale (Short-form) (IRES-S) was devised to assess stress associated with the practice of IR (Bluen, 1986; Bluen & Barling, 1987; see Barling & Milligan, 1987). This 20-item scale was developed by selecting those items that displayed the best psychometric properties from the 63-item IRES (Bluen, 1986; Bluen & Barling, 1987). The IRES-S, which contains three subscales (i.e., occurrence, negative and positive), provides a retrospective index of both objective and subjective stressors. The occurrence scale assesses the number of IR events that have occurred over a 12-month period. As such, it provides an index of objective stressors. Subjective measures of stress are provided by the perceived positive and negative impact subscales. These scales reflect the perceived positive (+1 through +3) or negative (-1 through -3) impact that each occurring event exerted on the respondent.

Past research (e.g., Sarason *et al.*, 1978) has indicated that negative impact scores correlate best with subsequent behaviour. Also the negative impact scale yields the most satisfactory psychometric properties of the IRES-S (Bluen & Barling, 1987; Bluen & Howse, 1988). Therefore, only the negative scale of the IRES-S was used in this study.

Test-retest reliability scores as measured by Pearson's correlations over a seven-week period were satisfactory for the negative subscale of the IRES-S ($r = .94$; $p < .01$) thus indicating temporal consistency (Bluen, 1986; Bluen & Barling, 1987).

Suitable support for the validity of the IRES-S was obtained for the negative subscale of the IRES-S. Concurrent validity was established by correlating the subscale with measures of four conceptually related constructs (i.e., role stress, job and supervision satisfaction and propensity to leave the organisation). The negative subscale of the IRES-S correlated significantly and in the predicted direction with measures of job and supervision satisfaction, and role ambiguity and conflict ($p < .05$). Discriminant validity of the IRES-S subscales was determined by comparing responses across conceptually different groups (i.e., race, union membership, union position, job category and degree of involvement in IR). The results revealed that the negative subscale discriminated significantly ($p < .05$) and consistently between groups.

The IRES has been used to assess the consequences of a strike. Barling and Milligan (1985) report significant test-retest reliability over a two-month period for the negative subscale ($r = .58$; $p < .01$) in a sample of teachers who had been legislated back to work after a strike. As the IRES-S is psychometrically equivalent to the IRES, it could similarly be used in a strike situation.

Given the psychometric adequacy of the IRES-S and its suitability for use with samples similar to the present one, it was considered acceptable for the present study.

Procedure

An outline of the proposed study was presented to NUM's Office-bearers Committee who then agreed to assist with its implementation.² Confidentiality was assured in that it was made clear that neither NUM nor Gencor would be provided with raw data or feedback pertaining to any individual respondent. At the same time, it was emphasised that participation be voluntary.

The questionnaires were administered individually to each participant. They were presented to the miner in his home language by one of five trained interviewers. Each questionnaire took approximately one and a half hours to administer.

It was originally arranged that both the experimental and control groups be interviewed two months after the disaster. The control group was interviewed as scheduled. However, for logistic reasons, interviews of the experimental group could not be conducted until four months after the disaster.³

Statistical Analysis

The aim of the present study was to assess psychological consequences of exposure to a disaster. It was hypothesised that exposure to a dis-

² Gencor was approached for support. Specifically, the NUM requested from the St Helena management that the miners involved in the disaster be given time off work to participate in the study. This was not granted. It was therefore decided to interview all subjects outside working hours so as not to confound the sampling process. Thus, it was not necessary to approach management of the other mines.

³ The specific reasons for the delay are sensitive and cannot be disclosed.

aster would yield negative psychological consequences. This hypothesis was tested by evaluating whether significant differences emerged between the experimental and control groups for levels of psychological distress, somatic symptoms, anxiety, social dysfunction and depression.

A further aim of the study was to investigate whether situational factors (i.e., supervisor support and trade union support) influenced the stress-strain relationship. Specifically, it was hypothesised that supervisor support and trade union support would be inversely associated with the five measures of psychological ill-health, and that these sources of support would moderate the detrimental psychological effects of the disaster.

Given the temporal proximity of the disaster to the three-week NUM strike, a measure of negatively perceived IR events was included as a covariate to reduce the potential for obtaining spurious findings (James *et al.*, 1983).

The analysis of covariance (ANCOVA) statistical procedure enables an assessment of main and moderating effects to be made (Spector, 1977). Furthermore, this procedure allows the relationship in question to be examined while statistically controlling for potentially confounding variable/s by including them as covariates (Wildt & Ahtola, 1980). This procedure adjusts the dependent variables for differences in the covariate/s and then investigates the relationship between the independent variable and the adjusted values of the dependent variables (Spector, 1977).

The significance of higher order interaction terms can also be calculated in order to assess the presence of moderating effects "exerted" by one independent variable on the relationship between another independent variable and the dependent variable. The inclusion of the interaction term often allows for a clearer interpretation of observed main effects (Pedhazur, 1982).

The ANCOVA method has been used previously in stress research to assess moderator effects (see Kobasa & Puccetti, 1983). The independent variable is measured as one main effect, the moderator variable is entered as a second main effect and the interaction between the two main effects provides an indication of the moderating effect. Kobasa and Puccetti (1983) used ANCOVA for the assessment of stressful life-events on illness onset. They examined personality, social assets, and perceived social support as moderators of the effects of stressful life-events on illness onset. Stressful life-events, personality hardiness, and each of the three social resource variables in turn were entered as independent variables, and illness reports served as dependent variables. Therefore, the ANCOVA is an appropriate technique for the assessment of stress-moderator-strain relationships. Consequently, in the present study, the statistical approach used by Kobasa and Puccetti (1983) was adopted, namely, ANCOVA.

The appropriate method of dealing with moderators when using the ANCOVA technique is through subgroup analysis (Zedeck, 1971). This technique allows for establishing the significance of the purported moderator variables as main effects, moderators, or both (Bluen, 1986; Kobasa & Puccetti, 1983). In subgroup analysis, the sample is divided into the subcategories of the moderator variable (e.g., males versus females). For continuous variables (e.g., supervisor or union support) subgroups are calculated by dividing the sample at the median (Bluen, 1986). Separate predictor-dependent variable relationships are calculated and comparisons are then made for the results obtained for each subgroup (Bluen, 1986; Zedeck, 1971). This technique has been used extensively in general psychological research (Zedeck, 1971), and in stress research (e.g., Barling et al., 1987; Kobasa & Puccetti, 1983). For example, Kobasa and Puccetti (1983) dichotomised the hardiness and social support variables at their respective medians and conducted an analysis of covariance on data measured at Time 2 controlling for any difference in

the data at Time 1. Such a technique was required in the present study because of the continuous nature of the moderator variables. Specifically, the two moderator variables were split at their medians (supervisor support, $mdn = 8$; trade union support, $mdn = 28$) (see Kobasa & Puccetti, 1983).

From the preceding discussion, it can be seen that the ANCOVA was extremely well-suited to the design of the present study. Specifically, a 2×2 (group status $\times$ supervisor support or trade union support) design was used. The 2-way design was chosen in preference to the 3-way (group status $\times$ supervisor support $\times$ trade union support) design because of the sample size (Korlanger, 1973): The sample size ($N = 67$) was too small to conduct a 3-way ANCOVA. Thus two sets of ANCOVA's were conducted. In the first, disaster and supervisor support were included as independent variables, with negative IR stress as the covariate, and psychological distress, somatic symptoms, anxiety, social dysfunction and depression as the five respective dependent variables. In the second set of ANCOVA's, trade union support was included as the independent variable in the place of supervisor support.

Before conducting the ANCOVA's, the various assumptions underlying an ANCOVA (Pedhazur, 1982) need to be addressed.⁴ Two major assumptions underlie analysis of covariance, namely, no measurement error and multicollinearity.

1. There is no measurement error: All variables are measured accurately. It is impossible to eliminate all measurement error (Anastasi, 1982). Thus the extent of measurement error was determined by calculating the reliability of all instruments. Specifically, the internal consistency of each instrument was established using the standardised Cronbach's Alpha formula, a derivative of the Kuder-Richardson (Formula 20) tech-

⁴ These assumptions also underlie the MANOVA which is discussed later (Pedhazur, 1982).

nique (Hull & Nie, 1979). An alpha of .60 was adopted as the minimum acceptable level in the present study (McKinnel, 1970).

2. The assumption of multicollinearity should not be violated: No two independent variables should be too highly correlated (i.e., $r < .80$; Lewis-Beck, 1980). The correlations between the independent variables were computed using Pearson's Product-Moment Correlation Coefficient (Anaswasi, 1982).

In the present study, one of the dependent variables, namely, psychological distress, is a composite of the other four dependent variables, namely, somatic symptoms, anxiety, social dysfunction and depression. Therefore, the dependent variables are conceptually related. Furthermore, inspection of the correlation matrix, in Table 6.3, reveals that the dependent variables in this study correlated significantly with each other (r (66) range: 0.48-0.93; $p < .01$). Hence, to reduce the potential for spuriousness, it was necessary to use a multivariate analysis of covariance (MANCOVA) procedure in this study (Kaplan & Litrownik, 1977).

A MANCOVA allows for the measurement of several related dependent variables simultaneously, combining them in a way that accounts for as much of the variance as possible (Kaplan & Litrownik, 1977; Spector, 1977). The MANCOVA involves a two-stage process (Spector, 1977). The first stage is to test the multivariate hypotheses. As in univariate ANCOVA's, there is an overall test for the main effects and interaction effects. Following Olson's (1976) recommendations, the Pillay's Trace F approximation was selected as the most appropriate test statistic to use (see Bluen & Von Zwan, 1987).

For each significant multivariate effect, the second stage in the analysis is to ascertain which of the dependent variables accounted for these significant effects (Spector, 1977). Where significant multivariate effects were found, separate univariate ANCOVA's were computed for each dependent variable to assess which of the dependent variables accounted

for the multivariate effect. In addition, where significant interactions were found ($p < .05$), scores were plotted and *post hoc* covariance tests performed to assess directionality (see Bluen & Van Zwam, 1987).

CHAPTER 6

RESULTS

The first part of the results section contains the findings of the assumption tests underlying ANCOVA. Thereafter, results of the MANCOVA's and subsequent ANCOVA's are set out.

Results of Assumptions Tests

Reliability of the Instruments

The results of the internal consistency (Cronbach's α) test are presented in Table 6.1. The reliability coefficients measured ($N = 87$; range = 70 - 96) were most satisfactory (Anastasi, 1982). (The internal consistency of the negatively perceived IR events scale could not be calculated due to the nature of the IRES-S; see Bluen and Barling, 1987). Thus, taking into account both the calculated reliability scores and the reported psychometric properties of the scales (see Measuring Instruments section, Chapter 5), the assumption of reliability of the instruments was satisfied.

Tests for Multicollinearity

Pearson's correlation tests were conducted between the *explanatory variables* (see Tables 6.2 and 6.3). From Tables 6.2 and 6.3, it can be seen that none of the correlations between the explanatory variables exceeded the specified cut-off of 0.80 (Lewis-Beck, 1980). Hence, the assumption of multicollinearity was not violated.

Biographical variables significantly associated with the dependent variables were to be treated as covariates to reduce the risk of spuriousness. Tables 6.2 and 6.3 indicate that, in all but one case (i.e., in the experimental group, tenure on mines and social dysfunction

Table 6.1

Descriptive statistics and internal consistencies of the measuring instruments in the combined, experimental and control groups

Measuring Instruments	N of items	Min.	Max.	Combined (N=67)		Experimental (n=21)		Control (n=46)		Alpha
				M	SD	M	SD	M	SD	
1. Negative IR Stress*	20	1	3	23,90	15,68	8,57	12,48	29,11	15,47	--
2. Supervisor Support	3	1	5	8,42	4,27	3,14	10,76	7,35	4,32	,96
3. Trade Union Support	25	1	3	29,41	8,91	6,32	31,20	28,63	4,16	,93
4. Psychological Distress	26	1	4	53,61	16,98	13,20	46,19	57,00	16,97	,93
5. Somatic Symptoms	7	1	4	13,69	5,41	4,41	11,29	14,78	5,51	,85
6. Anxiety	7	1	4	14,22	5,77	5,27	11,24	15,99	5,52	,88
7. Social Dysfunction	7	1	4	14,78	5,13	3,19	14,10	15,09	3,08	,70
8. Depression	7	1	4	10,93	4,65	3,43	9,57	11,54	5,02	,84

* Due to the nature of the IRES, the internal consistency of this measuring instrument could not be calculated (see Bluen & Barling, 1987).

Table 6.2

Pearson's correlations of dependent, moderator, covariate and demographic variables in the experimental and control samples

	1	2	3	4	5	6	7	8	9	10	11	12
1. Negative IR Stress		-.26	.26	.18	.22	.33	-.22	.11	.20	.38	.56	.23
2. Supervisor Support	-.33*		-.38	-.57**	-.33	-.60**	-.12	-.74**	.06	.12	.06	.01
3. Trade Union Support	.17	.27		.64**	.50*	.69**	.27	.49*	.02	.09	.01	.20
4. Psychological Distress	.41**	-.25	-.05		.89**	.89**	.61**	.78**	-.14	-.18	-.01	.01
5. Somatic Symptoms	.35**	-.29*	-.03	.91**		.67**	.66**	.49*	-.04	-.12	.06	.09
6. Anxiety	.42**	-.21	-.10	.94**	.63**		.26	.80**	-.07	-.03	.15	.02
7. Social Dysfunction	.32*	-.08	-.09	.72**	.51**	.62**		.16	-.32	-.48*	-.39	.01
8. Depression	.35*	-.24	.02	.90**	.76**	.78**	.59**		-.10	-.05	.01	.06
9. Age	.02	-.03	-.05	-.18	-.14	-.14	-.13	-.22		.75**	.28	.65**
10. Tenure on mines	.05	-.02	-.13	-.07	-.05	.01	-.07	-.15	.86**		.47	.77**
11. Tenure in trade unions	.21	.03	.03	.14	.15	.25	-.03	-.03	.23	.15		.26
12. Tenure in job	.13	-.00	.12	.06	.15	.11	.01	-.01	.37**	.42**	-.02	

Note: Data from the experimental group are presented above the diagonal; $n = 21$.Data from the control group are presented below the diagonal; $n = 46$.* $p < .05$; ** $p < .01$

Table 6.3

Pearson's correlations of dependent, moderator, covariate and demographic variables in the combined sample (N = 67)

	1	2	3	4	5	6	7	8	9	10	11
1. Negative IR Stress											
2. Supervisor Support	-.44**										
3. Trade Union Support	-.16	.15									
4. Psychological Distress	.46**	-.39**	.08								
5. Somatic Symptoms	.42**	-.36**	.06	.92**							
6. Anxiety	.50**	-.40**	.09	.93**	.81**						
7. Social Dysfunction	.25*	-.14	.02	.69**	.56**	.52**					
8. Depression	.37**	-.37**	.10	.88**	.72**	.78**	.49**				
9. Age	.06	-.02	-.03	-.15	-.10	-.10	-.16	-.18			
10. Tenure on mines	.19	-.06	-.10	-.03	-.00	.07	-.14	-.08	.81**		
11. Tenure in trade union	.30	.02	.03	.04	.09	.17	-.27	-.01	.24	.27	
12. Tenure in job	.20	-.06	.11	.11	.16	.12	.03	.01	.45**	.52**	.19

* p < .05; ** p < .01

correlated; $p < .05$), biographical variables did not correlate significantly with other variables in this study. Furthermore, t -tests on the continuous demographic variables (age, tenure on mines, tenure in trade union, tenure in job) yielded no significant differences ($p > .05$) between the experimental and control groups (see Table 5.1). Similarly, Chi² tests on the discrete demographic variables (home language, marital status) yielded no significant differences between the experimental and control groups (see Table 5.1). As these factors did not consistently contribute to the variance in the dependent variables and did not discriminate between the two groups, they were not included for further analysis in this study as covariates since they posed no threat of spuriousness (see Shiron & Kirmeyer, 1988).

The dependent variables were found to correlate highly and significantly with each other (r (66) range: .48 to .93; $p < .01$; see Table 6.3). Therefore, MANCOVA's were computed using the SAS computer programme. The data were analysed by a 2 x 2 (group status x supervisor support or trade union support) design. In both of these MANCOVA's, the Pillay's Trace F approximation was used to test for significant between-group differences. Where significant multivariate effects were found, separate univariate ANCOVA's were computed for each dependent variable to assess which of the dependent variables accounted for the multivariate effect (Spector, 1977). In addition, where significant interaction was found, scores were plotted and *post hoc* covariance tests were performed to assess directionality. In all the ANCOVA and MANCOVA analyses, negatively perceived IR events were included as a covariate.

Results of the Multiple and Univariate Analyses of Covariance

Results for the Group x Supervisor Support Model

Results of the MANCOVA and subsequent ANCOVA's for the group x supervisor support model are presented in Table 6.4.

Table 6.4

Summary table of the MANCOVA's and ANCOVA's to assess the relationship between disaster and non-disaster groups, and supervisor support, with the five measures of psychological ill-health

Combined Multivariate Analysis	df	F		
<i>Covariate</i>				
Negative IR Stress	4,59	2,79*		
<i>Main Effects</i>				
Group	4,59	0,56		
Supervisor Support	4,59	3,32*		
<i>Interaction Effects</i>				
Group x Supervisor Support	4,59	3,85**		
Separate Univariate Effects for the 5 Psychological Ill-health Variables	SS	df	MS	F
<i>Psychological Distress</i>				
<i>Covariate</i>				
Negative IR Stress	1856,30	1	1856,30	8,98**
<i>Main Effects</i>				
Group	0,79	1	0,79	0
Supervisor Support	1172,52	1	1172,52	5,67*
<i>Interaction Effects</i>				
Group x Supervisor Support	737,16	1	737,16	3,37
Error	12611,48	62	206,64	
<i>Somatic Symptoms</i>				
<i>Covariate</i>				
Negative IR Stress	143,93	1	143,93	5,87**
<i>Main Effects</i>				
Group	8,72	1	8,72	0,36
Supervisor Support	52,01	1	52,01	2,12
<i>Interaction Effects</i>				
Group x Supervisor Support	9,92	1	9,92	0,41
Error	1519,09	62	24,50	
<i>Anxiety</i>				
<i>Covariate</i>				
Negative IR Stress	251,22	1	251,22	11,58**
<i>Main Effects</i>				
Group	0,29	1	0,29	0,01
Supervisor Support	208,09	1	208,09	9,39**
<i>Interaction Effects</i>				
Group x Supervisor Support	188,94	1	188,94	8,71**
Error	1344,97	62	21,69	

* $p < ,05$; ** $p < ,01$

Table 6.4 continued

Separate Univariate Effects for the 5 Psychological Ill-health Variables	SS	df	MS	F
<i>Social Dysfunction</i>				
Covariate				
Negative IR Stress	24,56	1	24,56	2,53
Main Effects				
Group	0,02	1	0,02	0
Supervisor Support	2,03	1	2,03	0,21
Interaction Effects				
Group x Supervisor Support	2,76	1	2,76	0,28
Error	601,66	62	9,70	
<i>Depression</i>				
Covariate				
Negative IR Stress	105,72	1	105,72	6,01**
Main Effects				
Group	7,52	1	7,52	0,43
Supervisor Support	124,96	1	124,96	7,11**
Interaction Effects				
Group x Supervisor Support	73,83	1	73,83	4,20*
Error	1089,98	62	17,58	

* $p < .05$; ** $p < .01$

MANCOVA Findings

From Table 6.4, after controlling for negative IR stress, the Pillay's trace F approximation on the combined dependent variables (i.e., psychological distress, somatic symptoms, anxiety, social dysfunction and depression) yielded a significant interaction (group x supervisor support) effect ($F(4,59) = 3,85$; $p < .01$). In addition, a significant supervisor support main effect was found ($F(4,59) = 3,32$; $p < .05$). These findings justified inspecting univariate results (Spector, 1977). To assess exactly for which dependent variables differences were significant, subsequent univariate analyses of covariance were conducted for group x supervisor support and supervisor support effects (see Table 6.4). However, because there was no significant group multiple effect ($p > .05$) for the group (i.e., disaster) main effect, subsequent ANCOVA's for the group main effect were not considered.

ANCOVA Findings

Psychological distress

For the psychological distress dependent variable, after controlling for negative IR stress, no significant interaction (group x supervisor support) was found ($p > .05$). Conversely, significant differences for supervisor support as a main effect were found. Those classified in the low support category yielded significantly higher psychological distress scores ($M(\text{adjusted}) = 59.56$) than the high support group ($M(\text{adjusted}) = 49.72$; $F(1,62) = 5.67$; $p < .05$).

Somatic symptoms

For the somatic symptoms dependent variable, after controlling for negative IR stress, no significant interaction (group x supervisor support) or main effect was found ($p > .05$).

Anxiety

For the anxiety dependent variable, after controlling for negative IR stress, a significant interaction (group x supervisor support) effect was found ($F(1,62) = 8.71$; $p < .01$). In addition, significant differences for supervisor support as a main effect were found. Those receiving low supervisor support yielded significantly higher anxiety scores ($M(\text{adjusted}) = 16.79$) than the high support group ($M(\text{adjusted}) = 12.65$); $F(1,62) = 9.59$; $p < .01$).

To assess the direction of the significant interaction effect, subgroup scores were plotted (see Figure 6.1) and *post hoc* covariance tests were calculated. For the experimental group, controlling for negative IR stress, those classified in the low support category yielded signif-

icantly higher mean scores ($M(\text{adjusted}) = 18,66$) than the high support group ($M(\text{adjusted}) = 14,61$; $F(1,20) = 22,24$; $p < ,01$). For the control group, controlling for negative IR stress, the difference between the low support ($M(\text{adjusted}) = 14,93$) and high support groups ($M(\text{adjusted}) = 14,69$) was not significant ($F(1,20) = 0,02$; $p > ,05$).

Social dysfunction

For the social dysfunction dependent variable, after controlling for negative IR stress, no significant interaction (group x supervisor support) or main effects were found ($p > ,05$).

Depression

For the depression dependent variable, after controlling for negative IR stress, a significant interaction (group x supervisor support) effect was found ($F(1,62) = 4,20$; $p < ,05$). In addition, significant differences for supervisor support as a main effect were found. Those classified in the low support category yielded significantly higher scores of depression ($M(\text{adjusted}) = 13,04$) than the high support group ($M(\text{adjusted}) = 9,83$; $F(1,62) = 7,11$; $p < ,01$).

To assist with the interpreting of the interaction, subgroup scores were plotted (see Figure 6.2) and *post hoc* covariance tests were performed. For the experimental group, controlling for negative IR stress, those classified in the low support category yielded significantly higher depression scores ($M(\text{adjusted}) = 14,70$) than the high support group ($M(\text{adjusted}) = 9,04$; $F(1,20) = 32,86$; $p < ,01$). For the control group, controlling for negative IR stress, the difference between the low support ($M(\text{adjusted}) = 11,38$) and high support group ($M(\text{adjusted}) = 10,61$) was not significant ($F(1,20) = 0,21$; $p > ,05$).

Group X Supervisor Support

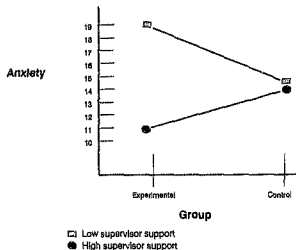


Figure 6.1:
Diagrammatic representation of significant interaction for the anxiety dependent variable.

Group X Supervisor Support

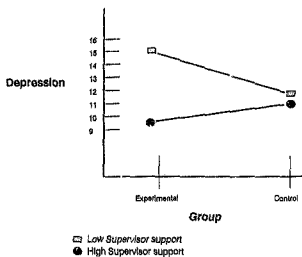


Figure 6.2:
Diagrammatic representation of significant interaction for the depression dependent variable.

Results for the Group x Trade Union Support Model

Results of the MANOVA and subsequent ANCOVA's for the group x trade union support model are presented in Table 6.5.

MANCOVA Findings

From Table 6.5, after controlling for negative IR stress, the Pillay's trace F approximation on the combined dependent variables (i.e., psychological distress, somatic symptoms, anxiety, social dysfunction and depression) yielded no significant interaction (group x trade union support) ($F(4,59) = 1.97$; $p > .05$). Furthermore, no significant group effect was found ($p > .05$). Because there are no group and trade union x group multivariate effects, subsequent ANCOVA's for these effects were not considered. The Pillay's trace F approximation does, however, reveal a significant main effect for trade union support ($F(4,59) = 3.51$; $p < .05$). This finding justified inspection of univariate analysis of covariance for the trade union support variable (Spector, 1977).

ANCOVA Findings

Psychological distress

For the psychological distress dependent variable, after controlling for negative IR stress, a significant difference for the main effect of trade union support was found. Those classified in the low support category indicated significantly greater psychological distress ($M(\text{adjusted}) = 46.97$) than the high support group ($M(\text{adjusted}) = 58.21$; $F(1,62) = 8.92$; $p < .01$).

Somatic symptoms

For the somatic symptoms dependent variable, after controlling for negative IR stress, a significant difference for trade union support as a

Table 6.5

Summary table of the Mancova's and Ancova's to assess the relationship between disaster and non-disaster groups and trade union support, with the five measures of psychological ill-health

Combined Multivariate Analysis	df	F		
Covariate				
Negative IR Stress	4,59	2,78*		
Main Effects				
Group	4,59	1,34		
Trade Union Support	4,59	3,51*		
Interaction Effects				
Group x Trade Union Support	4,59	1,97		
Separate Univariate Effects for the 5 Psychological Ill-health Variables	SS	df	MS	F
<i>Psychological Distress</i>				
Covariate				
Negative IR Stress	2013,70	1	2013,70	10,08**
Main Effects				
Group	319,90	1	319,90	1,60
Trade Union Support	1781,81	1	1781,81	8,92**
Interaction Effects				
Group x Trade Union Support	184,93	1	184,93	0,93
Error	12380,80	62	199,69	
 <i>Somatic Symptoms</i>				
Covariate				
Negative IR Stress	160,96	1	160,96	7,39**
Main Effects				
Group	46,48	1	46,48	2,13
Trade Union Support	216,99	1	216,99	9,97**
Interaction Effects				
Group x Trade Union Support	13,75	1	13,75	0,63
Error	1350,02	62	21,77	
 <i>Anxiety</i>				
Covariate				
Negative IR Stress	250,36	1	250,36	11,39**
Main Effects				
Group	67,23	1	67,23	3,06
Trade Union Support	255,82	1	255,82	11,64**
Interaction Effects				
Group x Trade Union Support	62,01	1	62,01	2,82
Error	1362,22	62	21,97	

* $p < .05$; ** $p < .01$

Table 6.5 continued

Separate Univariate Effects for the 3 Psychological Ill-health Variables	SS	df	MS	F
<i>Social Dysfunction</i>				
Covariates				
Negative IR Stress	20,52	1	20,52	2,15
Main Effects				
Group	1,81	1	1,81	0,19
Trade Union Support	9,21	1	9,21	0,96
Interaction Effects				
Group x Trade Union Support	9,07	1	9,07	0,95
Error	591,78	62	9,54	
<i>Depression</i>				
Covariates				
Negative IR Stress	140,05	1	140,05	7,62**
Main Effects				
Group	2,32	1	2,32	0,13
Trade Union Support	71,44	1	71,44	3,88*
Interaction Effects				
Group x Trade Union Support	0,99	1	0,99	0,05
Error	1140,10	62	18,39	

* $p < ,05$; ** $p < ,01$

main effect was found. Those classified in the low support category indicated significantly greater somatic symptoms ($M(\text{adjusted}) = 11,35$) than the high support group ($M(\text{adjusted}) = 15,28$; $F(1,62) = 9,97$; $p < ,01$).

Anxiety

For the anxiety dependent variable, after controlling for negative IR stress, a significant difference for trade union support as a main effect was found. Those classified in the low support category indicated significantly greater anxiety ($M(\text{adjusted}) = 11,57$) than the high support group ($M(\text{adjusted}) = 15,84$; $F(1,62) = 11,64$; $p < ,01$).

Social dysfunction

For the social dysfunction dependent variable, after controlling for negative IR stress, no significant trade union support main effect was found ($p > .05$).

Depression

For the depression dependent variable, after controlling for negative IR stress, a significant difference for trade union support as a main effect was found. Those classified in the low support category indicated significantly greater depression ($M(\text{adjusted}) = 9.78$) than the high support group ($M(\text{adjusted}) = 12.03$; $F(1,62) = 3.88$; $p < .05$).

CHAPTER 7

DISCUSSION OF RESULTS

The aim of the present study was to examine the long-term effects of exposure to a technological disaster (namely, an underground fire in a mine) on the psychological well-being of victims, after controlling for negatively perceived IR events. Results of the study indicate that workers exposed to the disaster evidenced no detrimental psychological effects (in terms of psychological distress, somatic symptoms, anxiety, social dysfunction and depression) four months after the disaster, as compared with a control group who were not exposed to the disaster. The study also explored two sources of social support (i.e., support offered by supervisors and a trade union) as moderators or buffers against the adverse effects of the disaster. The two sources of social support impacted differently on the five measures of psychological ill-health.

In this section, the findings are briefly presented for each of the five dependent variables (i.e., psychological distress, somatic symptoms, anxiety, social dysfunction and depression). These findings are then discussed in terms of the literature. Thereafter, theoretical and practical implications of the findings are presented, followed by the limitations of the study. Finally, guidelines for future research are suggested.

Presentation of Findings

Psychological distress

After controlling for negatively perceived IR events, no significant difference was found between the experimental and control groups for psychological distress. Both supervisor support and trade union support were found to be directly and inversely associated with psychological distress (i.e., those subjects receiving low supervisor and/or trade

union support yielded significantly higher psychological distress scores than those subjects receiving high supervisor and/or trade union support). However, these two sources of social support failed to moderate the relationship between the disaster and psychological distress.

Somatic symptoms

After controlling for negatively perceived IR events, no significant difference was found between the experimental and control groups for levels of somatic symptoms. Supervisor support was not significantly associated with somatic symptoms nor did it moderate the relationship between the disaster and measures of somatic symptoms. Trade union support was directly and inversely associated with somatic symptoms (i.e., those subjects receiving low trade union support yielded significantly higher scores for somatic symptoms than those subjects receiving high trade union support). However, trade union support failed to moderate the relationship between the disaster and measures of somatic symptoms.

Anxiety

After controlling for negatively perceived IR events, no significant difference was found between the experimental and control groups for levels of anxiety. Supervisor support was directly and inversely associated with anxiety (i.e., those subjects receiving low supervisor support yielded significantly higher anxiety scores than those subjects receiving high supervisor support). Supervisor support also moderated the relationship between the disaster and measures of anxiety. Victims receiving low supervisor support yielded significantly higher anxiety scores than victims receiving high support. However, for the control group, no significant differences were found between the low support and high support groups. Trade union support was directly and inversely associated with anxiety (i.e., those subjects receiving low trade union support yielded significantly higher anxiety scores than those subjects

receiving high trade union support). However, trade union support failed to moderate the relationship between the disaster and measures of anxiety.

Social dysfunction

After controlling for negatively perceived IR events, no significant difference was found between the experimental and control groups for levels of social dysfunction. Neither supervisor support nor trade union support were significantly associated with social dysfunction. Furthermore, neither source of support moderated the relationship between the disaster and measures of social dysfunction. Therefore, in this study, social dysfunction would appear to be impervious to the effects of social support.

Depression

After controlling for negatively perceived IR events, no significant difference was found between the experimental and control groups for levels of depression. Supervisor support was directly and inversely associated with depression (i.e., those subjects receiving low supervisor support yielded significantly higher depression scores than those subjects receiving high supervisor support). Supervisor support also moderated the relationship between the disaster and measures of depression. Victims receiving low supervisor support yielded significantly higher depression scores than victims receiving high support. However, for the control group, no significant differences were found between the low support and high support groups. Trade union support was directly and inversely associated with depression (i.e., those subjects receiving low trade union support yielded significantly higher depression scores than those subjects receiving high trade union support). However, trade union support failed to moderate the relationship between the disaster and measures of depression.

Discussion of Results

Consequences of Disaster Stress

In the present study, after controlling for negatively perceived IR events, victims evidenced no detrimental psychological effects four months after the disaster as compared with a control group.

The results of the present study concur with a recent South African study of an industrial disaster (Barling *et al.*, 1987). Barling *et al.* (1987) found no significant psychological distress differences between victims and a control group either two weeks or two months after an explosion in a factory.

The findings of the present study and those of Barling *et al.* (1987) contradict past research where exposure to a disaster has been associated with some deterioration in psychological well-being (e.g., Davidson & Baum, 1986; Erikson, 1976; Henderson & Bostock, 1977; Ploeger, 1977). One possible explanation for the discrepant findings concerns the properties of the disaster investigated in this study. It has been argued that the extent of impairment of victims is related to the properties of the disaster (e.g., Berren *et al.*, 1980).

Most research on disasters has focused on natural disasters. The psychological effects of technological disasters have, however, been found to be different from those of natural disasters (Baum *et al.*, 1983; Fain, 1987). In this regard, Baum *et al.* (1983) contend that these two types of disasters need to be distinguished in that technological disasters tend to be more sudden, less predictable, exert greater power and destructiveness, and often have a less clearly defined low point than natural disasters. It may therefore be inappropriate to compare consequences of natural and technological disasters.

One industrial disaster that has been extensively researched is the TMI disaster (e.g., Chisholm & Kasl, 1982; Chisholm *et al.*, 1983, 1986; Davidson & Baum, 1986; Kesi, Chisholm, Ekenazi, 1981). Regarding the psychological impact of the TMI disaster, Davidson and Baum (1986) found that victims continued to exhibit symptoms of stress nearly five years after the accident. Relative to control group subjects, TMI victims reported more symptoms, showed performance deficits and exhibited symptoms of stress-related arousal. Those findings suggest that symptoms of TMI victims are chronic (Davidson & Baum, 1986).

The nature of the stressor at TMI differed substantially from that of the stressor in the present study. Specifically, while the TMI disaster was central (i.e., it resulted in the temporary evacuation of the majority of residents living within a five mile radius of the TMI plant; Chisholm & Kasl, 1982), the disaster in the present study was intermediate (i.e., not all members of the community were affected and the physical setting remained unchanged). Green (1982) contends that a central disaster has a higher probability of serious long-term psychological consequences than has an intermediate disaster. Furthermore, unlike the chronic nature of the stressor in the TMI disaster that continues to exert detrimental effects (Chisholm *et al.*, 1983, 1986; Davidson & Baum, 1986), the nature of the disaster investigated in the present study can be characterized as acute (Pratt & Barling, 1987): It was of sudden onset, high intensity, extremely low frequency, and a low point was reached shortly after the disaster (see Barling *et al.*, 1987). Chronic disasters appear to produce greater psychological effects among victims than do acute disasters (Fredrick, 1977). Hence, meaningful comparisons between the findings of these two disasters cannot be made (see Pratt & Barling, 1987).

The explosion investigated by Barling *et al.* (1987) has similar properties to the disaster investigated in this study (i.e., it was an intermediate disaster, of sudden onset, high intensity, extremely low frequency, and a low point was reached shortly after the disaster: Barling *et al.*, 1987). As previously shown, the findings of Barling *et al.* (1987)

support those of the present study. Therefore, in accordance with Barling *et al.* (1987), it may be appropriate to conclude that technological disasters of an acute nature do not result in negative long-term psychological consequences. Indeed, Loo (1986) suggests that most of the detrimental effects of acute work stressors dissipate within three days of the stressor.

It should be noted, however, that in contrast to the present study, victims in the Barling *et al.* (1987) disaster were not exposed in their work situation to extreme physical stressors. Conversely, miners, who made up the present sample, are continually exposed to highly stressful working conditions (White, 1982). White (1982) posits that the parameters identified as stressful in the literature are exemplified in the working conditions in the South African gold mining industry. The stressors faced by black South African miners include:

"...that underground work in the gold mines in South Africa is performed in environmental conditions which are among the most severe anywhere in the world... Not only is the mineworker faced continually with the danger, the heat, the darkness, the damp, the noise, the dirt and the confined space, he is also required to work long hours in these conditions, and to perform an arduous, strenuous job. For the black mineworker there are the additional stressors of migration and separation from homes and families." (White, 1982, p.17).

Also, the accident rate among miners is high. Each miner can expect approximately one accident every 205 working days (Goodman & Garber, 1988). As miners are continually exposed to highly stressful working conditions, an alternative explanation for the results of the present study can be given.

It is suggested that, because of the stress of mining, miners do not necessarily have to be exposed directly to disaster conditions in order to experience psychological strain. Indeed, the daily stress experienced by miners may mask the impact of a particular event such as an underground fire. A disaster may not be perceived as traumatic against the background

of familiarity with persistent stressors such as those experienced in everyday mining.

Beach and Lucas (1960) conducted research on a coal mine disaster that killed 75 miners and trapped 19 more underground for 6,5 to 8,5 days. While underground, these miners had limited food and water and were exposed to the constant threat of death. Beach and Lucas (1960) assessed the psychological state of the trapped miners following their rescue. No significant psychological differences were found between the trapped miners and a control group of non-trapped miners. Beach and Lucas (1960) concluded that, due to the adverse work conditions in coal mines, even the non-trapped miners constituted a group experiencing high levels of stress. The existent high levels of stress associated with mining masked the specific impact of the disaster (Beach & Lucas, 1960).

In the present study, the disaster occurred less than 24 hours after the three-week NUM strike was called off (Sowetan, 1.9.87). Research suggests that the nature of a strike is extremely stressful (Wood & Pedler, 1978). Indeed, following a 22-day strike, Barling and Milligan (1987) found that negatively perceived IR events were associated with psychosomatic symptoms and with psychological distress. Hence, mineworkers in the present study were exposed to negative IR stress as well as the ongoing stressors associated with their working conditions.

Straker and the Sanctuaries Counselling Team (1987) argue that black township refugees are displaying a "continuous stress disorder" due to the continuous nature of the trauma to which they are subjected. Similarly, as miners are continually exposed to life-threatening dangers, to extreme environmental conditions and to arduous work (White, 1982), they may be suffering from a "continuous stress disorder".

This hypothesis was supported in the present study after controlling for negative IR stress. The mean dichotomised score of psychological distress on the GHQ-28, for all miners in this study, was 11,66: over double

that expected in a "normal population", suggesting high levels of stress in the population.¹ Furthermore, Goldberg (1978) and Chan and Chan (1983) have drawn attention to the tendency of the GHQ to miss subjects with chronic illness. Similarly, Benjamin, Decalmer and Haron (1982) point out that subjects who have become accustomed to their long-standing symptoms are not identified by the GHQ in view of the way in which questions are worded and scored. Therefore, the level of psychological distress in the present study may even be an underestimation.

To summarise, this study found no significant difference in levels of strain between the experimental group of miners exposed to the disaster and a control group of miners not exposed to the disaster. Two explanations may account for the failure to identify significant between-group differences. The acute nature of the disaster investigated in this study may have been such that it did not result in negative long-term psychological consequences. Additionally, because mineworkers represent a group who are exposed to ongoing stressors, the impact of the disaster may have been masked by a "continuous stress disorder".

Social Support offered by Supervisors

Results of this study indicate that, after controlling for negatively perceived IR events, supervisor support was significantly associated with psychological distress, anxiety, and depression. Furthermore, supervisor support moderated the relationship between the disaster and measures of anxiety and depression. However, no significant main or moderating effects were found between supervisor support and somatic symptoms and social dysfunction. Supervisor support therefore appears to be associated with the emotional (anxiety and depression) aspects of psychological

¹ The GHQ-28 provides a single severity score which enables "case identification" to take place and hence prevalence of psychological illness in a population to be estimated. In "normal populations" using the GHQ dichotomised scoring format, the threshold score is 4/3. A score above this level indicates the existence of "psychiatric cases" (Goldberg, 1978).

ill-health, whereas it does not appear to be associated with the interpersonal (social dysfunction) and physical (somatic) aspects of psychological ill-health. These findings therefore suggest that supervisor support operates with specificity (Bluen, 1986) in that it is associated only with certain aspects of strain and particular situations (see Barling *et al.*, 1987).

The finding that supervisor support is significantly associated with psychological distress corroborates previous research findings (Bluen, 1986). In the organisational literature there is considerable empirical evidence of the positive main effect of supervisor support on psychological well-being (e.g., Jayratne & Chess, 1984; Winnubst, Marcelissen, & Kleber, 1982). However, few studies of disasters have empirically investigated the impact of supervisor support on psychological well-being. Two disaster studies which have considered the role of supervisor support on psychological well-being (i.e., Barling *et al.*, 1987; Chisholm *et al.*, 1986) provide minimal support for its utility. Chisholm *et al.* (1986) found that the impact of supervisor support became less extensive as the hypothesised stress process moved from stress to strain to health outcome, whereas Barling *et al.* (1987) found that supervisor support did not have a main effect (or moderator effect) on psychological distress.

Barling *et al.* (1987) and Chisholm *et al.* (1986) assessed only emotional support offered by supervisors. In this study, however, both informational support and emotional support were assessed (see Appendix 1). This enabled a more comprehensive assessment to be made of the impact of supervisor support on psychological ill-health (see House, 1981). Indeed, given the adversarial union-management relations in South Africa (Kamfer, 1982), it is suggested that a union member will be more likely to enlist managerial (or supervisor) assistance for informational support than for emotional support (House, 1981).

Furthermore, Jacobson (1986) asserts that different kinds of support are more appropriate in different stressful situations. Three types of

stressful situations can be distinguished: crisis, transition and deficit states (Weiss, 1976). For example,

"a sequence of stressful situations may begin with a crisis. This crisis may end in a reduction of the threat and a return to the pattern of life that existed before the event's occurrence; or it may develop into a transition, entailing changes in the individual's ways of thinking about, and relating to, others and to the world at large. The aftermath of a transition may be a situation in which the individual's resources are equal to or exceed the demands he or she is facing, in which case it is not characterized by stress, or it may be a stressful deficit state in which a person's resources are inadequate for his or her needs." (Jacobson, 1986, p. 254).

Jacobson (1986) posits that, in crisis states, the most useful form of help is emotional support, which provides a person with reassurance that others are able and willing to help in his/her struggle to regain equilibrium.² In transition states, the primary type of help is cognitive support which helps the stressed individual grasp the meaning of the changes experienced. In deficit states, material aid and direct action are needed to remedy an imbalance between needs and tangible resources.

In the present study, conducted four months after a disaster, it is suggested that victims were in the transition state as specified by Weiss (1976).³ Thus, the inclusion of cognitive support (informational support being an aspect thereof; Jacobson, 1986) was warranted. In fact, the present study's assessment of both informational and emotional supervisor support could explain the discrepancy between the findings of the present study and those of Barling *et al.* (1987) and Chisholm *et al.* (1986), where only emotional support was investigated.

Supervisor support was not significantly associated with social dysfunction, nor did it moderate the relationship between the disaster

² Weiss (1976) suggests that emotional support seems to be effective in all stressful situations, because transition and deficit states can precipitate and overlap with other crises, while people in crises seem unable to use help of any other type.

³ The impact, recoil and initial stages of the post-traumatic period of a disaster would constitute the crisis state as specified by Weiss (1976).

and measures of social dysfunction.^a A social dysfunction measure of stress implicitly suggests that social dysfunction is a move away from normal social functioning. Miners live in hostels, separate from their families (White, 1982). Under hostel conditions, where normal social functions cannot exist, it may be misleading to use social dysfunction as a measure. Indeed, it is suggested that social dysfunction is an unsuitable construct to be assessed in this context.

Furthermore, Banks (1983) investigated the relationship between the four subscales of the GHQ-28, and found that social dysfunction was least well correlated with the total score. Banks (1983) suggests that, as the social dysfunction subscale is relatively independent, it could be more usefully studied as an outcome variable in research on social pathology than in research on psychological well-being.

The finding that supervisor support was significantly associated with anxiety and depression, yet unrelated to somatic symptoms, can be explained in terms of the psychodynamic constructs underlying these symptoms. These symptoms represent a warding off of unacceptable impulses (Calhoun, 1977). However, in somatic symptoms, the degree of the denial of the feeling which initiated the symptoms is greater than in either anxiety or depression (Nemiah, 1980). Thus, in somatic symptoms the feeling is less accessible, and consequently such symptoms are harder to treat. Indeed, Nemiah (1980) notes that patients with somatic symptoms are notoriously refractory to treatment. Therefore, supervisor support may impact mostly on the more overt psychological symptoms (i.e., anxiety and depression) which are more amenable to support than somatic symptoms. Furthermore, supervisor support may be less forthcoming for somatic symptoms than for anxiety or depression. As the conflict in somatic disorders is represented symbolically in the form of bodily complaints (Freedman et al., 1978), it may generally not be seen as psychosocially

^a Social dysfunction was the only outcome variable in this study which was found to be impervious to both supervisor and trade union support.

caused and, therefore, amenable to the effects of social support (Schottonfield & Cullen, 1986).

The finding that supervisor support moderated the relationship between the disaster and levels of anxiety and depression can also be understood when the typical affect associated with "man-made" disasters is considered. In "man-made" disasters, which are assumed to be "preventable" (Hoos, 1986), victims often experience severe rage towards those whom they consider responsible for the event (e.g., owner, supervisor; Rangell, 1976). Undischarged or suppressed rage exacerbates anxious and depressive feelings (depression being anger turned inwards; Calhoun, 1977). Hence, a supervisor who is able to deal with the victims' hostile feelings is indirectly facilitating a reduction of anxious and depressive affect. Angry fantasies are further reduced by the presence of a supervisor, an authority figure, who enables the reality factor to be brought in (Grinker & Spiegel, 1945). These findings highlight the importance of supervisor support in disaster situations.

Social Support offered by Trade Unions

In the present study, after controlling for negatively perceived IR events, no significant trade union moderating effects were found for any of the components of psychological ill-health. However, significant main effects were found for four of the five outcome measures, namely, psychological distress, somatic symptoms, anxiety and depression.²

Most research and discussion on trade unions concentrates on the economic and political functions of trade unions (Bendix, 1978). The findings in this study, however, attest to a further important function of trade unions, namely, a trade union's ability to reduce the psychological distress of its members by providing social support (Shostak, 1985).

² Trade union support exerted no effect on social dysfunction. Possible reasons for this have previously been discussed (see section on supervisor support).

Although researchers (e.g., House, 1981; Shostak, 1980, 1985) have alluded to the potential capacity of trade unions to provide support, a paucity of research exists in this area (see Bluen & Howse, 1988).

Membership of a trade union provides workers with a sense of security and protection (Bluen, 1986). For example, Kochan (1980) found that four out of five workers interviewed, reported that unions improve wages and job security for their members and protect them against unfair labour practices. Furthermore, union membership enhances worker empowerment (Shostak, 1985) by providing workers with a means of realizing their objectives (Bluen, 1986). Union have also been found to increase employees' control of stressful events (Shirom & Kirmayer, 1988). Research indicates that psychological health is enhanced when individuals believe that they can, at least partially, control events rather than feeling powerless (e.g., Gannellen & Blaney, 1984; Kobasa & Puccetti, 1983). Unions also provide informational support such as stress relief aids (Bluen & Howse, 1988; Shostack, 1980, 1985). Trade union membership also gives workers a sense of being part of a community (Tanssenbaum, 1951). The disaster literature has consistently indicated that belonging to a community which is regarded as cohesive and supportive improves psychological health (e.g., Bannat, 1970; Chodoff, 1963; Ford & Spaulding, 1973; Rawnsley & Loudon, 1964). Thus, through their membership of a trade union, workers in general receive a variety of support acts.

Workers may also gain support through their relationships with trade union representatives (Shostak, 1980). Thoits (1986) argues that persons of similar sociocultural and situational experience are in the best position to offer social support.⁶ Sociocultural similarity increases the probability that a significant other will suggest coping techniques or attempt to influence circumstances in ways that are viewed by individuals as acceptable (Thoits, 1986). Regarding similarity of situational ex-

⁶ When an individual presumes expertise in a helper this can override the importance of sociocultural and situational similarity. Psychotherapists are key examples (Pierloff, Waskow & Wolfe, 1978).

perience, Gottlieb (1985) contends that distressed individuals feel that others who have experienced the same situation are most likely to understand their predicament. Hence, given that trade union representatives are of a similar sociocultural and situational experience to their members, their ability to offer appropriate social support is further enhanced (Shostak, 1980). Indeed, the finding in the present study that trade union support was globally associated with the dimensions of psychological ill-health, supports this contention.

Trade union support failed to moderate the relationship between the disaster and any of the five measures of psychological ill-health. One explanation for the failure to find trade union moderating effects in this study is that provided by Cohen and Wills (1985). They reviewed a variety of studies on social support and concluded that support needs vary by type of stressor. Furthermore, they found that only support that was perceived as adequate operated as a buffer (Cohen & Wills, 1985). It is therefore possible that the disaster stress was not moderated as the support provided by the trade union was perceived as inadequate or inappropriate.

Another explanation for the failure of trade union support to moderate the effects of the disaster could be that trade union representatives were not in a position to provide support in that, in contrast to supervisors, they had limited access to the victims both at the time of the disaster and shortly thereafter.

It is also possible that trade union support ameliorates ill-health regardless of the situation hence the finding that trade union support exerted main, but no moderating, effects. Specifically, the trade union may be a central aspect of miners' lives. Support may therefore be perceived as ongoing rather than restricted to a crisis situation (e.g., a disaster).

In sum, the findings in this study indicate that both supervisor support and trade union support were inversely associated with psychological distress. However, their relationship with the components of psychological ill-health differed. Supervisor support was significantly associated with, and had moderating effects on, the emotional (anxiety and depression) aspects of psychological ill-health. However, supervisor support was not significantly associated with, nor moderated, the interpersonal (social dysfunction) and physical (somatic symptoms) aspects of psychological ill-health. Trade union support, on the other hand, was significantly associated with the emotional (anxiety and depression) and physical (somatic symptoms) aspects, but not with the interpersonal (social dysfunction) aspect of psychological ill-health. Furthermore, trade union support failed to moderate any aspect of psychological ill-health.

The present findings that the two sources of social support operated differentially on the various aspects of psychological ill-health, and the finding that both supervisor and trade union support operated selectively on these different aspects of psychological ill-health, supports Le Rocco *et al.* (1980) and Bluen's (1986) call for specificity in social support research.

Theoretical Implications of the Study

The findings of the present study differ from those of other studies in which disasters have been associated with negative long-term psychological consequences (e.g., Davidson & Baum, 1986). This discrepancy reinforces the assertion that it is not appropriate to generalize across different types of disasters (Logue *et al.*, 1981). In an attempt to refine the area of disaster research, theorists (e.g., Barton, 1969; Baum *et al.*, 1983; Green, 1982) have delineated three primary dimensions which differentiate disasters from each other (i.e., qualitative, spatial, and temporal). However, the findings in this study attest to the importance

of a further dimension which needs to be considered in disaster research, namely, its "contextual" dimension.

In this study, workers exposed to the disaster evidenced no detrimental psychological consequences four months after the disaster, as compared with a control group. Measures of stress obtained from the control group indicated that mineworkers in general were suffering from high levels of psychological stress. Had the context been one of low general stress, the psychological consequences of the disaster may have differed. Therefore, the context of a disaster must be considered when its impact is evaluated. Specifically, it is crucial that researchers provide baseline scores of psychological stress for the population under investigation.

Certain working populations are likely to be more stressed than others (French & Caplan, 1973). It is therefore important that studies of technological disasters control for prevailing work stressors faced by victims which may impinge on stress levels and, therefore, obscure an understanding of the specific disaster-illness process. An attempt was made in this study to control for some of the stressors faced by the mineworkers. Specifically, negatively perceived IR events were controlled for as a three-week miners' strike directly preceded the disaster (Sowetan, 1.9.87). However, despite controlling for negative IR stress, high levels of stress prevailed amongst the mineworkers, as indicated by the stress scores of the control group. Therefore, the results measured in this study clearly indicate that not all stressors faced by the mineworkers were accounted for.

The organisational literature provides many examples of potential stressors which workers face in their jobs (Bluen, 1986). Indeed, Bluen (1986) asserts that phenomena associated with every aspect of worklife may emerge as potential stressors. Therefore, it is unrealistic to expect to account for all stressors. Hence, the researcher has to assess which

organisational stressors are most pertinent to the investigation and then to control for those stressors.

To improve understanding of the consequences of a disaster, intervening processes which moderate such consequences need to be considered (Vitaliano *et al.*, 1987). Three primary intervening processes have been identified in the disaster literature, namely, situational, psychological, and demographic resources (Vitaliano *et al.*, 1987).

The situational resource investigated in this study is social support. The two sources of work-related social support assessed, namely, supervisor and trade union support, were found to be selectively associated with different components of psychological ill-health. These findings, therefore, suggest the importance of receiving support from a variety of sources as a moderator of the stress associated with a disaster.

In the present study, in which both emotional and informational support offered by supervisors were assessed, supervisor support was found to exert significant moderating effects. Previous studies of technological disasters (Barling *et al.*, 1987; Chisholm *et al.*, 1986) in which only emotional support offered by supervisors was assessed, found supervisor support to exert minimal effects. It is suggested that the dissimilar findings are a consequence of the different support acts considered. In this regard, Barrera and Ainley (1983) note that the strengths of the effects of social support on psychological well-being vary depending on what types of support acts are measured. Therefore, in order to assess the efficacy of social support systems comprehensively, it is necessary to consider a range of support acts (Jacobsen, 1986).

In occupationally-induced stressful situations, work-related sources of social support have been found to be most effective in reducing psychological strain (e.g., Le Rocco *et al.*, 1980). The finding in this study that supervisor support moderated the relationship between the disaster and levels of anxiety and depression, whereas trade union support exerted

no moderating effects, suggests that different sources of work-related social support are more effective in different occupationally-induced stressful situations. Specifically, it is suggested that in occupationally-induced stressful conditions in the form of a disaster, supervisor support may be more effective than trade union support in modifying the psychological consequences.

Finally, although a disaster can objectively be described as a severe stressor (Raphael, 1986), it may not appear so subjectively for victims. Victims in the present study displayed high stress levels unrelated to the disaster. Against a background of familiarity with persistent stressors, it is possible that the disaster was not perceived as traumatic by the victims. As subjective perceptions of a stressor affect the consequences which the stressor exerts (Vitaliano, 1987), it is essential that victims' appraisal of the disaster be considered in future research, rather than merely determining the degree of victims' exposure.

Practical Implications of the Study

Disasters have consistently been associated with negative consequences (Archibald *et al.*, 1963; Chisholm *et al.*, 1983; Davidson & Baum, 1986). Hence, where possible, steps should be taken to prevent such occurrences (Fain, 1987). For example, underground methane fires, such as the one investigated in the present study, can be prevented by improving ventilation, by monitoring the presence of gas, or by prohibiting ignition sources in areas where methane constitutes a danger (Fine, 1987).

Where prevention is not possible, steps should be taken to minimise the consequences of foreseeable disasters. For example, if an earthquake can be predicted, potential victims can be evacuated (Barren *et al.*, 1986).

In the event of a disaster which may have negative psychological consequences, intervention programmes are appropriate. The need for disaster

intervention services has been identified in various American states and implemented since 1971 in a number of disaster situations (e.g., Blaufarb & Levine, 1972; Richards, 1974). In South Africa, however, while companies can generally cope with the technological aspects of disasters, they are inadequately equipped to deal with the psychological consequences of disasters on their workers (Fain, 1987).

Chetkow (1982) describes three levels of disaster intervention: preventative services, involving promotion of current normalcy and prevention of disease conditions; curative services, involving immediate diagnosis and treatment; and restorative services, which includes both rehabilitation towards normal functioning and accommodation to inevitable consequences whilst preventing deterioration. A particular level of intervention will be appropriate depending on the organisational climate and level of health of victims involved in a disaster (see Fain, 1987).

The disaster investigated in the present study was found to have exerted no additional negative long-term psychological consequences on its victims. Nevertheless, supervisor support was found to have moderated the relationship between the disaster and levels of anxiety and depression of the victims. Hence, the beneficial effects of supervisor support in a disaster situation was shown. Although, trade union support was not found to have moderated the relationship between the disaster and levels of ill-health of victims, trade unions are fundamentally concerned with the health and safety of their workers (Golding, 1988). Therefore, both supervisors and trade unions should be involved in disaster intervention programmes. Fain (1987) suggests that disaster teams be formed including union representatives as well as line management and staff and relevant professionals. The inclusion of both trade union representatives and management would ensure fair representation of needs as well as promotion of trust by all employees. However, as the level of trust in South Africa between management and unions is insufficient to foster the climate necessary for such a programme (Bluen & Pullagar, 1986), this may present a problem in contemporary South African organisational settings.

In the present study, the impact of the disaster may have been masked by the high prior stress levels of the victims. Indeed, stress levels of the control group suggest that mineworkers in general are highly stressed. The specific factors contributing to miners' stress were not assessed in this study, although negatively perceived IR events were controlled for. However, as the parameters identified as stressful in the literature are exemplified in the working conditions in the South African gold mining industry (White, 1982), it seems justified to conclude that much of the psychological stress experienced by mineworkers is a consequence of their working conditions. Hence, it is suggested that certain measures be taken to improve their working conditions.

Golding (1988, pp. 3-8) suggests the following measures:

(a) Safety at the workplace.

Safety stewards should be appointed to represent miners and ensure that the work environment is safe. Anticipation of injury would therefore be reduced. Indeed, Shostak (1980) identifies safety hazards as one of the four major objective stressors faced by blue-collar workers.

(b) Improved working conditions.

Noise levels at the workplace can be reduced with the use of silencers. Similarly, protective clothing (e.g., ear muffs) could make the conditions more conducive for work.

(c) Security of employment.

The migrant labour system has generated an oscillating workforce. Although the NUM has been able to secure the right of workers to be re-employed after their contract is completed, the state has often repatriated workers for various reasons. The precariousness of miners' continued employment results in stress. Greater job security would reduce miners' stress (Shostak, 1980).

(d) Reduction in work overload.

Accidents often occur as a consequence of the monotony with which miners have to work in order to meet pressurised work targets. White (1982) contends that almost any individual under stress becomes temporarily "accident prone". Hence, realistic production targets need to be set so as to reduce accident rates.

(e) The payment of a living wage.

The vast majority of workers in the mining industry earn wages way below acceptable standards. Unless workers earn a sufficient wage, the burden of supporting their families will cause stress (Golding, 1988).

(f) The right to adequate compensation.

The low wages on which any compensation is based provides workers with very little security. Furthermore, if work stressors render a miner psychologically unfit to perform his job, he is likely to be dismissed without receiving any compensation whatsoever (Golding, 1988). Should the worker know that he would be adequately compensated if disabled as a result of work, some stress would be alleviated (Shostak, 1980). In this regard, Leger and Arkyles (1988) argue that compensation should take into account not only the degree of physical damage caused to a worker but also actual and projected loss of earnings.

(g) Stable family life.

The migrant labour system has resulted in the break up of family life (White, 1982). The destruction of the migrant labour system and the provision of family housing for workers are factors that can reduce stress levels.

(h) A stake in the democratic system.

Members who perceive themselves as influential in shaping their environment, have been shown to be shielded against the health-related effects of stressful events (Kobasa, Maddi & Kohn, 1982). Democratic participation of workers in decision-making in the workplace could moderate the stress-strain relationship (Shirom & Kirmeyer, 1988).

Implementation of Golding's (1988) suggestions may alleviate some of the stressors faced by South African miners. However, given the inherently dangerous nature of mining and the fact that physical stressors are an integral part of mining which cannot be eliminated entirely (White, 1982), it is not possible to remove all stressors faced by mineworkers. Thus, work stress needs to be managed appropriately. This can be achieved by eliminating stressors where possible, and focusing on moderators of stress, such as social support. Indeed, the findings of this study attest to the significance of social support as a form of stress management.

Cooper (1981) states that environmental support is a necessary yet overlooked area of support in an organisation. This neglect can be alleviated by the employment of psychologists/counsellors to attend to the emotional needs of the workforce (Bluen, 1982). Indeed, in a survey of unions, reducing work-related stress of union members was ranked the area of greatest need for services that industrial psychologists can render (Musveto, Wiggins & Currie, 1984). Furthermore, as the findings of this study indicate, non-professional resources in the workplace, such as supervisors and union representatives, are well-placed to offer social support. Therefore, such persons should pay greater attention to their support role, and, in so doing, reduce the level of strain experienced by workers (see Shostak, 1985). In this regard, the psychologist can assist by providing training in counselling and social support skills.

Certainly, counselling facilities should be provided for workers. As a complement, if necessary, one can seek to influence the stress process by means of drugs (pharmacotherapy). Other possibilities to increase

resistance and decrease vulnerability include, for example, training in relaxation and meditation techniques (Bluen, 1986).

Limitations of the Study

The methodological *limitations* of the present study may have influenced the findings. The limitations are presented for four major methodological sections of the study, namely, sample, design, measurement and statistics.

The Sample

In selecting subjects, it was hoped that a sample representative of all people involved in the disaster would be obtained. However, gaining access was a problem. Specifically, access to subjects through mine management was not granted. Hence, random selection of participants was not used. Instead, NUH organisers and shift-stewards recruited subjects. The majority of victims involved in the disaster appeared to be unwilling to participate in the study.⁷ Hence, all volunteers who met the necessary specified criteria were included in the study, thereby rendering the present sample a "sample of convenience". Rosnow and Rosenthal (1976) suggest that the validity of results derived from "volunteer" samples must be questioned. Thus the use of a volunteer population may have contaminated the findings. However, by controlling for demographic variables and negatively perceived IR events, the potentially confounding effects of using a "sample of convenience" were overcome to some extent.

A further consequence of the access problem is the relatively small size of the experimental group. Far fewer victims than hoped for volunteered to be interviewed. Miller (1975) contends that the larger the samples,

⁷ Fullagar (1986) observes that response rates in victim related research are usually low.

the greater the chance of detecting the underlying differences in the population. However, the sample size was acceptable for the statistics used.

The Design

A cross-sectional design was used in this study to assess the effects of exposure to the disaster. Since participants were interviewed only once, four months after the disaster, conclusions regarding impact are tied to that point in time and should be considered as "impact at four months". Collecting data at different points in time might have affected participants' recollections of the disaster and descriptions of their present status (Chisholm *et al.*, 1983). It might therefore have been advantageous to have employed a longitudinal design in this study.

Furthermore, the experimental and control samples were not interviewed simultaneously owing to practical constraints. Specifically, the control group was interviewed approximately two months earlier than the experimental group. It is suggested, however, that the time variation in the interviews did not significantly affect the results, since the assumption underlying the selection of the control group was based on the notion that the control group reflected stress levels of mineworkers in general and was therefore not timebound.

Measurement

Two classes of criticism may be levelled against the measurement of the disaster-illness process in the present study. First, various criticisms of the measuring instruments are stated. Second, the overall strategy of data collection that was adopted is critiqued.

The measuring instruments

The various scales used in this study were translated from English into Xhosa and Sotho. Bulmer (1983) cautions that questionnaire translations can lead to distortions in meaning. In order to establish whether the meaning of the original measure was preserved in this study, blind back-translation was used (see Hulin & Nayer, 1986).

A further problem concerns the suitability of the norms provided for one of the measuring instruments used in this study (i.e., the GHQ-28). The threshold score provided by the GHQ-28 is derived from British subjects (Goldberg, 1978). It may be that a different threshold score applies to black South Africans. However, the GHQ has been used extensively in South Africa, often on black subjects (e.g., House, 1987).

Overall research strategy

In the present study, only one source of data was used, namely, self-report, paper-and-pencil responses. Because of the high level of illiteracy amongst the respondents, it was necessary to administer the self-report questionnaires individually to each respondent. Certain problems with this data collection strategy can be identified.

First, although the interview method of assessment is the most commonly used approach, it has possible pitfalls (Calhoun, 1977). The personality of the interviewer can have a great impact on the the quality of the subject's responses and the interviewer's bias can result in highly subjective interpretations of responses (Calhoun, 1977). Steps were taken to overcome these difficulties in the present study. The interviewers were uniformly trained to administer questionnaires. Also, the interviews were highly structured and so did not require interpretative work from the interviewers. Thus measures were taken to render all interviews consistent.

Second, although all instruments included in the questionnaire were psychometrically acceptable, the self-report method is vulnerable to the test-taking attitudes of the respondents (Wilde, 1972). Response bias (e.g., social desirability and acquiescence) of the subject can lead to highly inaccurate profiles being obtained (Calhoun, 1977). Thus the data in this study are vulnerable to these distortions.

Third, the research approach adopted in this study can be criticised for focusing solely on the individual as a source of data. Probably the most compelling feature of the self-report modelity has to do with the fact that data derived from self-reports arise from the individual experiencing the phenomena in question (Derogatis, 1982). A multi-level measure approach which includes, for example, behavioural and biochemical measures of stress, and third-party assessments, would have provided a more comprehensive and objective assessment of the stress process (Bluen, 1986; Davidson & Baum, 1986).

Fourth, by relying on paper-and-pencil tests and surveying a wide range of people, the nomothetic approach was adopted in the present study (Bluen, 1986). Such an approach "masks the subtlety of the ideographic nature of stress" (Fineman & Payne, 1981, p. 62). The broadly positivist approach employed contains two weaknesses. First, it selects a very limited portion of the respondents' experiences and thus fails to give a holistic and qualitative understanding of their responses. Second, the non-dialogical form of the questionnaire pre-empts the possibility of new, more appropriate, questions being addressed to the respondents (Crump, Cooper & Smith, 1980). Such a problem could have been avoided had the researcher employed a more participatory form of research. Indeed, Bluen and Fillager (1986) suggest that the researcher should work with the researched to develop a mutually-acceptable research project.

In spite of the above, paper-and-pencil, self-report questionnaires are economical (Calhoun, 1977), are sensitive to a broad range of measurement contexts (Derogatis, 1982), are highly amenable to actuarial methods of

scoring (Meehl & Dahlstrom, 1960), and have a certain face validity in that the respondents are asked directly about how they feel towards specific issues (Weyer, 1982). Therefore, the choice of paper-and-pencil, self-report questionnaires seems justified.

Statistical Issues

In this study the sample size was small. Furthermore, the results suggest that the subjects recorded high baseline levels of stress. Cohen and Wills (1985) argue that such conditions reduce the possibility of a buffering effect being demonstrated. A larger number of subjects may therefore have increased the likelihood of statistically significant effects being distinguished.

Implications for Future Research

The empirical testing of the disaster-psychological illness model formulated in this study indicated strengths and limitations in the research procedure adopted and pointed to areas for further investigation. Based on this, implications for future research are suggested.

The Measurement of Disaster Stress

Contrary to expectations, in this study, the disaster did not exert negative long-term psychological consequences on its victims. An explanation for this finding is that the impact of the disaster was masked as victims were already exposed to chronic stress associated with mining. Victims may therefore not have appraised the disaster as a severe stressor. As the subjective perception of an event will effect its psychological consequences (Vitaliano *et al.*, 1987), it is crucial that future researchers consider victims' appraisal of the stressor. Furthermore, as a disaster will impact differentially depending on the prior levels of stress amongst its victims, it is essential that the context in which a disaster occurs is considered. Specifically, scores of stress

for the sample under investigation should be evaluated against appropriate population norms. Finally, stressors faced by victims which may impinge on outcome need to be controlled for. In the present study, after controlling for negatively perceived IR events, high levels of stress were found to prevail among the min. workers. Although, it is unrealistic to expect that all work stressors can be accounted for (Bluen, 1986), it remains a challenge for researchers to explore multiple causation of long-term psychological health consequences following technological disasters (Logue *et al.*, 1981).

Outcomes of the Disaster Stress Process

Findings from this study confirm that, if standardised psychological questionnaires are to be employed effectively, three criteria need to be met. First, it is essential that the questionnaire provides an overall score for stress levels. Second, it would be advantageous for the questionnaire to be devised so as to include a threshold score which would enable "psychiatric cases" to be identified. Third, multiple outcome variables need to be measured (Shore *et al.*, 1983).

The questionnaire used in this study met the above specifications. However, a more comprehensive and objective assessment of psychological well-being would have been obtained if additional sources of data were used to assess the outcome variables (Bluen, 1986). Therefore, future disaster researchers should use paper-and-pencil self-reports in conjunction with, for example, behavioural, biochemical and third-party assessments of the stress process (Davidson & Baum, 1986).

In this study, stress levels of victims were assessed four months after the disaster. An earlier or later assessment may have resulted in a different outcome (Barling *et al.*, 1987). It is thus preferable for disaster researchers to use a longitudinal design. Barling *et al.* (1987) suggest that, where possible, data should be gathered three days after the disaster and up to a year or more thereafter. This would enable an

assessment to be made of whether there are immediate negative psychological consequences that dissipate within days, as well as if a delay occurs before negative psychological consequences become apparent.

Finally, exposure to a disaster may have both psychological and physical health consequences (Bennet, 1970). In this study, only the psychological concomitants of exposure to a disaster were investigated. Such an approach is in line with recent disaster research which generally follows this dichotomous approach (Logue *et al.*, 1981). However, as the division of disaster-related health consequences into either psychological or physical is artificial and may result in an underestimation of the total impact of the disaster (Logue *et al.*, 1981), it is suggested that future disaster researchers adopt a holistic approach to the assessment of the health consequences of a

Moderators of the Disaster Stress Process

Situational, psychological and demographic moderators have been adjudged as central to the disaster stress-strain relationship (Vitaliano *et al.*, 1987). In this study, however, only situational moderators (in the form of social support) were considered. Had this study assessed psychological resources, it may have been able to provide more information on victims at "high risk" to developing symptomatology following exposure to a disaster. Similarly, had this study assessed demographic factors rather than merely controlling for these, more information about "high risk" victims may have been obtained. This remains a challenge for future disaster research.

In this study, two sources (i.e., supervisor and trade union) of social support were assessed. These sources of support were differentially associated with the components of psychological ill-health. Such a finding indicates that a variety of sources of social support should be assessed in order to comprehensively evaluate the role of social support in reducing stress. For example, co-worker support was not assessed in

this study. However, due to their sociocultural and situational similarity with one another, co-workers are extremely well-placed to offer effective social support. Furthermore, the findings in this study tend to support Jacobson's (1986) position that the efficacy of a source of support is dependant on its ability to offer a variety of support acts at a specified time. Future research should therefore investigate the moderating effects of different kinds of support offered by a variety of sources in specific situations.

Future Research Strategy

In the course of this study, many of the criticisms of existing disaster research have been discussed. Future disaster research can avoid repeating past mistakes by adopting the following guidelines suggested by Bluen (1986):

1. The research should adopt a multivariate framework.
2. The variables to be measured must be conceptually well-defined and unambiguous, and should be operationalised using psychometrically sound techniques.
3. Instead of relying solely on paper-and-pencil self-reports, data should be gathered from a variety of sources.
4. Rather than relying solely upon positivist, quantitative research, qualitative, in-depth methods should be incorporated into research designs.
5. Instead of imposing a research design on an organisation, the researcher should work with the researched to develop a mutually-acceptable research project.
6. Where possible, longitudinal designs should be employed.

Summary and Conclusion

The present study set out to investigate the long-term psychological consequences of exposure to a technological disaster. The disaster and stress literature suggests that, theoretically, exposure to a disaster is potentially stressful (Kinston & Rosser, 1974; Vitaliano *et al.*, 1987). Practically, however, contradictory findings have emerged regarding the nature and extent of psychological impairment which ensue following exposure to a disaster. Disparities in the findings can be attributed to the mistaken assumption that disasters are equivalent events (Sarron *et al.*, 1980). Disasters having different properties induce distinct consequences. Furthermore, disasters impact differentially depending on the context in which they occur. These factors have not been adequately explored by previous researchers. The present study attempted to address these issues, and thereby, contribute to the understanding of the psychological consequences of disasters of similar nature and context.

This study investigated the impact of an acute, "man-made" disaster on the psychological ill-health of mineworkers. In order to obtain a clearer understanding of the disaster-illness process, negatively perceived IR events, which may have impinged on the process, were controlled for. Furthermore, baseline stress scores were obtained to enable findings to be evaluated within a framework of background stress levels.

The results indicated that mineworkers exposed to the disaster evidenced no detrimental psychological consequences four months after the disaster as compared with a control group of miners who were not exposed to the disaster. All subjects, however, displayed high stress levels not necessarily related to the disaster, indicating that stressors faced by mineworkers in general were not adequately accounted for in this study. Hence the findings may pertain only to disasters which occur in a context

of high prior stress levels. Future researchers of technological disasters should therefore pay greater attention to the working conditions and prevailing stressors of their subjects in order to obtain a clearer understanding of the disaster-illness process.

A further factor evaluated in this study was the moderating role of social support on disaster stress. Research has indicated that work-related sources of support are most effective in reducing psychological strain in occupationally-induced stressful situations (Barling *et al.*, 1987; Beehr, 1985; Ganster *et al.*, 1986; La Rocco *et al.*, 1980). Therefore, two work-related sources of social support (i.e., supervisor support and trade union support) were assessed. Findings indicated that both supervisor and trade union support were inversely associated with psychological distress. However, their impact on the four components of psychological ill-health differed. Supervisor support exerted main and moderating effects on anxiety and depression, whereas, no significant effects were found for social dysfunction and somatic symptoms. Trade union support exerted main effects on anxiety, depression and somatic symptoms, but not on social dysfunction. Trade union support was not found to exert moderating effects.

The differential association of the two sources of support with the various components of psychological ill-health attests to the importance of the availability of support from a variety of sources. Despite the limited approach adopted in this study to assess supervisor support, results indicate that it moderates the emotional aspects of psychological ill-health for disaster victims. Supervisors are well placed to provide support in technological disasters. Future disaster research would therefore benefit from closer consideration of supervisor support. The present study is the first to assess the role of trade union support in a disaster situation. The global manner in which trade union support was associated with the measures of psychological ill-health testify to its efficacy as a source of support. Trade union support therefore warrants inclusion in future stress studies.

It is suggested that future research would benefit from employing longitudinal, cross-sectional designs. Furthermore, the victims' subjective appraisal of the disaster stressor needs to be considered. Also, to facilitate identification of "high risk" victims, psychological and demographic moderators need to be included in the analysis of the disaster-illness process. Psychological and physical health consequences should be examined holistically. Finally, multiple sources of data (e.g., behavioural, biochemical and third-party assessment) should be used.

By adopting these suggestions, a clearer understanding of the disaster-illness process will be obtained. Indeed, had the present study considered all these factors, the findings may have been more conclusive. Specifically, it may have been possible to determine whether the nature of the disaster was such that it did not result in negative psychological consequences, or whether the impact of the disaster was masked as a result of victims' high levels of ongoing stress.

REFERENCES

- Abe, K. (1976). The behaviour of survivors and victims in a Japanese nightclub fire. *Nass Emergencies*, 1, 119-124.
- Abrahams, M.J., Fricke, J., Whitlock, F.A., & Williams, G. (1976). The Brisbane floods, January 1974: their impact on health. *Medical Journal of Australia*, 2, 936-939.
- Adler, A. (1943). Neuropsychiatric complications in victims of Boston's Coconut Grove disaster. *Journal of the American Psychiatric Association*, 123, 1098-1101.
- Adler, A. (1945). Two different types of post-traumatic neuroses. *American Journal of Psychiatry*, 102, 237-240.
- American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed.). Washington, DC: Author.
- Anastasi, A. (1982). *Psychological testing* (5th ed.). New York: Collier-MacMillan.
- Anderson, C.R., Hellriegel, D., & Slocum, J.W. (1977). Managerial response to environmentally induced stress. *Academy of Management Journal*, 20, 260-272.
- Anderson, W.A. (1969). *Disaster and organizational change: A study of the long-term consequences in Anchorage of the 1964 Alaska earthquake*. Disaster Research Center Monograph, Ohio State University.
- Anshentel, C.S., & Stone, J.D. (1982). Stress and depression. *Archives of General Psychiatry*, 39, 1392-1396.
- Antonovsky, A. (1974). Conceptual and methodological problems in the study of resistance resources and stressful life events. In B.S. Dohrenwend & B.P. Dohrenwend (Eds.), *Stressful life events: Their nature and effects*. New York: Wiley.
- Antonovsky, A. (1979). *Health, stress, and coping*. San Francisco: Jossey-Bass.
- Antonovsky, A., Maoz, B., Dowty, N., & Wijsenbeek, H. (1971). Twenty-five years later: a limited study of the sequelae of the concentration camp experience. *Social Psychiatry*, 6, 166-189.
- Archibald, H.C.D., Long, D.M., Miller, C., & Tuddenham, R.D. (1963). Gross stress reactions in combat: a 15 year follow-up. *American Journal of Psychiatry*, 119, 317-322.
- Ayalon, O. (1983). Coping with terrorism: The Israeli case. In D. Meichenbaum & N. Jarema (Eds.), *Stress reduction and prevention*. New York: Plenum Press.
- Balsden, B., & Quarantelli, E.L. (1981). The delivery of mental health services in community disasters: An outline of research findings. *Journal of Community Psychology*, 9, 195-203.
- Baker, G.W., & Chapman, D.W. (Eds.). (1962). *Man and society in disaster*. New York: Basic Books.
- Baldi, J.J. (1974). Project search: Anatomy of a survey under disaster. *Gerontologist*, 14, 100-105.
- Banks, M.H. (1983). Validation of the General Health Questionnaire in a young community sample. *Psychological Medicine*, 13, 349-353.

- Benks, M.H., Clogg, G.W., Jackson, P.R., Kemp, N.J., Stafford, E.M., & Wall, T.D. (1980). The use of the General Health Questionnaire as an indicator of mental health in occupational studies. *Journal of Occupational Psychology*, 53, 187-194.
- Barling, J. (1986). Interrole conflict and marital functioning amongst employed fathers. *Journal of Occupational Behaviour*, 7, 1-8.
- Barling, J., Bluen, S.D., & Fain, R. (1987). Psychological functioning following an acute disaster. *Journal of Applied Psychology*, 72, 685-690.
- Barling, J., & Milligan, J. (1987). Some psychological consequences of striking: A six month, longitudinal study. *Journal of Occupational Behaviour*, 8, 127-138.
- Barrera, M., & Ainley, S.L. (1983). The structure of social support: a conceptual and empirical analysis. *Journal of Community Psychology*, 11, 133-143.
- Barton, A.H. (1969). *Communities in disaster: A sociological analysis of collective stress situations*. Garden City, NY: Anchor, Doubleday.
- Basin, J. (1982). Growth of a new worker organ - the Germiston Shop Stewards' Council. *South African Labour Bulletin*, 7(8), 42-53.
- Bates, F.L., Fogelman, C.W., Parenton, V.J., Pittman, R.H., & Tracey, G.S. (1963). *The social and psychological consequences of a natural disaster*. (Disaster study no. 18.) Washington DC: National Academy of Sciences, National Research Council.
- Bell, A., Fleming, R., & Davidson, L.M. (1983). Natural disaster and technological catastrophe. *Environment and Behaviour*, 15, 333-334.
- Beach, N.D., & Lucas, R.A. (Eds.). (1960). *Individual and group behaviour in a coal mine disaster*. Washington DC: National Academy of Sciences, National Research Council.
- Beck, S.T. (1972). Cognition, anxiety and psychophysiological disorders. In C.D. Spielberger (Ed.), *Anxiety and stress: Current studies in theory and research* (Vol. 2). New York: Academic Press.
- Bekker, J. (1987, September 4-9). A blast, a fire, a rush of wind ... then darkness. *Weekly Mail*, 5.
- Bedeian, A.G., Armenakis, A.A., & Curran, S.H. (1981). The relationship between role stress and job-related, interpersonal and organizational climate factors. *Journal of Social Psychology*, 113, 247-260.
- Beehr, T.A. (1985). The role of social support in coping with organizational stress. In T.A. Beehr & R.S. Bhagat (Eds.), *Human stress and cognition in organizations: An integrated perspective*. New York: Wiley.
- Beehr, T.A., & Newman, J.E. (1978). Job stress, employee health, and organizational effectiveness: A facet analysis model and literature review. *Personnel Psychology*, 31, 665-699.
- Benjamin, S., Decalmer, P., & Haran, D. (1982). Community screening for mental illness: A validity study of the General Health Questionnaire. *British Journal of Psychiatry*, 140, 174-180.
- Bonnet, G. (1970). Bristol floods 1968. Controlled survey of effects on health of local community disaster. *British Medical Journal*, 3, 454-458.

- Barron, M.R., Baigel, A., & Ghortnor, S. (1980). A typology for the classification of disasters. *Community Mental Health Journal*, 16, 103-111.
- Barron, M.R., Baigel, A., & Ghortnor, S. (1986). A typology for the classification of disasters. In R.H. Moos (Ed.), *Human stress and cognition in organizations: An integrated perspective*. New York: Wiley.
- Blaufarb, H. & Levine, J. (1972). Crisis intervention in an earthquake. *Social Work*, 17, 16-19.
- Bluen, S.D. (1986). *Consequences and moderators of industrial relations stressors*. Unpublished doctoral thesis, University of the Witwatersrand, Johannesburg.
- Bluen, S.D., & Barling, J. (1987). Stress and the industrial relations process: Development of the Industrial Relations Event Scale. *South African Journal of Psychology*, 17, 150-156.
- Bluen, S.D., & Barling, J. (1988). Psychological stressors associated with industrial relations. In C.L. Cooper & P. Payne (Eds.), *Causes, coping and consequences of stress at work*. New York: Wiley.
- Bluen, S.D., & Fullegar, C. (1986). Psychology and industrial relations. In J. Barling, C. Fullegar & S.D. Bluen (Eds.), *Behaviour in organizations: South African perspectives* (2nd ed.). Johannesburg: McGraw-Hill.
- Bluen, S.D., & Howse, D.A. (1988). *Development of the Trade Union Support Scale*. Manuscript submitted for publication.
- Bluen, S.D., & Van Zwan, C. (1987). Trade union membership and job satisfaction. *South African Journal of Psychology* 17, 160-164.
- Bowen, B. (1979). Behavioural observations of the Granville train disaster and the significance of stress for psychiatry. *Social Science and Medicine*, 13a, 463-471.
- Bowlby, J. (1969). *Attachment and loss: Vol. 1. Attachment*. London: Hogarth Press.
- Bowlby, J. (1973). *Attachment and loss: Vol. 2. Separation: Anxiety and anger*. London: Hogarth Press.
- Bowlby, J. (1980). *Attachment and loss: Vol. 3. Loss*. New York: Basic Books.
- Bridges, K.W., & Goldberg, D.P. (1986). The validation of the GHQ-28 and the use of the MUSE in neurological in-patients. *British Journal of Psychiatry*, 148, 548-553.
- Bromet, E., Parkinson, D., Schulberg, H.C., Dunn, L. & Gondek, P.C. (1980). *Thao Nila Island: mental health findings*. Washington DC: National Institute of Mental Health (Contract no 278-79-0048 5m).
- Bulmer, H. (1983). Sampling. In H. Bulmer & D.P. Warwick (Eds.), *Social research in developing countries*. New York: Wiley.
- Calhoun, J.F. (1977). *Abnormal psychology: Current perspectives* (2nd ed.). New York: Random House.
- Caplan, S. (1964). *Principles of preventive psychiatry*. New York: Basic Books.
- Cassel, J.C. (1976). The contribution of the social environment to host resistance. *American Journal of Epidemiology*, 104, 107-123.

- Chalmers, B.E. (1981). A selective review of stress: Some cognitive approaches taken a step further. *Current Psychological Reviews*, 1, 325-344.
- Chalmers, B.E. (1982). Stressful life events: Their past and present status. *Current Psychological Reviews*, 2, 123-138.
- Chamberlain, B. (1980). The psychological aftermath of disaster. *Journal of Clinical Psychiatry*, 41, 238-244.
- Chen, D.W., & Chan, T.S.C. (1983). Reliability, validity and the structure of the General Health Questionnaire in a Chinese context. *Psychological Medicine*, 13, 363-371.
- Chapman, D.W. (1962). A brief introduction to contemporary disaster research. In G.W. Baker & D.W. Chapman (Eds.), *Men and society in disaster*. New York: Basic Books.
- Charles-Picard, G. (Ed.) (1983). *Larousse encyclopedia of archaeology*. London: Hamlyn.
- Chetkow, B.H. (1982). A model of emergency social services for regionwide crises, and how to get a model implemented. In G.D. Spielberger, I.G. Sarason & N.A. Milgram (Eds.), *Stress and anxiety*. Washington: Hemisphere.
- Chisholm, R.F., & Kasl, S.V. (1982). The effects of work site, supervisory status, and job function on nuclear workers' responses to the TMI accident. *Journal of Occupational Behaviour*, 3, 39-62.
- Chisholm, R.F., Kasl, S.V., & Eskonzi, B. (1983). The nature and predictors of job-related tension in a crisis situation: Reactions of nuclear workers to the Three Mile Island Accident. *Academy of Management Journal*, 26, 385-405.
- Chisholm, R.F., Kasl, S.V., & Mueller, L. (1984). The effects of social support on nuclear worker responses to the Three Mile Island accident. *Journal of Occupational Behaviour*, 7, 179-193.
- Chodoff, P. (1963). Late effects of the concentration camp syndrome. *Archives of General Psychiatry*, 8, 37-41.
- Ciocco, A., & Thompson, D.J. (1961). A follow-up of Donora ten years after: Methodology and findings. *American Journal of Public Health*, 51, 155-164.
- Citizen (1987, December 19). No mine victims found. *Citizen*, 8.
- Cobb, S. (1974). A model of life events and their consequences. In B.S. Dohrenwend & B.P. Dohrenwend (Eds.), *Stressful life events: Their nature and effects*. New York: Wiley.
- Cobb, S. (1976). Social support as a moderator of life stress. *Psychosomatic Medicine*, 38, 300-314.
- Cobb, S. (1978). *Social support and health through the life cycle*. Paper presented at the 1978 meeting of the American Association for the Advancement of Science.
- Cobb, S., & Lindemann, E. (1943). Neuropsychiatric observations during the Coconut Grove Fire. *Annals of Surgery*, 117, 814-824.
- Cohen, R.E., & Ahasrn, F.L. (1980). *Handbook for mental health care of disaster victims*. Baltimore: John Hopkins University Press.

- Cohen, F., & Lazarus R.S. (1979). Coping with the stress of illness. In G.C. Stone, F. Cohen, N.E. Adler, R. (Eds.), *Health Psychology: A handbook*. Washington: Jossey-Bass.
- Cohen, S., & Wills, T.A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, 98, 310-357.
- Cook, J.D., & Campbell, D.T. (1976). *Quasi-experimentation: Design and analysis for field settings*. Chicago: Rand McNally.
- Cox, T. (1978). *Stress*. Baltimore: University Park Press.
- Crump, J.H., Cooper, C.L., & Smith, M. (1980). Investigating occupational stress. A methodological approach. *Journal of Occupational Behaviour*, 2, 191-204.
- Cuny, F.C. (1983). *Disasters and development*. New York: Oxford University Press.
- Daly, R.J. (1983). Samuel Pepys and P.T.S.D. *British Journal of Psychiatry*, 143, 64-68.
- Davidson, L.M., & Baum, A. (1986). Chronic stress and post-traumatic stress disorders. *Journal of Consulting and Clinical Psychology*, 54, 303-308.
- De Novi, D.P. (1977). *Earthquakes*. Millbrae, California: Celestial Arts.
- Derogatis, L.R. (1982). Self-report measures of stress. In L. Goldberger & S. Breznitz (Eds.), *Handbook of stress. Theoretical and clinical aspects*. New York: The Free Press.
- Dimsdale, J.E. (1974). The Coping behaviour of Nazi concentration camp survivors. *American Journal of Psychiatry*, 131, 792-797.
- Dohrenwend, B.P. (1975). Sociocultural and social-psychological factors in the genesis of mental disorders. *Journal of Health and Social Behaviour*, 16, 363-392.
- Dohrenwend, B.S., & Dohrenwend, B.P. (1974). *Stressful life events: Their nature and effects*. New York: Wiley.
- Dohrenwend, B.S., & Dohrenwend, B.P. (Eds.). (1978). Some issues in research on stressful life events. *Journal of Nervous and Mental Disease*, 166, 7-15.
- Dworkins, J. (1973). *Global trends in natural disasters 1947-1973 (Natural Hazards Research, Working Paper, 26)*. University of Toronto.
- Dynes, R.R., & Quarantelli, E.L. (1979). The family and community context of individual reactions to disaster. In H.J. Parad, H.L.P. Resnik, & L.G. Parad (Eds.), *Emergency and Disaster Management. U.S.A.: The Charles Press Publishers*.
- Eitenger, L. (1971). Organic and psychosomatic aftereffects of concentration camp imprisonment. *International Psychiatric Clinics*, 8, 202-215.
- Erikson, K.T. (1976). Loss of communality at Buffalo Creek. *American Journal of Psychiatry*, 133, 302-305.
- Erikson, K.T. (1979). *In the wake of the flood*. London: George Allen and Unwin.
- Feich, G., & Rose, R. (1979). Blizzard morbidity and mortality: Rhode Island, 1978. *American Journal of Public Health*, 69, 1050-1052.

- Pain, R.M. (1987). *Stress and disaster intervention: an exploratory investigation*. Unpublished masters dissertation, University of the Witwatersrand, Johannesburg.
- Farberow, N.L. (1978). *Training manual for Human Service Workers in major disasters*. U.S. Department of Health and Human Services, Washington DC: U.S. Government Printing Office.
- Fine, A. (1987, September 10). Mine safety: a long way to go. *Business Day*, 6.
- Fineman, S., & Payne, R. (1981). Role stress - A methodological trap? *Journal of Occupational Behaviour*, 12, 51-64.
- Ford, C.V., & Spauldings, R.C. (1973). The 'Pueblo' Incident. *Archives of General Psychiatry*, 29, 340-343.
- Fox, A. (1974). *Beyond contract. Work, power and trust relations*. London: Faber and Faber.
- Frederick, C.J. (1977). Current thinking about crisis or psychological intervention in United States disasters. *Nass Emergencies*, 2, 43-50.
- Frederick, C.J. (1980). Effects of natural vs human induced violence upon victims. (Special issue). *Evaluation and Change*, 71-75.
- Freudman, A.M., Kaplan, M.I., & Sadock, B.J. (1978). *Modern synopsis of comprehensive textbook of psychiatry* (2nd ed.). Baltimore, MD: Waverly Press.
- Freeman, R.B., & Medoff, J.L. (1984). *What do unions do?* New York: Basic Books.
- French, J.R.P., Jr. (1974). Person-role fit. In A. Maless (Ed.), *Occupational Stress*. Springfield: Thomas.
- French, J.R.P., Jr., & Caplan, R.D. (1973). Organizational stress and individual strain. In A.J. Marrow (Ed.), *The failure of success*. New York: AMACON.
- Friedson, H.J. (1962). Older persons in disaster. In G.W. Baker & D.W. Chapman (Eds.), *Man and society in disaster*. New York: Basic Books.
- Fritz, C.E. (1961). Disaster. In R.K. Merton & R.A. Nisbet (Eds.), *Social problems*. New York: Harcourt, Brace and World.
- Fritz, C.E., & Marks, E.S. (1954). The NORC studies of human behavior in disaster. *Journal of Social Issues*, 10, 26-41.
- Fullagar, C. (1986). *Causes, correlates and outcomes of union commitment*. Unpublished doctoral thesis, University of the Witwatersrand, Johannesburg.
- Ganellon, R.J., & Blaney, P.H. (1984). Hardiness and social support as moderators of the effects of life stress. *Journal of Personality and Social Psychology*, 47, 156-163.
- Ganster, D.C., Fusilier, M.R., & Hayes, B.T. (1986). Role of social support in the experience of stress at work. *Journal of Applied Psychology*, 71, 102-110.
- Gibson, K. (1986). *The effects of civil 'unrest' on children. A guide to research*. Unpublished masters dissertation, University of Cape Town, Cape Town.
- Glantz, M.H. (1976). *Politics of natural disaster: The case of the Sahel drought*. New York: Praeger.

- Glass, A.J. (1959). Psychological aspects of a disaster. *Journal of the American Medical Association*, 171, 222-225.
- Glasser, G.C., Green, B.L., & Winget, C.M. (1978). Quantifying interview data of psychic impairment of disaster survivors. *Journal of Nervous and Mental Disorders*, 166, 209-216.
- Glasser, G.C., Green, B.L., & Winget, C.M. (1981). *Prolonged psychosocial effects of disaster: A study of Buffalo Creek*. New York: Academic Press.
- Goldberg, D.P. (1972). *The detection of psychiatric illness by questionnaire*. London: Oxford University Press.
- Goldberg, D.P. (1978). *Manual of the General Health Questionnaire*. Slough: National Foundation for Educational Research.
- Goldberg, D.P., Cooper, B., Eastwood, M., Kewward, H., & Shepherd, M. (1970). A standardized psychiatric interview for use in community surveys. *British Journal of Preventive and Social Medicine*, 24, 18-23.
- Goldberg, D.P. & Millier, V.V. (1979). A scaled version of the General Health Questionnaire. *Psychological Medicine*, 9, 139-145.
- Golding, M. (1988). Stress at the workplace: Solutions to be contemplated. Unpublished manuscript.
- Goodson, P.S., & Garber, S. (1988). Absenteeism and accidents in a dangerous environment: Empirical analysis of underground coal mines. *Journal of Applied Psychology*, 73, 81-86.
- Gottlieb, B.H. (1985). Theory and practice. Issues that surface in planning interventions which mobilize support. In I.G. Sarason & S.R. Sarason (Eds.), *Social support: Theory, research and application*. The Hague, The Netherlands: Martinus Nijhof.
- Grant, W.B., McNamara, L., & Bailey, K. (1975). Psychiatric disturbance with acute onset and offset in a Darwin evacuee. *Medical Journal of Australia*, 1, 652-654.
- Green, B.L. (1980). *Prediction of long-term psychosocial functioning following the Beverly Hills fire*. Unpublished doctoral thesis, University of Cincinnati.
- Green, B.L. (1982). Assessing levels of psychological impairment following disaster: Consideration of actual and methodological dimensions. *Journal of Nervous and Mental Disorders*, 170, 544-552.
- Grinker, R.F., & Spiegel, J.P. (1945). *Men under stress*. Philadelphia, PA: Blackiston.
- Grosser, G.H., Wechsler, H., & Greenblatt, M. (Eds.). (1964). *Threat of impending disaster: contributions to the psychology of stress*. Massachusetts: MIT Press.
- Henderson, S., & Dostock, J. (1977). Coping behaviour after shipwreck. *British Journal of Psychiatry*, 131, 15-20.
- Hewitt, K., & Shaheen, L. (1969). *A pilot survey of global natural disasters of the past twenty years* (Natural Hazards Research, Working Paper 11) University of Toronto.
- Hobfoll, S.E., & London, P.E. (1986). The relationship of self-concept and social support to emotional distress among women during war. *Journal of Social and Clinical Psychology*, 2, 189-205.

- Hocking, F. (1965). Human reactions to extreme environmental stress. *Medical Journal of Australia*, 2, 477-483.
- Hocking, F. (1970). Psychiatric aspects of extreme environmental stress. *Diseases of the Nervous System*, 31, 542-545.
- Holmas, T.H., & Rahe, R.H. (1967). The Social Readjustment Rating Scale. *Journal of Psychosocial Research*, 11, 213-218.
- Holroyd, K.A., & Lazarus, R.S. (1982). Stress, coping, and somatic adaptation. In L. Goldberger & S. Breznitz (Eds.), *Handbook of stress: Theoretical and clinical aspects*. New York: The Free Press.
- Horowitz, M. (1974). Stress response syndromes: Character style and dynamic psychotherapy. *Archives of General Psychiatry*, 31, 768-781.
- Horowitz, M. (1986). Stress-response syndromes: a review of posttraumatic and adjustment disorders. *Hospital and Community Psychiatry*, 37, 241-249.
- House, J.S. (1981). *Work stress and social support*. Reading, MA: Addison-Wesley.
- House, J.S., & Wells, J.A. (1978). Occupational stress and health. In *Reducing occupational stress*. Cincinnati: NIOSH Research Report.
- House, P.A. (1983). *The role of the social support offered by trade unions as a moderator of the stress-strain relationship*. Unpublished masters dissertation, University of the Witwatersrand, Johannesburg.
- Huerta, F., & Horton, R. (1978). Coping behaviour of elderly flood victims. *Gerontologist*, 18, 541-546.
- Hulin, C.L., & Mayer, L.J. (1986). Psychometric equivalence of a translation of the Job Descriptive Index into Hebrew. *Journal of Applied Psychology*, 71, 83-94.
- Null, C.H., & Nis, N.H. (1979). *SPSS update. New procedures and facilities for releases 7 and 8*. New York: McGraw-Hill.
- Munzco, G.E., Wiggins, J.G., & Currie, J.S. (1984). The relationship between psychology and organized labor. *American Psychologist*, 39, 432-440.
- Ivanovich, J.H., & Matteson, M.T. (1980). *Stress and work: A managerial perspective*. Glenview Ill.: Scott, Foresman & Co.
- Jacobsen, D.E. (1986). Types and timing of social support. *Journal of Health and Social Behaviour*, 27, 250-264.
- James, L.R., Mulick, S.A., & Brett, J.M. (1963). *Causal analysis: Assumptions, models and data*. Beverly Hills, CA: Sage Publications.
- Jannerich, U.T., Burnett, W.S., Peck, G., Hoff, M., Masca, P., Poladnak, A.P., Greenwald, P., & Vianna, N. (1981). Cancer incidence in the Love Canal area. *Science*, 212, 1404-1407.
- Jannerich, D.T., Stark A.D., Greenwald, P., Burnett, W.S., Jacobsen, M.I., & McCusker, J. (1981). Increased leukemia, lymphoma and spontaneous abortion in western New York following a flood disaster. *Public Health Reports*, 96, 350-356.
- Jennay, J.G., Masuda, M., & Holmes, T.H. (1977). Impact of a natural catastrophe on life events. *Journal of Human Stress*, 3, 22-34.

- Jayratne, S., & Chess, W.A. (1984). The effects of emotional support on perceived job stress and strain. *Journal of Applied Behavioral Science*, 20, 141-153.
- Kohn R., & Antonucci, T. (1980). Convoys over the life course: Attachment, roles and social support. In P.B. Baltes & O. Brim (Eds.), *Life span development and behaviour* (Vol. 3). Boston: Lexington Press.
- Koefor, L. (1982). Conflict handling processes for S.A. industrial relations. *Industrial Relations Journal of South Africa*, 2(4), 33-39.
- Kaplan, B.H., Cassel, J.C., & Gore, S. (1977). Social support and health. *Medical Care*, 15, 47-58.
- Kaplan, R.M., & Litrownik, A.J. (1977). Some statistical methods for the assessment of multiple outcome criteria in behavioural research. *Behavior Therapy*, 18, 383-392.
- Kardiner, A. (1959). Traumatic neurosis of war. In S. Arieti (Ed.), *American Handbook of Psychiatry* (Vol 2). New York: Basic Books.
- Kasl, S.V., Chisholm, R.F., & Eskenazi, B. (1981). The impact of the accident at the Three Mile Island on the behaviour and well-being of nuclear workers. *American Journal of Public Health*, 71, 472-495.
- Kaufmann, G.M., & Baehr, T.A. (1986). Interactions between job stressors and social support: Some counterintuitive results. *Journal of Applied Psychology*, 71, 522-526.
- Keenan, A., & Newton, T.J. (1985). Stressful events, stressors and psychological strains in young professional engineers. *Journal of Occupational Behaviour*, 6, 151-156.
- Keenan-Smith, D. (1985). Labour unrest in the South African Mining Industry. *South African Journal of Labour Relations*, 9(3), 74-81.
- Kerlinger, F.N. (1973). *Foundations of behavioural research* (2nd ed.). New York: Holt, Rinehart and Winston.
- Kessler, R.C. (1979). Stress, social status and psychological distress. *Journal of Health and Social Behaviour*, 20, 259-272.
- Kilijaneck, T.S., & Drabek, T.E. (1979). Assessing long-term impacts of a natural disaster: A focus on the elderly. *Gerontologist*, 19, 555-566.
- Kinston, W., & Rossor, R. (1974). Disaster: Effects on mental and physical state. *Journal of Psychosomatic Research*, 18, 437-456.
- Klein, H. (1974). Delayed effects and after-effects of severe traumatization. *Israel Annals of Psychiatry and Related Disciplines*, 12, 293-303.
- Klein, H., Zellermeier, J., & Shanan, J. (1963). Former concentration camp inmates on a psychiatric ward. *Archives of General Psychiatry*, 8, 334-342.
- Kobasa, S.C. (1982). Commitment and coping in stress resistance among lawyers. *Journal of Personality and Social Psychology*, 42, 707-717.
- Kobasa, S.C., Maddi, S.R., & Kahn, S. (1982). Hardiness and health: A prospective study. *Journal of Personality and Social Psychology*, 42, 168-177.
- Kobasa, S.C., & Puccetti, M.C. (1983). Personality and social resources in stress resistance. *Journal of Personality and Social Psychology*, 45, 839-850.

- Koch, J.L. (1976). Managerial succession in a factory and changes in supervisory leadership patterns: A field study. *Human Relations*, 31, 49-58.
- Koch, J.L. (1979). Effects of good specificity and performance feedback to work groups on peer leadership, performance and attitudes. *Human Relations*, 32, 819-840.
- Kochan, T.A. (1980). Collective bargaining and industrial relations process: Development of the Industrial Relations Event Scale. *South African Journal of Psychology*, 17, 150-159.
- Lacey, G. (1972). Observations on Aberfan. *Journal of Psychosomatic Research*, 16, 257-260.
- Langer, W.L. (1958). The next assignment. *American Historical Review*, 63, 283-304.
- La Rocco, J.M., House, J.S., & French, J.R.T. (1980). Social support, occupational stress, and health. *Journal of Health and Social Behaviour*, 21, 202-218.
- La Rocco, J.M., & Jones, A.P. (1978). Co-worker and leader support as moderators of stress-strain relationships in work situations. *Journal of Applied Psychology*, 63, 619-634.
- Lazarus, R.S. (1966). *Psychological stress and the coping process*. New York: McGraw-Hill.
- Lazarus, R.S. (1977). Cognitive and coping processes in emotion. In A. Monat & R.S. Lazarus (Eds.), *Stress and Coping: an Anthology*. New York: Columbia University Press.
- Leavy, R.L. (1983). Social support and psychological disorder: A review. *Journal of Community Psychology*, 2, 3-21.
- Leger, J.P. (1985). *Towards safer underground gold mining*. An investigation commissioned by the National Union of Mineworkers. Department of Sociology, University of Witwatersrand.
- Leger, J.P. & Arkyles, R.S. (1988). *Permanent disability in black mineworkers: a critical analysis*. Paper presented at the ASSA conference, July, 1988. University of Durban-Westville.
- Leopold, N.L., & Dillon, R. (1963). Psychosomatics of a disaster. A long term study of post-traumatic neuroses in survivors of a marine explosion. *American Journal of Psychiatry*, 119, 913-932.
- Levine, S., & Scotch, N.A. (Eds.). (1970). *Social stress*. Chicago: Aldi Press.
- Lewis-Beck, M.S. (1980). *Applied regression: an introduction*. Beverly Hills, CA: Sage.
- Lids, T. (1946). Psychiatric casualties from Guadalcanal. *Psychiatry*, 9, 193-215.
- Lifton, R.J. (1967). *Death in life: survivors of Hiroshima*. New York: Random House.
- Lifton, R.J., & Olson, E. (1976). The human meaning of total disaster: the Buffalo Creek experience. *Psychiatry*, 39, 1-18.
- Lin, N., Ensel, W.M., Simeone, R.S., & Kuo, W. (1979). Social support, stressful life events and illness: A model and an empirical test. *Journal of Health and Social Behaviour*, 20, 104-119.

- Liedemann, E. (1944). Symptomatology and management of acute grief. *American Journal of Psychiatry*, 101, 141-148.
- Logue, J.N. (1978). Long-term effects of a major natural disaster: the Hurricane Agnes flood in the Wyoming Valley of Pennsylvania, June, 1972. Unpublished doctoral dissertation, Columbia University School of Public Health.
- Logue, J.N., Melick, M.E., & Hansen, H. (1981). Research issues and directions in the epidemiology of health effects of disasters. *Epidemiologic Reviews*, 3, 140-162.
- Loe, R. (1986). Post-shooting stress reactions among police officers. *Journal of Human Stress*, 12, 27-31.
- Lorraine, N.S.R. (1954). Convey Island flood disaster, February 1953. *Medical Officer*, 91, 59-62.
- Lucas, R.A. (1969). *Man in crisis: A study of a mine disaster*. New York: Basic Books.
- Lundin, T. (1984). *Disaster reactions: A study of survivors' reactions following a major fire disaster*. (Unpublished paper). University of Uppsala, Sweden.
- MacBride, A., Lunce, W., & Freeman, S.J.J. (1981). The psychosocial impact of a labor dispute. *Journal of Occupational Psychology*, 54, 125-133.
- MacEachron, A.J. (1967). *Management of human behaviour in disaster*. Produced by Department of National Health and Welfare, Canada.
- MacEwan, K.E., & Barling, J. (in press). Interrole conflict, family support and marital functioning of employed mothers: A short-term longitudinal study. *Journal of Occupational Behaviour*.
- Maddi, S.R., & Kobasa, S.C. (1984). *The hardy executive: Health, pressure*. Illinois: Irwin.
- Mangelsdorff, A.D. (1985). Lessons learned and forgotten: The need for prevention and mental health interventions in disaster preparedness. *Journal of Community Psychology*, 13, 239-257.
- McCaughy, B.C. (1985). US Coast Guard collision at sea. *Journal of Human Stress*, Spring, 42-46.
- McFarlane, A.C. (1981). Posttraumatic morbidity of a disaster: A study of cases prepared for psychiatric treatment. *Journal of Nervous and Mental Disease*, 169, 4-14.
- McGrath, J.E. (1976). *Social and psychological factors in stress*. New York: Holt, Rinehart and Winston.
- McLean, A.A. (1979). *Work Stress Reading*, MA: Addison-Wesley.
- McKinnell, A. (1970). Attitude measurement: Use of coefficient alpha with cluster or factor analysis. *Sociology*, 4, 227-245.
- Meehl, P.E., & Delstrom, W.C. (1960). Objective configurational rules for discriminating psychotic from neurotic MMPI profiles. *Journal of Clinical and Consulting Psychology*, 21, 375-387.
- Melick, M.E. (1976). *Social, psychological and medical aspects of stress-related illness in the recovery period of a natural disaster*. Doctoral dissertation, State University of New York at Albany.

- Melick, M.E., Logue, J.N., & Frederick, U.J. (1982). Stress and disaster. In L. Goldberger & S. Breznitz (Eds.), *Handbook of stress: Theoretical and clinical aspects*. New York: The Free Press.
- Miller, S. (1975). *Experimental design and statistics* London: Methuen.
- Milne, G. (1977a). Cyclone Tracy :1. Some consequences of the evacuation for adult victims. *Australian Psychologist*, 12, 39-44.
- Milne, G. (1977b). Cyclone Tracy :2. The effects on Darwin children. *Australian Psychologist*, 12, 55-62.
- Nines and Weeks Act (1956). *The Nines and Weeks Act and Regulations*, Act no. 27 of 1956, Johannesburg: Lex Patria Publishers.
- Holife, T. (1987, December 21). 33 bodies found. *Sowetan*, 1.
- Noore, H.E. (1958a). Some emotional concomitants of disaster. *Mental Hygiene*, 42, 45-50.
- Noore, H.E. (1958b). *Tornadoes over Texas: a study of WACO and San Angelo in disaster*. Austin, Texas: University of Texas Press.
- Munzenrider, R.F., & Flynn, C.B. (1980, September). *An overview of social, psychological, and behavioural impacts of T.M.I.* Paper presented at the annual convention of American Psychological Association, Montreal.
- Murphy, L.R. (1984). Occupational stress management: A review and appraisal. *Journal of Occupational Psychology*, 57, 1-15.
- Nailor, M.G., Tarlton, F., & Cassidy, J. (1978). *Loye Canal: public health time bomb - a special report to the Governor and Legislature*. Albany: New York State Department of Health.
- Nash, E. (1984). Lessons of Laingsburg: A psychiatrist's view. *Psychotherapy and Psychiatry in Practice*, 34, 32-34.
- Noale, J.N., & Liebert, R.M. (1980). *Science and Behaviour* (2nd ed.). Englewood Cliffs, New York: Prentice-Hall.
- Nemiah, J.C. (1980). Somatoform disorders. In H.I. Kaplan, A.M. Freedman, & B.V. Sadock (Eds.), *Comprehensive Textbook of Psychiatry* (3rd ed.). Baltimore: Williams and Wilkins.
- Newman, J.E., & Beehr, T.A. (1979). Personal and organizational strategies for handling job stress: A review of research and opinions. *Personnel Psychology*, 32, 1-43.
- Niederland, W.G. (1981). The survivor syndrome: Further observations and dimensions. *Journal of the American Psychoanalytic Association*, 29, 413-423.
- Okura, K. (1975). Mobilizing in response to a major disaster. *Community Mental Health Journal*, 11, 136-144.
- Olson, C.L. (1976). On choosing a test statistic in multivariate analysis of variance. *Psychological Bulletin*, 83, 579-586.
- Parad, H.J., Resnik, H.L.P., & Parad, L.E. (Eds.). (1976). *Emergency and disaster management: A mental health sourcebook*. Maryland: The Charles Press Publishers.
- Parker, G. (1975). Psychological disturbance in Darwin evacuees following cyclone Tracy. *Medical Journal of Australia*, 1, 650-652.

- Parker, G. (1977). Cyclone Tracy and Darwin evacuees: On the restoration of the species. *British Journal of Psychiatry*, 130, 548-555.
- Parlinson, D.K., & Bromet, E.J. (1983). Consequences of mental health in nuclear and coal-fired power plant workers. *Scandinavian Journal of Work Environment and Health*, 9, 341-345.
- Parloff, M.B., Waskow, I.E., & Wolfe, B.E. (1978). Research on therapist variables in relation to process and outcome. In S.L. Garfield & A.E. Bergin (Eds.), *Handbook of psychotherapy and behavior change: An empirical analysis*. New York: Wiley.
- Pedhazur, E.J. (1982). *Multiple regression in behavioral research: Explanation and prediction*. New York: Holt, Rinehart & Winston.
- Penick, E.C., Powell, B.J., & Slack, W.A. (1976). Mental health problems and natural disaster: tornado victims. *Journal of Community Psychology*, 4, 64-67.
- Perry, R.W. (1983). Population evacuation in volcanic eruptions, floods, and nuclear power plant accidents: Some elementary comparisons. *Journal of Community Psychology*, 11, 36-47.
- Perry, R.W., & Lindell, M.K. (1978). The psychological consequences of natural disaster: A review of research on American communities. *NASA Emergency*, 3, 104-115.
- Piron, J., Human, L., & Rajah, M. (1989). The man in the middle: Supervisors in South African organisation today. *South African Journal of Labour Relations*, 7(2), 4-19.
- Ploeger, A. (1977). A 10-year follow up of miners trapped for 2 weeks under threatening circumstances. In C.D. Spielberger & I.G. Sarason (Eds.), *Stress and anxiety* (Vol. 4). Washington, DC: Hemisphere.
- Popovic, M., & Petrovic, D. (1964). After the earthquake. *Lancet*, 2, 1169-1172.
- Powell, J.W. (1954). In J.W. Powell, J.E. Pinesinger, & M.H. Greenhill, *An introduction to the natural history of disaster*. College Park: University of the Maryland, Disaster Research Project.
- Pratt, L.L., & Barling, J. (1987). Differentiating between daily events, acute, and chronic stressors: A framework and its implications. In J.R. Murrell, L.R. Murphy, S.L. Sauter, & C.L. Cooper (Eds.), *Occupational stress: Issues and developments in research*. London: Taylor and Francis.
- Price, J. (1978). Some age-related effects of the 1974 Brisbane floods. *Australian and New Zealand Journal of Psychiatry*, 12, 55-58.
- Prince, R., & Miranda, L. (1977). Monitoring life stress to prevent recurrence of coronary heart disease episodes. *Canadian Psychiatric Association Journal*, 22, 101-109.
- Prince, S.H. (1968). *Catastrophe and social change*. New York: AMS Press.
- Procidano, M.E., & Heller, K. (1983). Measures of perceived social support from friends and family: Three validation studies. *American Journal of Community Psychology*, 11, 1-22.
- Quarantelli, E.L. (1979). *The consequences of disaster for mental health: Conflicting views*. Columbus: Ohio State University, Disaster Research Center.
- Quarantelli, E.L., & Dynes, R.R. (1977). Response to social crisis and disaster. *Annual Review of Sociology*, 3, 23-49.

- Quick, J.C., & Quick, J.D. (1984). *Organizational stress and preventative management*. New York: McGraw-Hill.
- Rabins, P.V., & Brooks, B.R. (1981). Emotional disturbance in multiple sclerosis patients: validity of the General Health Questionnaire (GHQ). *Psychological Medicine*, 11, 425-427.
- Rabkin, J.G., & Straus, E.L. (1977). Social change, stress and illness: A selective literature review. In T. Shapiro (Ed.), *Psychoanalysis and Contemporary Science* (Vol. 5). New York: International University Press.
- Rangell, L. (1976). Discussion of the Buffalo Creek disaster: The course of psychic trauma. *American Journal of Psychiatry*, 133, 313-316.
- Raphael, B. (1986). *When disaster strikes: How individuals and communities cope with catastrophe*. New York: Basic Books.
- Rawnsley, K., & Loudon, J.R. (1964). Epidemiology of mental disorder in a closed community. *British Journal of Psychiatry*, 110, 830-839.
- Richard, W. (1974). Crisis intervention services following natural disasters: The Pennsylvania flood recovery project. *Journal of Community Psychology*, 2, 211-219.
- Rosnow, R., & Rosenthal, R. (1976). The volunteer subject revisited. *Australian Journal of Psychology*, 28, 97-108.
- Sank, L.J. (1979). Psychology in action: Community disaster: Primary prevention and treatment in a health maintenance organization. *American Psychologist*, 34, 334-338.
- Sarason, I.G., Johnson, J.M., & Siegel, J.M. (1978). Assessing the impact of life changes: Development of the Life Experiences Survey. *Journal of Consulting and Clinical Psychology*, 46, 932-946.
- Sarason, I.G., Levine, H.M., Basham, R.B., & Sarason, B.R. (1983). Assessing social support: The Social Support Questionnaire. *Journal of Personality and Social Psychology*, 44, 127-139.
- Schottenfeld, R.S. & Cullen, M.R. (1986). Recognition of occupation-induced posttraumatic stress disorders. *Journal of Occupational Medicine*, 28, 365-369.
- Segovis, J.C., & Bhagat, S. (1981). Participation revisited-implications for organizational stress and performance. *Small Group Behaviour*, 12, 299-327.
- Selye, H. (1956). *The stress of life*. New York: McGraw-Hill.
- Selye, H. (1974). *Stress without distress*. New York: Lippincott.
- Shirom, A., & Krimmer, S. (1988). The effects of unions on blue collar job stress and somatic strain. *Journal of Organizational Behaviour*, 9, 29-42.
- Shore, J.H., Tatum, E.L., & Vollmer, W.H. (1986). Psychiatric reactions to disaster: The Mount St. Helens experience. *American Journal of Psychiatry*, 143(3), 590-595.
- Shostak, A.B. (1980). *Blue collar stress*. Reading, MA: Addison-Wesley.
- Shostak, A.B. (1985). Union efforts to relieve blue collar stress. In C.L. Cooper & M.J. Smith (Eds.), *Job stress and blue collar work*. New York: Wiley.

- Siporin, M. (1976). Altruism, disaster and crisis intervention. In M.J. Paré, H.L.P. Rosnick, & L.P. Paré (Eds.), *Emergency and disaster management: A mental health sourcebook*. Bowie, Maryland: Charles Press.
- Solomon, Z., Mikulincer, M., & Hobfoll, S.E. (1986). Effects of social support and battle intensity on loneliness and breakdown during combat. *Journal of Personality and Social Psychology*, 51, 1269-1276.
- Sowetan (1987, September 1). Mine blast-92 missing. *Sowetan*, 1, 2.
- Spector, P.E. (1977). What to do with significant multivariate effects in multivariate analysis of variance. *Journal of Applied Psychology*, 62, 158-163.
- Steiner, I.D. (1970). Strategies for controlling stress in interpersonal situations. In J.E. McGrath (Ed.), *Social and psychological factors in stress*. New York: Holt, Rinehart and Winston.
- Stern, G.N. (1976). From chaos to responsibility. *American Journal of Psychiatry*, 133, 300-301.
- Straker, G. and the Sanctuaries Treatment Team (1987a). *Black Township Refugees: Problems in Treatment*. Paper read at the 5th National Psychiatric Conference, Cape Town.
- Straker, G. and the Sanctuaries Treatment Team (1987b). The Continuous Traumatic Stress Syndrome-The single therapeutic interview. *Psychology in Society*, 8, 46-78.
- Strom, A. (Ed.). (1968). *Norwegian concentration camp survivors*. Oslo: Universitetsforlaget.
- Swank, R.L. (1949). Combat exhaustion: Descriptive and statistical analysis of causes, symptoms and signs. *Journal of Nervous and Mental Disorders*, 109, 475.
- Takuma, T. (1978). Human behaviour in the event of earthquakes. In E.L. Quarantelli (Ed.), *Disasters: theory and research*. Beverly Hills: Sage.
- Tannenbaum, F. (1951). *The philosophy of labor*. New York: Knopf.
- Tardy, C. (1985). Social support measurement. *Journal of Community Psychology*, 13, 187-202.
- Taylor, J.C., & Bowers, D.G. (1972). *Survey of Organizations*. Ann Arbor: Institute for Social Research, University of Michigan.
- Taylor, V.A., Ross, G.A., & Quarantelli, E.L. (1976). *Delivery of mental health services in disasters: The Ronie tornado and some implications*. Columbus: Ohio State University, Disaster Research Center.
- Terr, L. (1981). Psychic trauma in children: observations following the Chowchilla schoolbus kidnapping. *American Journal of Psychiatry*, 138, 14-19.
- The Reef (1987, January). Inter-mine safety prize schemes. *The Reef*, 73(867), 66-71.
- Thoits, P.A. (1986). Social support as coping assistance. *Journal of Consulting and Clinical Psychology*, 54, 416-423.
- Titchener, J.L., & Kapp, F.T. (1976). Family and character change at Buffalo Creek. *American Journal of Psychiatry*, 133, 295-299.
- Turton, R.W. (1986). *Stressful life events and illness among urban blacks*. Unpublished masters dissertation, University of the Witwatersrand, Johannesburg.

- Tyhurst, J.S. (1951). Individual reactions to community disaster: The natural history of psychiatric phenomena. *American Journal of Psychiatry*, 107, 764-769.
- Vitaliano, P.P., Maiuro R.D., Bolton, P.A., & Arnsden, G.C. (1987). A psychoepidemiologic approach to the study of disaster. *Journal of Community Psychology*, 15, 99-122.
- Wallace, A.F.C. (1936). *Tornado in Worcester: An explanatory study of individual and community behaviour in an extreme situation*. (Publication No. 178.). Washington DC: National Academy of Sciences, National Research Council.
- Weissach, L. (1983). *The study of a factory fire*. Doctoral Dissertation. University of Oslo.
- Weiss, R.S. (1976). Transition states and other stressful situations: Their nature and programs for their management. In G. Caplan & M. Killilea (Eds.), *Support systems and mutual help: Multi-disciplinary explorations*. New York: Bruce and Stratton.
- Wells, J.A. (1982). Objective job conditions, social support and perceived stress among blue collar workers. *Journal of Occupational Behavior*, 3, 79-94.
- Wendling, W. (1977). *Industrial safety and collective bargaining*. Industrial Relations Research Association 30th Annual Proceedings, 427-436.
- Wert, B.J. (1979). Stress due to a nuclear accident: a survey of an employee population. *Occupational Health Nursing*, 27, 16-24.
- Weyer, G. (1982). Self-report measures in research on job-related stress. In *Series in clinical and community psychology: Achievement, stress and anxiety*.
- White, D.H. (1982). *The effects of job stress in the South African gold mining industry*. Unpublished doctoral dissertation, University of South Africa, Pretoria.
- Wilde, G.J.S. (1972). Trait description and measurement by personality questionnaires. In R.B. Cattell (Ed.), *Handbook of modern personality theory*. Chicago: Aldine.
- Wildt, A.R., & Ahtola, O.T. (1980). *Analysis of covariance*. Beverly Hills, CA: Sage.
- Williams, H.B. (1954). Fewer disasters, better studied. *Journal of Social Issues*, 10, 5-11.
- Wing, J., Cooper, J., & Sartorius, N. (1974). *The measurement and classification of psychiatric symptoms*. Cambridge: Cambridge University Press.
- Winubet, J.A.M., Marcelissen, F.M.G., & Kleber, R.J. (1982). Effects of social support in the stress-strain relationship: A dutch sample. *Social Science and Medicine*, 16, 475-482.
- Wolfenstein, M. (1957). *Disaster: A psychological essay*. New York: Free Press of Glencoe.
- Wood, S., & Podlar, N. (1978). On losing their virginity: The story of a strike at the Grosvenor Hotel, Sheffield. *Industrial Relations Journal*, 9(2), 15-37.

Work in Progress (1987, October-November). Strike trends: Mid-August to mid-October 1987. *Work in Progress*, 50/51, 75-80.

World Health Organization (1978). *International classification of diseases: mental disorders*, (9th rev.). Geneva: Author.

Zarke, T., Hartsough, D., & Ottinger, D. (1974). Torn to recovery: The development of a professional- paraprofessional response to a disaster. *Journal of Community Psychology*, 2, 311-321.

Zedeck, S. (1971). Problems with the use of "moderator" variables. *Psychological Bulletin*, 76, 295-310.

Simonsen, M. (1983). Methodological issues in the assessment of life events: A review of issues and research. *Clinical Psychology Review*, 3, 335-370.

APPENDIX 1

Covering letter and instruments
used in the Study

This Appendix contains only the English versions of the covering letter and measuring instruments. The Xhosa and Sotho translations of all of these are available on request.



UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

1 Jan Smuts Avenue, Johannesburg

P.O. WITS
2050, SOUTH AFRICA

Telephones
4-27125 SA
(011) 716-1111

Reference:

Enquiries:

(011) 716

Date:

Dear Sir

I am currently involved in doing research on the experience of miners working in the industry. I am interested in any emotional or physical problems which you might be experiencing due to your work. It is hoped that the results of my study will be of benefit to you regarding work-related problems you may experience in the future. I would appreciate it if you would help me by answering all the questions in this questionnaire. Please answer all the questions in terms of how you yourself feel and not in terms of how you think others (e.g., management; union officials) would like you to answer. This questionnaire is anonymous and your answers will be treated in the strictest confidence. They will only be used for this study. Remember, there are no right or wrong answers to this study. I just want you to answer openly and honestly. In this way a true understanding of the difficulties you are facing, can be reached.

Thank you for your co-operation.

G. Edelstein

Hana Edelstein

I would like to begin by asking you some questions about yourself and your work. I do not want to know your name, so nobody will be able to find out who you are from your answers.

Please answer all the following questions. Where a list of responses has been provided for a particular question, please select the most appropriate one and cross the corresponding box.

1. Age

.....

2. Home Language

☐
☐
☐

Xhosa

Sotho

Other (please specify)

3. Where were you born?

.....

4. Marital Status

☐
☐
☐
☐
☐
☐

Single

Married

Widowed

Divorced

Separated

Living with girlfriend

5. When were you last home?

Month:..... Year:.....

6. Have you ever had trouble or problems with your nerves?

☐
☐

Yes

No

7. If yes, explain

.....
.....

8. Have you ever had trouble or problems with your physical health?

☐
☐

Yes

No

9. If yes, explain

.....
.....

10. Have you ever spent any time in hospital?

☐
☐

Yes

No

11. If yes, for what reason and for how long?

.....
.....

12. For how long have you been working on the mines?

.....

13. What is your present job on the mines?
(e.g. team leader, winch driver, machine driller)

.....

14. For how long have you had this job?

.....

15. Where is your working place?

☐
☐
☐

Stops

Development

Other (please specify)

16. What shift do you work?

☐
☐
☐

Morning

Night

Rotating

17. Which hostel do you stay in?

.....

18. Do you belong to a trade union?

☐
☐

Yes

No

19. If yes, to which one and for how long?

.....

20. Do you feel underground work is dangerous?

☐
☐
☐
☐

Always dangerous

Almost always dangerous

Sometimes dangerous

Never dangerous

21. Do you worry that y. might be hurt during the course of your work?

Always worry
Almost always worry
Sometimes worry
Never worry

22. Do you think accidents can be prevented on the mines?

Always prevented
Almost always prevented
Sometimes prevented
Never prevented

The following questions refer to your supervisor i.e., the white miner in charge of your gang. Please indicate how you feel by crossing the appropriate column for each item.

	To a very little extent	To a little extent	To some extent	To a great- er extent	To a very great extent
1. How friendly and easy to approach is your supervisor?					
2. When you talk with your supervisor, to what extent does he pay attention to what you are saying?					
3. To what extent is your supervisor willing to listen to your problems?					

Here are some statements which refer to feelings and experiences which occur to most people at one time or another who belong to trade unions. Please indicate whether you agree or disagree with each statement by crossing the appropriate box. If you agree with the statement place a cross in the 'Yes' column, and if you disagree place a cross in the 'No' column. If you are unsure or only agree/disagree sometimes, then place a cross in the 'Sometimes/Maybe' column.

	YES	SOME- TIMES/ MAYBE	NO
1. My shaft steward helps me when I have done something wrong at work.			
2. There are enough trade union officials at union meetings to help me with my problems.			
3. I feel a sense of solidarity with fellow union workers.			
4. My union is effective in taking steps to protect me against unfair labour practices.			
5. My trade union keeps me well informed on all financial and legal aid that it offers to its members.			
6. If I were to appeal against my dismissal there would be a trade union official there to give me the support I need.			
7. My trade union officials are effective in solving my problems.			
8. My trade union is effective in taking up issues with management on my behalf.			
9. My trade union would take up an unfair labour practice for me.			
10. My trade union is effective in improving working conditions for me.			
11. My trade union provides me with educational aid (e.g. bursaries).			
12. My trade union helps me find a job when I'm unemployed.			

	YES	SOME- TIMES/ MAYBE	NO
13. My trade union protects me against any form of victimisation at the workplace.			
14. My trade union would give me financial support if I went on a union organized strike.			
15. There is someone at the union offices who will help me to deal with my personal and family problems.			
16. I have confidence and trust in most of my union officials.			
17. My trade union officials are available to help me solve my problems.			
18. My shaft steward is always there to give me the support I need.			
19. I feel free to discuss my problems with my shaft steward.			
20. My fellow trade union members help me solve my family problems.			
21. My trade union helps me with my personal needs.			
22. I think that my trade union has a good record for solving my work related problems.			
23. I have made a lot of new friends whom I can rely on since joining my union.			
24. The people at the trade union offices listen to me and are effective in solving my problems.			
25. My fellow union members give me emotional support when I am upset.			

Listed below are a number of events that sometimes happen at work. These events bring about changes in the work situation which might have an effect on you. Please indicate which of these events you have experienced in the past year by placing a cross in the column marked 'occurred'. Only cross the 'occurred' column if you have experienced that event in the past year. If not, leave the column blank and proceed to the next item. Also, for those events which you have experienced, please indicate the extent to which you viewed the event as having either a favourable (good) or an unfavourable (bad) effect on you at the time of occurrence.

For example

ITEM

If you found the event extremely unfavourable cross the 'occurred' box and the '-3' box.

If you found the event moderately unfavourable cross the 'occurred' box and the '-2' box.

If you found the event slightly unfavourable cross the 'occurred' box and the '-1' box.

If you found the event extremely favourable cross the 'occurred' box and the '+3' box.

If you found the event moderately favourable cross the 'occurred' box and the '+2' box.

If you found the event slightly favourable cross the 'occurred' box and the '+1' box.

If the event occurred but had no effect on you cross the 'occurred' box and the '0' box.

If you have not experienced that event in the past year leave all columns for that item blank and move on to the next item.

occurred	extremely unfavourable	moderately unfavourable	slightly unfavourable	no effect	slightly favourable	moderately favourable	extremely favourable
X	X3	-2	-1	0	+1	+2	+3
X	-3	X2	-1	0	+1	+2	+3
X	-3	-2	X1	0	+1	+2	+3
X	-3	-2	-1	0	+1	+2	X
X	-3	-2	-1	0	+1	X	+3
X	-3	-2	-1	0	X	+2	+3
X	-3	-2	-1	X	+1	+2	+3

1. Unfair labour practices
2. Being victimized
3. Being discriminated against
4. Failure to use industrial relations procedures
5. Joining a trade union
6. Being intimidated
7. Being disciplined
8. Shop steward or worker representative elections
9. Representing others
10. Injustice and inequality
11. Anticipating or being approached by a trade union
12. Being powerless to act in the face of corruption
13. Resistance to black advancement
14. Being called abusive names
15. Not knowing who to turn to
16. Problems with accommodation, transport etc.
17. Not being treated with human dignity
18. Job insecurity
19. Change in working conditions
20. Not being represented adequately

occurred	extremely unfavourable	moderately unfavourable	slightly unfavourable	no effect	slightly unfavourable	moderately favourable	extremely favourable
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3
	-3	-2	-1	0	+1	+2	+3

If you have experienced any other work-related events which have had an effect on your life in the past year, please list and rate them.

21.	-3	-2	-1	0	+1	+2	+3
22.	-3	-2	-1	0	+1	+2	+3
23.	-3	-2	-1	0	+1	+2	+3

I should like to know if you have had any medical complaints, and how your health has been in general, over the past few weeks. Please answer all the questions on the following pages simply by marking the answer with a cross which you think most nearly applies to you. Remember that I want to know about present and recent complaints, not those that you had in the past.

It is important that you try and answer all the questions.

1. Have you recently been feeling perfectly well and in good health?

better than usual	some as usual	worse than usual	much worse than usual
-------------------------	---------------------	------------------------	--------------------------------

2. Have you recently been feeling in need of some medicine to pick you up?

not at all	no more than usual	rather more than usual	much more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

3. Have you recently been feeling run-down and out of sorts?

not at all	no more than usual	rather more than usual	much more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

4. Have you recently felt that you are ill?

not at all	no more than usual	rather more than usual	much more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

5. Have you recently been getting any pains in your head?

not at all	no more than usual	rather more than usual	much more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

6. Have you recently been getting a feeling of tightness or pressure in your head?

not at all	no more than usual	rather more than usual	much more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

7. Have you recently been having hot or cold spells?

no at all	no more than usual	rather more than usual	much more than usual
-----------------	-----------------------------	---------------------------------	-------------------------------

8. Have you recently lost much sleep over worry?

not at all	no more than usual	rather more than usual	much more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

9. Have you recently had difficulty in staying asleep?

not at all	no more than usual	rather more than usual	much more than usual
------------	--------------------	------------------------	----------------------

10. Have you recently been managing to keep yourself busy and occupied?

more so than usual	same as usual	rather less than usual	much worse than usual
--------------------	---------------	------------------------	-----------------------

11. Have you recently been taking longer over the things you do?

quicker than usual	same as usual	longer than usual	much longer than usual
--------------------	---------------	-------------------	------------------------

12. Have you recently felt on the whole you were doing things well?

better than usual	about the same	less well than usual	much less well
-------------------	----------------	----------------------	----------------

13. Have you recently felt that you are playing a useful part in things?

more so than usual	same as usual	less useful than usual	much less useful
--------------------	---------------	------------------------	------------------

14. Have you recently felt capable of making decisions about things?

more so than usual	same as usual	rather less than usual	are less capable than usual
--------------------	---------------	------------------------	-----------------------------

15. Have you recently felt constantly under strain?

not at all	no more than usual	rather more than usual	much more than usual
------------	--------------------	------------------------	----------------------

16. Have you recently felt you couldn't overcome your difficulties?

not at all	no more than usual	rather more than usual	much more than usual
------------	--------------------	------------------------	----------------------

17. Have you recently been able to enjoy your normal day-to-day activities?

more so than usual	same as usual	less so than usual	much less than usual
--------------------	---------------	--------------------	----------------------

18. Have you recently been getting edgy and bad tempered?

not at all	no more than usual	rather more than usual	such more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

19. Have you recently been getting scared or panicky for no good reason?

not at all	no more than usual	rather more than usual	such more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

20. Have you recently found everything too much for you?

not at all	no more than usual	rather more than usual	such more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

21. Have you recently been thinking of yourself as a worthless person?

not at all	no more than usual	rather more than usual	such more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

22. Have you recently felt that life is entirely hopeless?

not at all	no more than usual	rather more than usual	such more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

23. Have you recently been feeling nervous and uptight all the time?

not at all	no more than usual	rather more than usual	such more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

24. Have you recently felt that life isn't worth living?

not at all	no more than usual	rather more than usual	such more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

25. Have you recently thought of the possibility that you might make away with yourself?

defin- itely not	I don't think so	Has crossed my mind	defin- itely have
------------------------	---------------------------	------------------------------	-------------------------

26. Have you recently found at times you couldn't do anything because your nerves were too bad?

not at all	no more than usual	rather more than usual	such more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

27. Have you recently found
yourself wishing you were
dead and away from it all?

not at all	no more than usual	rather more than usual	such more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

28. Have you recently found
that the idea of taking
your own life kept coming
into your mind?

not at all	no more than usual	rather more than usual	such more than usual
------------------	-----------------------------	---------------------------------	-------------------------------

The following questions refer to your experience of disaster/s, in particular the St Helena mining disaster. Please answer all the questions. Where a list of responses has been provided for a particular question, please select the most appropriate one and cross the corresponding box.

1. Have you been in a disaster/a prior to the St Helena disaster?

☐
☐

Yes
No

2. If yes, please complete

DISASTER	DATE	INJURED	NOT INJURED
☐	☐	☐	☐

3. Do you think the St Helena disaster could have been prevented?

☐
☐

Yes
No

4. If yes, in what way?

.....
.....

5. Has management ever discussed with you what to do in the event of a accident?

☐
☐

Yes
No

6. Have you ever discussed with fellow workers what to do in the event of a disaster?

☐
☐

Yes
No

7. What was your level of preparedness for the disaster?

☐
☐
☐
☐

No preparation
Little preparation
Well prepared
Very well prepared

8. Were you injured in the disaster?

☐
☐

Yes
No

9. If yes, in what way?

.....
.....

10. Did you need to be hospitalized?

☐
☐

Yes
No

11. If yes, for how long?

.....

12. Do you feel that you have recovered from the disaster?

☐
☐

Yes
No

13. If you have not, explain

.....
.....

14. Did anyone close to you die in the disaster?
(e.g. friend/s; family member/s; co-worker/s)

☐
☐

Yes
No

15. If yes, what was the relationship?

.....

16. With the actual impact of the disaster, do you feel you

☐
☐
☐
☐

Managed well
Managed very well
Let yourself down
Let others down

17. When the disaster took place did you think you

☐
☐
☐

Were going to die
Might be injured
Would not be harmed

18. When the disaster took place, how did you react?
(e.g. flee; felt confused; help others)

.....
.....

19. Were you involved in the rescue work?

☐
☐

Yes

No

20. If yes, in what way?

.....
.....

21. Any additional comments?

.....
.....



Author Edelstein Ilana

Name of thesis Psychological Strain Four Months Following The St. Helena Mining Disaster. 1988

PUBLISHER:

University of the Witwatersrand, Johannesburg

©2013

LEGAL NOTICES:

Copyright Notice: All materials on the University of the Witwatersrand, Johannesburg Library website are protected by South African copyright law and may not be distributed, transmitted, displayed, or otherwise published in any format, without the prior written permission of the copyright owner.

Disclaimer and Terms of Use: Provided that you maintain all copyright and other notices contained therein, you may download material (one machine readable copy and one print copy per page) for your personal and/or educational non-commercial use only.

The University of the Witwatersrand, Johannesburg, is not responsible for any errors or omissions and excludes any and all liability for any errors in or omissions from the information on the Library website.