CYCLONE BOLA:

A STUDY

OF THE

PSYCHOLOGICAL AFTER-EFFECTS.

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ABSTRACT:

The present study investigates the long-term post-trauma psychological reactions to Cyclone Bola, which struck the East Coast of the North Island of New Zealand in March, 1988. This study evaluates psychological morbidity in respondents, in particular it estimates prevalence of post-traumatic stress disorder (PTSD). The current study identifies factors which could influence the development of PTSD or other psychological problems which may result from a natural disaster. A questionnaire was posted to subjects identified as either having been evacuated from their homes during Cyclone Bola, or who applied for financial aid following the disaster. Four hundred and ninety three questionnaires were sent to the Gisborne area in July, 1993. One hundred and eighteen replies were suitable for analysis. The study found that, at the time of measurement, 11.8% of respondents could be classified as PTSD cases and 17% scored in the high psychological distress group. Results did not support a direct link between the amount of adversity suffered and the psychological morbidity reported. However, there was an indirect link between the adversity suffered, the emotional distress reported by respondents at the time of the disaster and levels of psychological morbidity. Furthermore, there was support for the mediating influence of how satisfied respondents were with the help they received from relief agencies and with the social support they received at the time of the disaster. There was no support for gender differences in reactions to natural disasters. Some of these findings support previous research. Implications of these findings for future post-disaster psychological intervention are discussed.

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CHAPTER ONE:

INTRODUCTION.

The aim of this thesis is to examine long-term post-trauma psychological reactions in a community sample of the New Zealand population. The event which is investigated is Cyclone Bola, which struck the East Coast of the North Island in March, 1988. This study evaluates potential psychological problems, in particular post-traumatic stress disorder (PTSD) (American Psychiatric Association, 1987), in a sample of survivors of Cyclone Bola. This research also aims to identify possible factors that may influence the development of PTSD or other psychological problems which may result from a natural disaster.

1.1 BACKGROUND:

Human reactions to extreme events can be traced back through recorded history. As early as 1666 an account has been found of an individual who survived the great fire of London and subsequently suffered what could only be described as post-trauma stress reactions: "He subsequently developed dreams of the fire and falling down of houses, six months after the fire he was still unable to sleep without great terrors of fire" (Trimble, 1985, p 7). Historically, however, the greatest amount of post-trauma stress research has arisen out of combat situations. It is reported that during the American Civil War doctors observed states of physical and mental exhaustion or 'neurasthenia' occurring in soldiers exposed to fighting (Ramsay, 1990).

During World War I in addition to the vast number of physical casualties, there were many recorded cases of 'shell shock'. Affected soldiers suffered from anxiety attacks, startle reactions, insomnia and repetitive battle dreams (Russell, 1919, cited in Ramsay, 1990). Originally these reactions were attributed to some physical cause like "a brain lesion, most likely induced by carbon dioxide poisoning" (Ramsay, 1990, p355), or to brain damage caused by sudden changes in atmospheric pressure from the intensive shelling by heavy artillery.

During World War II further observations of patients led to disagreement with this view. Neurologists dealing with casualties accepted a psychological explanation both to the etiology and treatment of battle neuroses (as it was known then) (Trimble, 1985). However, there was still continuing debate over whether these problems were not simply cases of malingering. This suggestion was later disputed by studies similar to that of Morgan, Wright and Van Ravenswaag (1946, cited in Kluznik, Speed, Von Valkenburg & Magraw, 1986) who performed general medical examinations of 4,618 American prisoners of war repatriated from the Japanese. They found evidence of detachment from reality, absent-mindedness, loss of sexual interest and apprehension about returning home. Those who had been prisoners longer were shown to have more definite psychological responses than did those imprisoned for a shorter time, even though at times the treatment of the latter group had been harsher. In 1954, Cohen and Cooper (cited in Kluznik et al., 1986) reported a six year follow-up review of the medical records of 3,654

white World War II prisoners of war, which further supported Morgan et al's. findings. They found a marked excess of the diagnoses of "psychoneurosis" and "psychosis" among these prisoners of war.

In the late 1960s and 1970s environmental disasters became the subject of medical and psychological study. Some examples of disaster studies include the Bristol floods of 1968 (Bennet, 1970), the 1974 Brisbane floods (Abrahams, Price, Whitlock & Williams, 1976; Price, 1978), Cyclone Tracy in Darwin, Australia (Milne, 1977), the 1978 Cyclone in Sri Lanka (Patrick & Patrick, 1981) and perhaps one of the most thoroughly researched disasters to date, the Buffalo Creek dam collapse of 1972 (Erikson, 1976; Newman, 1976; Titchener & Kapp, 1976). All of these studies reported elevated physical and/or psychological morbidity in people exposed to these natural disasters. However, there was no agreement over exactly what this morbidity being reported was or which aspects of the trauma were causing it.

In the 1970s and early 1980s there was a heavy military emphasis on trauma research as a result of the Vietnam War (Boman, 1982; Gerardi, Blanchard & Kolb, 1989; Tennant, Streimer & Temperly, 1990; Green, Grace, Lindy, Gleser & Leonard, 1990). It was this war, perhaps more than any other event, which brought post-trauma reactions to the widespread attention of health care providers. Vietnam was the war everyone wanted to forget and the soldiers who returned were not hailed as heroes or helped to reintegrate into society. In the years that followed Vietnam, veterans began to call for the recognition

they felt they deserved but had not been given. This in turn drew attention to the psychiatric problems many veterans were experiencing, and it was this research which led to post-trauma stress reaction being recognised as a formal psychological disorder in the Diagnostic and Statistical Manual of Mental Disorders, third edition, (DSM-III) (American Psychiatric Association, 1980). Even so, initially there was still a distinction made by some researchers between disaster research, combat related research and post-traumatic stress disorder (PTSD) research. Studies of disaster survivors continued to be undertaken by community orientated investigators who did not follow a 'disorder' or 'psychopathological' model. As a result early studies of disasters did not address PTSD as a potential response (Green, 1991). It was not until later that researchers began to recognise these two areas of study were actually largely related and the literature began to reflect this.

1.2 DISASTER RESEARCH:

The word 'disaster' is derived from the latin *dis*, meaning against, and *astrum*, meaning stars, hence, "the stars are evil" (Green, 1991, p 538). Figley (1985) defined a disaster as an "extraordinary event or series of events which is sudden, overwhelming, and often dangerous, either to one's self or significant others" (p. xviii). Green (1991) agreed with this definition, but added that a disaster could involve a threat to or loss of property.

The most notable features of disasters, apart from their magnitude, is their unpredictable and uncontrollable nature, which has made research difficult.

Most disaster research is confined by circumstance to being retrospective and has historically been carried out using self-report questionnaires or a structured interview. Even so, there has been a lot of diversity in the conceptualizations and methodologies used. These diversities occur in time frames, samples, definition of populations and measuring instruments. Green (1991) believes reasons for this are because disasters have been studied by a wide range of clinicians and behavioural scientists who have "conceptualized potential disaster effects in many different ways, most of which are not psychopathologically oriented" (p 538). Disaster research is so diverse it has covered variables such as race and ethnic differences in disaster recovery (Bolin & Bolton, 1986), emotional and physical distress (Logue, Hansen & Struening, 1979), consequences of evacuation (Milne, 1977), psychiatric reactions (Shore, Tatum & Vollmer, 1986), and psychological reactions (Lane, 1991).

Diversity in this research also arises out of the nature of the disasters, with studies examining cyclones (Fairley, Langeluddecke & Tennant, 1986), hurricanes (Logue, Hansen & Struening, 1979), dam bursts (Bennet, 1970; Green, Grace, Lindy, Gleser, Leonard & Kramer, 1990), earthquakes (Burger & Palmer, 1992) and nuclear accidents such as Three Mile Island (Baum, Gatchel & Schaeffer, 1983). Berren, Beigel and Ghertner (1980) proposed a model which would help to classify the various types of disasters. Their hypothesis was that "to understand and predict psychological reactions to disaster one must first recognise the important characteristics that differentiate

disasters from each other" (Berren, Beigel & Ghertner, 1980, p 104). This theoretical approach never became popular and has not been widely used. Instead researchers have focused mainly on the differences between man-made and natural disasters, the severity of damage each disaster has caused and the types of psychological responses of people to disasters. The emphasis of this review is on natural disaster research as Cyclone Bola falls into this category. Furthermore, this enables the focus of this study to be narrowed to one which is manageable, as trauma research extends over an enormous field.

Responses to natural disasters have been found to cover a wide range of, and different types of disorders including; anxieties (Norris & Murrell, 1989; Green, Grace, Lindy, Gleser, Leonard & Kramer, 1990), depression (Bravo, Rubio-Stipec, Woodbury & Ribera, 1990; Nolen-Hoeksema & Morrow, 1991), stress (Baum, Gatchel & Schaeffer, 1983), physical symptoms (Clayer, Bookless-Pratz & Harris, 1985), and interpersonal problems (Milne, 1977; Adams & Adams, 1984). Following its inclusion in the DSM III (American Psychiatric Association, 1980) and its redefinition in DSM-III-R (American Psychiatric Association, 1987), post-traumatic stress disorder (PTSD) began to be considered as a possible response to disasters (McFarlane, 1988; Karl, 1989; Steinglass & Gerrity, 1990; Keane & Wolf, 1990). After PTSD became an official diagnosis (in 1980) several areas of investigation which had been following separate and independent lines began to converge. Green (1991) states "the designation of a post-traumatic diagnosis had a potent effect on

moving conceptualization and research in various areas on converging paths" (p 538). Acceptance of this new clinical diagnosis was not immediate but eventually researchers realized that many of the traumatic stress responses showed remarkable similarity. In other words, PTSD and disaster researchers realised their two areas of research actually overlapped and they were often finding similar disorders in their results.

1.3 POST-TRAUMATIC STRESS DISORDER (PTSD): (see Table 1)

The five major features of PTSD are; (1) experiencing a distressing event outside the range of normal human experience, (2) the re-experiencing of the trauma through dreams and intrusive waking thoughts, (3) emotional numbing to other life experiences and relationships, (4) symptoms of hyperarousal, autonomic instability, depression and cognitive difficulties (such as poor concentration), and (5) duration of the disturbance of at least one month. PTSD may develop in persons who have experienced emotional or physical stress that was of a magnitude which would be extremely traumatic for virtually anyone. Examples of such traumas given included combat experience, natural disasters, assault, rape and serious accidents (for example, automobile accidents, building fires) (Kaplan and Sadock, 1991).

In the original definition of PTSD in DSM III (American Psychiatric Association, 1980) there was allowance for three subtypes of this disorder. These three subtypes of PTSD were: an acute disorder which has started within six months of the trauma and lasted for less then six months; a chronic disorder lasting

six months or longer; while delayed PTSD is diagnosed only if its onset is at least six months after the traumatic event. The revised definition in DSM-III-R (American Psychiatric Association, 1987) stipulates symptoms must be present for at least one month but the time of onset is not specified (Ramsay, 1990).

A diagnosis of PTSD is normally established by interview or questionnaire, that is, by self-rating scales. Diagnostic criteria for PTSD can be seen in Table 1.

Table 1: Diagnostic Criteria for Post-traumatic Stress Disorder.

A. The person has experienced an event that is outside the range of usual human experience and that would be markedly distressing to almost anyone (e.g. serious threat to one's life or physical integrity; serious threat or harm to one's children spouse or other close relatives and friends; sudden destruction of one's home or community; or seeing another person who has recently been,or is being seriously injured or killed as the result of an accident or physical violence).

B. The traumatic event is persistently reexperienced in at least one of the following ways:
   (1) recurrent and intrusive distressing recollections of the event (in young children, repetitive play in which themes or aspects of the trauma are expressed)
   (2) recurrent distressing dreams of the event
   (3) sudden acting or feeling as if the traumatic event were recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative [flashback] episodes, even those that occur upon awakening or when intoxicated)
   (4) intense psychological distress at exposure to events that symbolize or resemble an aspect of the traumatic event, including anniversaries of the trauma

C. Persistent avoidance of stimuli associated with the trauma or numbing of general responsiveness (not present before the trauma), as indicated by at least three of the following:
   (1) efforts to avoid thoughts or feelings associated with the trauma

(2) efforts to avoid activities or situations that arouse recollections of the trauma
(3) inability to recall an important aspect of the trauma (psychogenic amnesia)
(4) markedly diminished interest in significant activities (in young children, loss of recently acquired developmental skills such as toilet training or language skills)
(5) feeling of detachment or estrangement from others
(6) restricted range of affect (e.g. being unable to have loving feelings)
(7) sense of a foreshortened future (e.g.) does not expect to have a career, marriage, children or a long life)

D. Persistent symptoms of increased arousal (not present before the trauma), as indicated by at least two of the following:
(1) difficulty falling or staying asleep
(2) irritability or outbursts of anger
(3) difficulty concentrating
(4) hypervigilance
(5) exaggerated startle response
(6) physiologic reactivity upon exposure to events that symbolize or resemble an aspect of the traumatic event (e.g. a woman who was raped in an elevator breaks out in a sweat when entering any elevator)

E. Duration of the disturbance (symptoms in B, C and D) of at least one month

Specify delayed onset if the onset of symptoms was at least six months after the trauma

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(Table from Kaplan & Sadock, 1991, p 411)

Difficulties in diagnosing PTSD arise as this disorder often mimics other psychiatric disorders and may therefore be misdiagnosed, for example, as anti-social personality disorder or chronic paranoid schizophrenia (Ramsay, 1990). Diagnosis may be further complicated by other concurrent disorders such as; alcoholism, drug dependence, somatization disorder, psychosis, affective disorders and phobic disorders (Keane & Wolfe, 1990; Ramsay, 1990).

These difficulties have led to questions concerning the appropriateness of the DSM-III-R (American Psychiatric Association, 1987) criteria for PTSD. Norris (1992) and Solomon and Cannino (1990) believe the current criteria may cause under-reporting of PTSD. Norris (1992) supports this by stating that "this study was not the first to demonstrate that whether a victim meets DSM-III-R criteria is largely a matter of whether he or she satisfies criterion C" (p 416). She further states that if two rather than three symptoms were sufficient to satisfy criterion C then reported rates of PTSD would double and possibly even triple (Norris, 1992).

Green (1991) believes, especially in disaster research, researchers should avoid testing exclusively for PTSD because of the problems associated with making an accurate diagnosis. Further, she suggests "focusing on PTSD only as a diagnosis is likely to provide a low yield and miss important mental health problems that need to be addressed..." (Green, 1991, p 539). Although PTSD is currently a relatively common diagnosis in trauma research, evidence shows (Ramsay, 1990) it is not the only diagnosis which can be made. This implies trauma research should not exclusively measure for PTSD, but also for other mental health problems, so all diagnostic possibilities are covered.

1.4 ETIOLOGY:

The etiology of PTSD has proven elusive, as has any agreement over which factors of a disaster are important in causing psychological distress. In the present study the etiology of both PTSD and post-natural disaster psychological reactions will be considered under the same headings. This is because they are similar questions for a researcher, as the factors could be the same.

At present it has been difficult to predict with any consistency the relationship between traumatic events and the onset of disease and/or recovery. Frequently this difficulty has been due to differences in the nature and severity of the disasters studied. Moreover, the effects of traumatic stressors have been found to be mediated by a number of variables including; social support, premorbid personality, individual developmental history, and the multiple meanings ascribed to the experience by individuals and groups. Some authors (Quarantelli & Dynes, 1977; Luketina, 1986) still maintain the view that disasters have few long-term psychological effects. It could be argued that the diverse findings of researchers is due to the complex interaction of specific aspects of the trauma, the mediating factors and the difference between the communities and individuals subject to the event. In spite of this, there are some factors which appear routinely in both PTSD and disaster research, which suggests they may be important.

1.4.1 Traumatic Severity:

The nature of the event is generally seen as one of the primary factors in an individuals response to trauma. Among Vietnam veterans intensity and length of combat exposure has consistently been found to be a critical factor in the experiences of individuals diagnosed with PTSD (Ramsay, 1990; Green, Grace, Lindy, Gleser & Leonard, 1990; Tennant, Streimer & Temperly, 1990). Similar effects have been found in disaster research as well. Bolin and Bolton (1986) reported that after a tornado in Texas, victims who suffered the highest amounts of damage reported higher degrees of neuroses and emotional strain due to the storm. At the end of their book, after studying four different types of disasters in many different cultures, they concluded that the level of damage was the most important factor in explaining the rate of recovery from disasters. McFarlane (1987), when studying firefighters who fought severe bushfires in South Australia in 1983, found "a significant relationship existed between the degree of adversity experienced by individuals in a disaster and their level of psychiatric morbidity" (p 365). Shore, Tatum and Vollmer (1986) also support this finding in their study of people who were affected by the Mount St Helens eruption in 1980. They found a definite "dose-response relationship to disaster stress which is associated with major property loss or death of a family member or close relative due to the disaster" (p 594).

1.4.2 Distress:

Although McFarlane (1988) believes there is general agreement that adversity causes distress, there is as yet, little consensus about whether it is the adversity or the distress which plays the major etiological role in post-trauma response. In his 1988 paper McFarlane questioned his own earlier findings concluding that "psychiatric impairment did not seem directly related to the actual nature of the exposure or losses in this group but rather to the amount of distress these experiences had caused" (p 138). Additionally, he found that some firefighters who were extremely distressed did not become psychologically impaired. This implies perhaps there is no one to one relationship between either the trauma itself or the amount of distress and psychological disorder. It would appear to be a complicated relationship between a number of factors. McFarlane (1988) suggests that "a range of vulnerability factors may be operating in those individuals who are distressed following extreme adversity and go on to develop post-traumatic stress disorder" (p 138).

In summary, it appears the level of distress individuals experience at the time of a disaster may be a factor in whether they will go on to develop any psychological morbidity. However, McFarlanes (1988) study suggests emotional distress should not be examined as an individual factor but considered as part of a wider picture.

1.4.3 Post-disaster Stressors:

Some research has found that recurrent stressors and post-disaster disruptions which arise in the immediate post-disaster period may be associated with psychological morbidity (Green, Wilson, & Lindy, 1985). Green (1990) conceptualizes these as environment-recovery factors and suggests they may effect psychological morbidity more than the event itself. Baum, O'Keefe and Davidson (1990) discussed the difficulties associated with defining acute and versus chronic stress as created by a disaster. They questioned whether the stress associated with the disaster ends when the flood waters subside, the earth stops shaking or the wind stops blowing or does it continue until the mud is finally cleaned away and the financial strain has eased. Horowitz, Stinson and Field (1991) theorized that the event (the earthquake or flood) is just the beginning of the stress and the event actually precedes "loss of functioning of the self, work, important relationships; possibly the death of others; disruption in social cohesion and goals; and/or financial instability. These are further affected by the degree of preparation before the event and the presence of helpers and/or exploiters after the event" (p 557). Although the event itself may be of a magnitude that would be extremely traumatic for virtually anyone, there is a suggestion it is the combined stress of the event and the difficulties this creates in day-to-day living, often for an extended period of time after the event, which is adding to the problems. This raises questions concerning the importance of post-disaster aid in the psychological recovery of victims. Traditionally disaster aid focuses on the physical requirements and financial needs of victims. Bolin and Bolton (1986)

found that at all the sites they studied and across all the ethnic groups, the aid people received was an extremely important factor in their psychological recovery. Aid appears to be important as it eases the stress experienced after the event. This is further supported by findings showing that those people covered by insurance report less distress than those who are not. This points to a complicated relationship between the amount of damage suffered and the individuals resources available to cope, either through insurance or financial aid from outside agencies. However, even though this might be true it does not eliminate the importance of the compassion and care which should be shown by relief workers. One noticeable complaint from Cyclone Bola victims was the number of forms which had to be filled out in order to receive aid. It was felt this dehumanized the victims, and many failed to receive the necessary aid because they were tired of filling out forms and refused to fill in any more (Gisborne Herald, 1989, p1).

1.4.4 Social Support:

While aid from relief agencies is important, help from family, friends and the community is equally as important. Bolin and Bolton (1986) found that "the role of kin in providing moral support and emotional comfort was quite obvious, and at sites where there was relatively high rates of residential dislocation the role of relatives in providing shelter and food was particularly evident" (p 220). Social support has been shown to be a mediating factor which is effective in attenuating many of the negative aspects of trauma. Particularly noteworthy is the phenomena of the therapeutic community. Dynes and Quarantelli

(1975, cited in Milne, 1977) saw the behaviour patterns which develop within the post-disaster community as therapeutic because; "(a) pre-existing personal and social conflicts are resolved, (b) self-aggressive and anti-social behaviour resulting from loss and deprivation is reduced and prevented, and (c) individuals within the community system are re-motivated to devote their energies to socially constructive and regenerative tasks" (p 52). This is believed to explain why after some disasters morale is reported to be high.

Some studies have supported the existence of the therapeutic community by showing that communities which can work together to overcome the problems created by natural disasters often show fewer long-term psychological problems, (Bolin & Bolton, 1977; Patrick & Patrick, 1981). The therapeutic community is best illustrated by focusing on situations where it has not been allowed to occur, for example, Milnes (1977) study of Cyclone Tracy, which devastated Darwin, Australia. Milne found that those people who were allowed to stay in Darwin actually recovered more rapidly and more completely than those who were evacuated down the coast away from the disaster site. Milne suggested that "the extent to which disaster victims can cope and adapt may well be a function of their ability to remain inside the impacted community and be subject to its integrative and regenerative forces" (Milne, 1977, p 53). Milne shows how evacuation has short-circuited the normal social support of tight knit communities and how this can create more problems and place additional stress on victims.

A further illustration of problems arising from communities which are not able to help one another is the Buffalo Creek disaster. Erikson (1976) proposed that "many of the traumatic symptoms experienced by the people of Buffalo Creek are as much from the shock of being separated from a meaningful community base as to the actual disaster itself" (p 302). After the Buffalo Creek disaster people were evacuated to refugee camps which were scattered at random, this meant that "old bonds of kinship and neighbourhood, which had depended on physical proximity, were effectively severed. People no longer related to one another in old and accustomed ways. The threads of the social fabric had snapped" (Erikson, 1976, p 303). These cases illustrate what can happen if communities are unable to work cooperatively in times of stress. It may be that the important factor is returning life to normality as soon as possible and this can not happen until people can go back to their own homes with familiar surroundings and people around them.

Various studies aimed at measuring the mediating role of social support have confirmed its importance. Cook and Bickman (1990) found that social support acted as "...a coping resource that assisted in the immediate recovery from the psychological effects of a disaster" (p 555). The authors also found that the relationship between symptom levels and social support changed over time. This change, it was suggested, could account for some of the inconsistencies in previous studies. In other words, not only does social support act as a mediator but this mediation changes over time. This suggests results could

differ depending on the time which has elapsed since the occurrence of the stressor.

Findings from other studies further suggest that although social support mediates in disaster recovery exactly how this mediation operates is still unclear. Solomon, Smith, Robins and Fishbach (1987) examined both the negative and positive consequences of social support. They found that males and females have different needs as far as social support is concerned. In particular they found having large social support networks can actually have a negative effect on females as they are required to give support to others at times of stress, as well as trying to deal with their own stress. Murphy (1988) found self-efficacy was a significant predictor of health outcomes whereas social support was not. The participants of this study were said to rely "more heavily on self-reliant behaviours than on help-seeking behaviours" (Murphy, 1988, p168). Murphy further suggests there may be a different role for interpersonal and intrapersonal support in mediating post-disaster reactions and that this needs further exploration. Kaniasty, Norris and Murrell (1990) found peoples expectations of social support were often not met after a disaster, which in turn resulted in individual's perceptions of social support to decline. Furthermore, this decline in subjects perceptions of social support would then result in these subjects not seeking social support in the future. It was noted that this change in perceived support was predictive of increased psychological distress at a later date.

Literature indicates social support is an important mediating factor in both post-disaster psychological reactions and PTSD. To date however, its entire role is not fully understood and needs to be examined in more depth.

1.4.5 Gender:

Some researchers have found that males and females respond differently to trauma. As previously mentioned Solomon, Smith, Robins and Fishbach (1987) in their study of social support found that men and women had different support needs after a disaster. Steinglass and Gerrity (1990) found substantial gender differences in both short-term and the long-term response rates to disasters. They found that women reported more distress than men. It was concluded that the factors causing these striking gender differences were not apparent from their analysis. Shore, Tatum and Vollmer (1986), in their study of the Mount St Helens eruption, also reported substantial gender differences in one-year post event psychiatric sequelae. This was especially true for what they called the "high-exposure" group. Other studies, however, have found no gender differences. Madakasira and O'Brien (1987), who used similar measures to the other two studies mentioned above, found no gender differences at all. This raises interesting questions about gender differences in post-disaster reactions. For instance, do men and women react differently to disasters causing different possibilities of developing long-term morbidity?

1.5 THE CURRENT STUDY;

The purpose of the present study is to examine long-term post-traumatic responses to natural disaster, with particular interest in the possible identification of PTSD cases and the prevalence rates of PTSD in a disaster community.

The literature reviewed in this chapter has shown that the majority of researchers have found natural disasters can cause adverse psychological responses. Discussion, based on this literature, identifying factors which are important in the development of psychological morbidity following natural disasters, is diverse and at times vastly contradictory. This study aims to evaluate some of these factors and attempts to confirm some of the major findings. Also it is hoped to rectify the lack of research on New Zealand populations, to determine whether findings from overseas studies can be generalised to New Zealanders.

Based on the previous research findings mentioned in this chapter several hypotheses have been generated. The main hypothesis is that:

1. Those people who suffered more adversity as a result of Cyclone Bola will report having more psychological problems.

Other hypotheses are that:

2. Those people who were more satisfied with the help they received from disaster relief agencies, at the time of the disaster, will exhibit fewer psychological problems.

3. Those individuals who were highly emotionally distressed at the time of the disaster, regardless of the amount of adversity suffered, will report higher levels of psychological morbidity.

4. Those individuals who had more social support at the time of the disaster will report lower levels of psychological morbidity.

5. Females will report higher levels of psychological distress than males.

6. It is a combination of a few of these variables which predicts the incidence of psychological morbidity after a natural disaster, rather than it being only one particular variable.

CHAPTER TWO:

METHOD.

2.1 DESIGN:

This study utilised a cross-sectional survey research design which consisted of two phases. The first phase involved the design and administration of a survey to a sample of people 'affected' by Cyclone Bola. The second phase was a follow-up letter sent to subjects who had not responded to the original posting of the survey.

2.2 SAMPLING:

It is normally desirable in testing to choose a sample population as randomly as possible. Sometimes this is not easy to achieve because of the aims and scope of the research being undertaken. This study was no exception. Choosing a sample was limited by the need to find a sample of people who were 'affected' by Cyclone Bola. It was decided to define 'affected' as those people who had either suffered damage to property or who were evacuated from their homes during the emergency. The Civil Defence Coordinator for the Gisborne District Council was able to supply two possible sample populations. First, a list of those people who applied for financial assistance from the Mayoral Relief Fund (anyone who suffered any damage during the emergency was eligible to apply for this aid). Second, researchers were given access to lists of names of people evacuated from their homes during Cyclone Bola because of the immediate danger of flooding to their homes. It was decided

to take samples from both these populations but the two groups were not compared in this study.

It has been shown in previous studies that postal surveys which are based on retrospective addresses can have variable response rates. This problem was further compounded to in this study because of the length of time since the event, as addresses supplied were those at the time of the disaster. To overcome inaccuracies in addresses, for example, no street numbers and rural delivery numbers, were checked using the Gisborne and Eastern Maori Electoral Roles, updated for the 1992 Referendum. This resulted in a large number of possible respondents being ruled out because current addresses could not be obtained for them. Once this process was complete 493 people, with what was hoped were current addresses, were identified for inclusion in the study.

2.3 SURVEY ADMINISTRATION:

In July 1993 the survey was posted to 493 people living in the Gisborne area who had been identified as being affected by Cyclone Bola in 1988. Before the survey was posted a press release (Appendix A) was sent to the two local Gisborne newspapers to inform people in the area that a study was under way. Reasoning for this was to give people prior warning that research was to be undertaken and information about what the study was about.

The survey was sent out with a covering letter (Appendix B) an information

sheet (Appendix C) and a consent form (Appendix D). These cover sheets included information about the study, mentioned who was eligible for the study and explained what participants would be asked to do. The information sheet gave assurances of confidentiality as well as explaining the rights of the participants to withdraw at any time or to refuse to answer any questions. Additionally, that they have the right to contact researchers at any time, as well as the right of access to results from the study. Participants were asked to complete the consent form before they answered the questionnaire. The survey, which can be seen at Appendix D, had an instruction sheet which explained how to complete the questionnaire and encouraged subjects to carry this out in a quiet room and in one session. Subjects were asked to return the questionnaires at their earliest convenience in the enclosed postage paid envelope.

The initial response was slow. Thirty five questionnaires were returned for being incorrectly addressed, this lowered the number of possible respondents to 458. Twenty surveys were returned not filled in, some with accompanying notes from subjects who for various reasons declined to take part in the study. During this initial response period 91 questionnaires were returned which had been completed. One person rang the local newspaper and complained about the contents of the survey. This resulted in an unfavourable article being written, which can be seen at Appendix F. It is believed that this article may have affected the response rate, putting some people off taking part in the study.

To reduce any adverse effects the newspaper article may have had a follow-up letter was sent to subjects who had not responded to the initial posting. The follow-up letter (Appendix G) was sent in early September 1993 and emphasised the confidentiality and rights of respondents. This resulted in 6 envelopes returned for address problems, 7 people declining to take part in the study and a further 29 questionnaires being returned which could be used for analysis. Overall, by the beginning of October 1993, out of 452 surveys believed to be correctly addressed 147 questionnaires, or 33%, were accounted for. One hundred and eighteen of these were available for analysis, which is a response rate of 26%. Over 60% of the questionnaires were not responded to.

2.4 THE EVENT: [1]

Cyclone Bola occurred between 6 - 9 March 1988. The timing and intensity of the heavy rainfall varied depending on the location. The worst affected areas in New Zealand were Taranaki, Northland and the East Cape/Wairoa/Northern Hawkes Bay region. Most of the East Cape area received an average of over 400mm of rain. The most severe rainfall however, occurred inland from Tolaga Bay with a maximum recorded in some places of 900mm of rain in just a few days. For example, at Tutmoe (30km north west of Tolaga Bay) 705mm of rain were recorded between 0000 hours on 6 March 1988 and 2400 hours on 9 March 1988 with more than 25mm per

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[1] All statistics are from: Ministry of Civil Defence (1988) Expanded Report: The Effects of Cyclone Bola on East Coast - Wairoa region - March 23, 1988.

hour being recorded from 2300 on 6 March 1988 to 0700 on 9 March 1988. The average rainfall for this region for an entire year is between 1102mm and 2148mm, which illustrates the volume of water which fell in the area in just three days.

Cyclone Bola affected all the rivers in the region. The Waipoa river had a peak flow of 5300 cubic metres per second, which was over 1000 cubic metres more then previous recorded floods of 1896 and 1948. Both the Waipoa and Hikuwai rivers rose 10 metres above their normal levels, while the Wairoa river peaked at 16.6 metres above normal. A state of Local Civil Defence Emergency was declared at 1627 hours on the 6 March 1988 and continued for a full seven days. Over this period more than 3 000 people were evacuated from their homes.

Damage occurred in five counties on the East Cape; Waiapu, Cook, Waikohu, Wairoa and Hawkes Bay. The majority of this damage was to farmland with an estimated 1200 - 1300 farms within the region out of a total of 1800 being affected. Losses included crops, erosion of soils, stock death and fencing destruction. It was estimated that the total damage from Bola, including roading, housing, telecom, harbours, and farming, was somewhere around $112 million.

The affects of Cyclone Bola were further intensified by the unstable economy in the region prior to the disaster. The East Cape was already suffering from

the early stages of economic recession, due to the rural downturn, which was causing high unemployment and falling property values. Cyclone Bola therefore had a major economic impact on the East Cape.

Cyclone Bola generated a great deal of stress for people all over the East Cape region. In newspapers a year after Bola (September, 1989) it was reported that the hidden emotional damage was still taking its toll. Social workers reported that the psychological impact of Bola was still continuing, with some people seeking professional help, especially for severe depression. Others were reported to be at the end of their tether from the strain and worry. Not only had Bola had a major physical and economic impact on the East Cape but it had a major psychological effect as well.

2.5 MEASURES:

A postal survey was chosen for this study because of the distances between subjects, which ranged from Gisborne to Te Araroa at the top of the East Cape. The questionnaire consisted of six separate scales. These scales were measures of: post-traumatic stress disorder; current psychological distress; social support; traumatic severity; previous traumatic experiences and a measure of the emotional distress felt in the

month following Cyclone Bola. Also included were various biographical questions.

2.5.1 Biographical Measures:

Information was sought on participants age, gender, marital status, ethnicity, size of their families and also their employment and income both at the time of Cyclone Bola as well as at the time of completing the questionnaire. Questions were modelled on questionnaires used in previous research on PTSD (Long, Chamberlain & Vincent, 1992).

2.5.2 Post-traumatic Stress Disorder;

To measure whether Cyclone Bola has caused any chronic cases of PTSD the civilian version of the Mississippi PTSD (M-PTSD) (Keane, Caddell, & Taylor, 1988) scale was used. The original thirty five item M-PTSD scale was developed from the Diagnostic and Statistical Manual of Mental Disorders criteria for PTSD (Keane et al., 1988). On this scale ratings on how true the subject feels each item is for them are made on a five point Likert scale and are summed to provide a continuous measure of PTSD symptom severity. To determine a diagnosis a cutoff point is used, that is, those who score above a certain score (the cutoff) are said to have PTSD, while those who score below that score do not. Keane et al. (1988) used a cutoff score of 107, however, they indicated that cutoff scores would need to be developed to suit each separate study and situation.

Keane et al. (1988) reported that the scale had acceptable psychometric properties with good internal reliability with a coefficient alpha of 0.94. They found that the M-PTSD generated a six factor structure reflecting intrusive

memories and depressive symptomatology, interpersonal adjustment problems, lability of affect and memory, ruminative features and other interpersonal difficulties and sleep problems. Further, Vietnam veterans retested over one week intervals (0.97), showing that the M-PTSD has good test-retest reliability. Finally, Keane et al. (1988) noted that the scale overall hit rate for diagnostic accuracy was in the 90% range.

McFall, Smith, Mackay and Tarver (1990) support these psychometric properties with a Cronbach alpha coefficient of 0.96 and they found that they were able to distinguish PTSD from substance-abuse veterans with an accuracy of 90.6% using the M-PTSD. They found that their factor analysis corresponded roughly with Keane et al. (1988). The main difference being that they only identified three distinct factors; intrusive reexperiencing/numbing-avoidance, anger/lability and social alienation. These three factors support Keane et al.'s (1988) claim that the M-PTSD does cover the spectrum of the DSM-III defined symptoms of PTSD.

The civilian version of the M-PTSD differs form the original in the wording of the questions, for example, "I do not feel guilt over what I did in the military" becomes "I do not feel guilt over things I did in the past". Also there are four new items in the civilian version making it a 39 item scale. The addition of the new items means that cutoff scores have to be adjusted to allow for the higher possible total. A personal communication was made with Professor Keane regarding cutoff scores for this scale. To date no definitive cutoff scores have

been calculated for the civilian version of the M-PTSD. This meant that for this study cutoffs had to be determined and how this was done is explained fully in the results section.

There is no psychometric data available for the civilian version of the M-PTSD at this stage, however, it is felt that the good psychometrics of the original justify using this version as the differences are not major. Also the military version has been used extensively in New Zealand by Long, Chamberlain and Vincent (1992).

2.5.3 Psychological Distress;

Psychological distress at the time of the survey was measured using the Hopkins Symptom Checklist-21 item version (HSCL-21) (Green, Walkey, McCormick & Taylor, 1988). The original HSCL (Parloff, Kelman & Frank, 1958 cited in Green et al., 1988) was a fifty eight item scale developed as a measure of clinical change in psychotherapy patients. However, its length made its administration time-consuming and arduous for patients.

The HSCL-21 was developed using repeated statistical confirmation of a three factor structure with a number of different samples and HSCL scales of varying lengths (Green et al., 1988). The three factors became three subscales of seven items each: General Feelings of Distress (GFD); Somatic Distress (SD); and Performance Difficulty (PD). These three scales can also be summed to obtain a Total Distress Score.

The items in the HSCL-21 are all statements about how the subject may have felt during the *past seven days*. They are asked to report how distressing they found each of these statements on a four point scale from 1 (not at all) to 4 (extremely).

The HSCL-21 has reasonable psychometric properties with Green et al. (1988) reporting alpha reliability coefficients for a sample of students and nurses which ranged from 0.75 to 0.86 for the three subscales and 0.90 for the total score. Deane, Leatham, and Spicer (1992), using clients referred for psychotherapy as outpatients in two New Zealand hospitals, found comparable results with Cronbach alpha's ranging from 0.80 to 0.87 for the subscales and 0.89 for the Total Distress score. Deane et al. (1992) also reported that the HSCL-21 was able to significantly distinguish between clinical patients and nurses.

A further reason for using this scale is that it has been normed on New Zealand subjects so is particularly suitable for use in New Zealand research.

2.5.4 Distress;

The Impact of Events Scale (IES) (Horowitz, Wilner, & Alvarez, 1979) was used to measure individuals subjective emotional distress at the time of Cyclone Bola. The IES is a 15 item, self-report questionnaire designed specifically to measure the extent of stress-response symptoms to a particular event, or as Steinglass and Gerrity (1990) state to "provide a cross-sectional

picture of subjective psychological responses to stressful life events" (p1750).

Horowitz et al. (1979) identified what they thought were the two main responses to stress, avoidance and intrusion, and the IES was based on these. Items for the scale were derived from statements the authors thought were most frequently used to describe episodes of distress by people who had experienced recent life changes (Horowitz et al., 1979). To anchor the qualities to a particular context, the life event specific to each person was to be entered at the top of the scale as a referent for each of the statements. Subjects are asked to answer how true each of the 15 statements was for them in the past seven days on a four point Likert scale with 1 being Not at all and 4, Often. All fifteen scores can be added to give a total subjective stress score, or broken down to provide two subscores; avoidance and intrusion. For the purposes of this study subjects were asked how true the statements were for them in the month following Bola. This was to allow the subjective distress for that time to be measured, in other words, how distressed each individual was by the event.

Internal consistency for the IES was found to be high with the total score giving a cronbach alpha of 0.86 and the two subscales 0.78 and 0.82 respectively. A correlation of 0.42 ($p > 0.0002$) between the intrusion and avoidance subscale scores indicated that the two subscales are associated while not actually measuring identical dimensions (Horowitz et al., 1979). Horowitz et al. (1979) also found good test-retest reliability scores of 0.87 for

the total stress scores, 0.89 for the intrusion subscale and 0.79 for the avoidance subscale.

The IES scale has been used in numerous trauma stress studies since its development in 1979, in particular McFarlane (1988) has used it in most of his studies on firefighters in Australia. Green (1991) also supports the IES, calling it a useful measure and noting that because it has been used so extensively comparisons can be made between traumatized groups.

2.5.5 Trauma Screening:

Screening subjects for any possible confounding traumatic events they may have experienced, either prior to or since Cyclone Bola, was done using a shortened version of the Norris Traumatic Stress Schedule (TSS) (Norris, 1990). Norris developed this scale for use in traumatic stress research as "a useful means of assessing and controlling for extraneous influences in their 'victim' and 'control' data" (Norris, 1990, p1705).

The TSS consists of ten questions, nine about specific events and one final question which gives the subject the opportunity to answer for any other significant event not previously mentioned. The nine questions refer to selected events which share the common properties of being undesirable, unexpected and uncontrollable and outside the range of normal human experience, for example rape and natural disaster. Under each question are six items asking for more detail about the event. This makes the TSS into a

lengthy scale. For the purposes of this study only the first two items were included. These items asked about frequency of the event (once or more than once) and how long ago it occurred on a four point scale from 1 (< 6 months ago) to 4 (>5 years ago). The other four items ask about intrusion and avoidance thoughts about the event. These were excluded in the interests of space in the questionnaire and also because this information could be obtained from the Civilian Mississippi scale (see 2.5.2).

One problem with using the TSS is the lack of psychometric data available for it because it is such a new scale.

2.5.6 Traumatic Exposure Scale;

To measure the 'trauma' or amount of adversity subjects were exposed to during Cyclone Bola a scale was developed by the author. This scale was based on previous natural disaster research conducted by Abrahams, Price, Whitlock and Williams (1976), Madakasira and O'Brien (1987) and Norris (1990). These authors all used similar items to quantify the adversity people were exposed to during a natural disaster. Abrahams et al. (1976) researched the Brisbane floods of 1974 and measured the exposure to the floods using the "height to which water rose in the house, how long subjects were evacuated for, whether evacuation was voluntary or compulsory, how long it was before victims could return to their homes, details of lost or damaged possessions and particulars of financial and other help received" (p937). Madakasira and O'Brien (1987) developed an interview for their research

along similar lines with six aspects identified: type and extent of loss; type of injury; immediate psychological reactions; social support; nature of unmet needs; and level of satisfaction with disaster services. Norris' (1990) paper contains a detailed discussion on the six main aspects of a traumatic event she believes it is important to assess: loss; scope of the disaster; threat to life and physical integrity; blame; familiarity with the event and post-traumatic stress. These six aspects were used to develop the TSS.

Some of the items suggested by these authors were already being measured in this study by other scales, for example, the SSQ6 (2.5.7) and the Civilian Mississippi scale (2.5.2). However, the remainder of the concepts mentioned by the above authors were used to develop an eighteen item scale to measure the amount of trauma each subject was exposed to. The scale has two subscales; exposure (E) and satisfaction (S). The eleven item E subscale mainly examines at material aspects of the disaster, for example, the dollar amount of the loss, how much of the loss was covered by insurance, evacuation and injury. The seven item S subscale looks at the subjects satisfaction with the help received from helping agencies in the *month following* Bola.

The items are answered on a five point Likert scale. Each subscale is totalled to give an exposure score and a satisfaction score. The cost of the damage suffered can also be treated as a separate variable.

2.5.7 Social Support:

Social support was assessed using the six-item short form of the Social Support Questionnaire (SSQ6) (Sarason, Sarason, Shearin & Pierce, 1987). This instrument, which is a shortened version of the original SSQ (Sarason, Levine, Bashman & Sarason, 1983), provides scores on both network size and perceived social support.

The measure is comprised of six items from the original scale chosen by statistical analysis (Sarason et al., 1987). Each item of the scale requires a two part response. Firstly, respondents list the people they can count on for support in a certain situation (N score). Then they are asked to rate their satisfaction with the support provided on a five point Likert scale (S score). For the purpose of this study subjects were asked about their support *in the month following Cyclone Bola*. This was done by changing the questions to past tense, for example, "Who could you count on to console you when you were upset?".

Two scores result from the administration of this scale; (N) is the number of persons listed for each item, this score can then be summed and divided by the number of items to obtain a mean N score. The satisfaction score (S), which ranges from 1 (very satisfied) to 5 (very dissatisfied) for each item, is also summed and divided by the number of items to produce a mean S score.

Sarason et al. (1987) report that the internal reliability's (Coefficient alpha) for

the original SSQ were between 0.97 to 0.98 for N and between 0.96 to 0.97 for S. They found comparable internal reliability's for the SSQ6 with ranges of 0.90 to 0.93 for both N and S for three different student samples.

2.6 SAMPLE DESCRIPTION:

Detailed biographical information of respondents is given in Table 2. The sample was relatively evenly split genderwise, with 57% being male and 43% female. Table 3 shows a gender comparison of all biographical information.

The ages of respondents ranged from 22 to 82. However, as can be seen in Table 2, the majority fell within the 30 - 60 age groups (70%). Which along with the mean age of respondents (49 years), indicates that most of the respondents fall into the middle aged group. This proportion of middle aged adults is relatively high when compared with the general population, where only 37% of the population fall in the 30 to 60 range (New Zealand Census of Population, 1992). Table 3 shows that all the younger respondents (20 - 29 years) were females, while numbers within the other age groups were fairly similar. This can be supported by the mean ages (male = 50 years, female = 46 years), where the female mean age is slightly younger, having been lowered slightly by the six females in the 20 to 29 age group.

Most respondents (70%) were married, while only 10% were separated or divorced. This high proportion of married respondents may be due to the high number of middle aged subjects. It is suggested that this is the age group

most likely to be married. Further, the limited number of young adults in the sample could explain why the number of respondents never married is so low at only 10%. This is seen as particularly low when compared with the general population. For instance in our sample 16% of females and only 6% of males have never been married while in the general population 28% of females and 35% of males classify themselves as having never been married (New Zealand Official Yearbook, 1993).

The proportion of Maori respondents in the sample is quite high (25%) when compared to the 1991 census data where only 10% of the general population is classified as Maori. However, this is representative of the Gisborne Regional Council area which at 1991 census had 41% of its population specified as belonging to the New Zealand Maori ethnic group, which is the highest proportion of any region in New Zealand (1991 New Zealand Census, 1992). The majority of the sample (69%) are European, which is consistent with 1991 census figures for the general population
where 80% are European. Table 3 shows that the majority of the males (85%) were European, while the females had a wider spread with only 47% Europeans and 39% Maori.

Annual income for 1988, in Table 2, is spread fairly evenly across categories, with slightly greater proportions of respondents earning between $10 000 and $19 999 (22%) and between $20 000 and $29 999 (20%). The mean income however, was quite high at $36 000, which is due to the 10% of respondents

Table 2: Summary of biographical information.

	Number of respondents	Percentage of respondents
Age (Years)		
20-29	6	5.1
30-39	25	21.3
40-49	34	28.8
50-59	24	20.3
60-69	21	17.8
70-79	7	5.9
80+	1	0.8
Marital Status		
Never Married	12	10.2
Married	83	70.3
Separated/Divorced	12	10.2
Widowed	11	9.3
Ethnicity		
Maori	29	24.6
European	81	68.6
Pacific Islander	1	0.8
Other	7	5.9
Annual Income for 1988		
Below $10 000	10	8.5
$10 000 - $19 999	26	22.0
$20 000 - $29 999	23	19.5
$30 000 - $39 999	11	9.3
$40 000 - $49 999	7	5.9
$50 000 - $59 999	5	4.2
$60 000 - $69 999	2	1.7
$70 000 - $79 999	-	-
$80 000 and above	12	10.2
Not specified	22	18.6
Annual Income for 1993		
Below $10 000	17	14.4
$10 000 - $19 999	16	13.5
$20 000 - $29 999	17	14.4
$30 000 - $39 999	18	15.3
$40 000 - $49 999	6	5.1
$50 000 - $59 999	3	2.5
$60 000 - $69 999	-	-
$70 000 - $79 999	1	0.8
$80 000 and above	17	14.4
Not specified	23	19.5

Table 2: Summary of Biographical Information.

Number of People in Family		
1	7	5.9
2	15	12.7
3	13	11.0
4	22	18.6
5	25	21.2
6	12	10.2
7	8	6.8
8	4	3.4
9	2	1.7
Not specified	10	8.5
Occupation for 1988		
Retired	9	7.6
Unemployed	4	3.4
Houseperson	13	11.0
Student	-	-
Beneficiary	3	2.5
Administrative/ Management	7	5.9
Professionals	9	7.5
Technicians etc	8	6.6
Clerical Workers	6	5.0
Service/Sales	3	2.5
Agricultural & Fishery etc	40	33.8
Trades Workers	5	4.1
Plant/Machine Operators etc	9	7.4
Labourers etc	1	0.8
Not Specified	1	0.8
Occupation for 1993		
Retired	15	12.7
Unemployed	4	3.4
Houseperson	15	12.7
Student	1	0.8
Beneficiary	3	2.5
Administrative/ Management	6	5.0
Professionals	10	8.4
Technicians etc	11	9.2
Clerical Workers	3	2.5
Service/Sales	6	4.9
Agricultural & Fishery etc	31	26.2
Trades Workers	5	4.1
Plant/Machine Operators etc	6	6.8
Labourers etc	1	0.8
Not Specified	1	0.8

Table 3: Gender differences in biographical information.

	Males	%	Females	%
Age (Years)				
20-29	-	-	6	11.8
30-39	11	16.4	14	27.5
40-49	24	35.8	10	19.6
50-59	15	22.4	9	17.6
60-69	11	16.4	10	19.6
70-79	5	7.5	2	3.9
80+	1	1.5	-	-
Marital Status				
Never Married	4	6.0	8	15.7
Married	55	82.0	28	54.9
Separated/Divorced	5	7.5	7	13.7
Widowed	3	4.5	8	15.7
Ethnicity				
Maori	9	13.4	20	39.2
European	57	85.1	24	47.0
Pacific Islander	-	-	1	2.0
Other	1	1.5	6	11.8
Annual Income for 1988				
Below $10 000	-	-	10	19.6
$10 000 - $19 999	13	19.4	13	25.5
$20 000 - $29 999	15	22.4	8	15.7
$30 000 - $39 999	6	9.0	5	9.8
$40 000 - $49 999	6	9.0	1	2.0
$50 000 - $59 999	5	7.5	-	-
$60 000 - $69 999	2	1.7	-	-
$70 000 - $79 999	-	-	-	-
$80 000 and above	11	16.4	1	2.0
Not specified	9	13.4	13	25.5
Annual Income for 1993				
Below $10 000	4	6.0	13	25.5
$10 000 - $19 999	7	10.4	9	17.6
$20 000 - $29 999	14	20.9	3	5.9
$30 000 - $39 999	10	14.9	8	15.7
$40 000 - $49 999	5	7.5	1	2.0
$50 000 - $59 999	3	4.5	-	-
$60 000 - $69 999	-	-	-	-
$70 000 - $79 999	1	1.5	-	-
$80 000 and above	14	20.9	3	5.9
Not specified	9	13.4	14	27.4

Table 3: Gender differences in biographical information.

Number of People in Family				
1	3	4.5	4	7.8
2	7	10.4	8	15.7
3	4	6.0	9	17.6
4	14	20.9	8	15.7
5	19	28.4	6	11.8
6	6	8.9	6	11.8
7	4	6.0	4	7.8
8	3	4.5	1	2.0
9	-	-	2	3.9
Not Specified	7	10.4	3	5.9
Occupation for 1988				
Retired	5	7.5	4	7.8
Unemployed	3	4.5	1	2.0
Houseperson	-	-	13	25.5
Student	-	-	-	-
Beneficiary	1	1.5	2	3.9
Administrative/ Management	5	7.4	2	3.9
Professionals	4	6.0	5	9.8
Technicians etc	3	4.5	5	9.8
Clerical Workers	1	1.5	5	9.8
Service/Sales	-	-	3	5.9
Agricultural & Fishery etc	33	49.3	7	13.7
Trades Workers	5	7.4	-	-
Plant/Machine Operators etc	7	10.4	2	3.9
Labourers etc	-	-	1	2.0
Occupation for 1993				
Retired	9	13.4	6	11.8
Unemployed	1	1.5	3	5.9
Houseperson	-	-	15	29.4
Student	-	-	1	2.0
Beneficiary	2	3.0	1	2.0
Administrative/ Management	5	7.4	1	2.0
Professionals	4	6.0	6	11.8
Technicians etc	7	10.4	4	7.8
Clerical Workers	-	-	3	5.9
Service/Sales	3	4.5	3	5.9
Agricultural & Fishery etc	26	38.8	5	9.8
Trades Workers	5	7.4	-	-
Plant/Machine Operators etc	5	7.4	1	2.0
Labourers etc	-	-	1	2.0
Not Specified	-	-	1	2.0

who placed their income in the above $80 000 mark. When income is compared with occupation though, it is found that the majority of respondents who were in this high income bracket were farmers, therefore it is possible that income given may have been farm profit and not what was actually earned through wages. This was suspected as one or two respondents stated incomes of over $100 000, and in one case over $300 000.

A relatively high proportion of respondents (19%) did not specify any income. When this was further examined it was discovered that the majority of people who did not state any income listed their occupation as 'housewives'. This is supported by Table 3 where it can be seen that 13 of the 22 respondents who did not list an income were females and that under occupation for 1988 there were 13 females classified as 'houseperson'.

Table 3 shows that the majority of respondents from the lower income brackets were females (61%), while there were very few woman in the higher income brackets. This is reflected in the mean incomes, which for men was $41 000 while for women it was less than half that ($15 700).

Income figures were similar for 1993 annual incomes although more respondents had fallen below the $10 000 mark (9% to 14%). At the same time those earning above $80 000 had risen (10% to 14%). Table 3 shows that these separate trends were apparent for both sexes. There was an increase for both sexes in the number of respondents who were in the below

$10 000 income bracket, with the male figure going from 0 to 6% and that of the female rising from 20% to 26%. There was also an increase for both sexes in the above $80 000 bracket, males moving from having 16% earning over $80 000 to 21% and females rising by 2 people to 6%. The mean incomes, however, for 1993 actually rose with the mean income for males rising by $8 000 to $49 000 and the mean income for females rising $3 000 to $18 600. The percentage of respondents in the $80 000 and over income bracket is high when compared with 1991 census data which shows that only 7% of New Zealand males and 2% of New Zealand females earn over $50 000. Percentages are even lower for the Gisborne area with only 4% of males and 1% of females living in this district earning in this high income bracket. In fact, the majority of females in the Gisborne area earned incomes which were below $10 000 (44%).

The majority of respondents (74%) had between two and six people in their families. The mean number of people in respondents families was four, which suggests that the sample is similar to the national figures of the average family consisting of two adults and two children. However, without knowing the composition of each family this is only speculation. There were no gender differences in the number of members of each family, with both males and females having similar means (4.0 and 3.9 respectively).

The occupations of respondents were classified in accordance with the New Zealand Standard Classification of Occupations 1990 (Department of

Statistics, 1992). A large proportion of respondents for both 1988 and 1993 fell into the agricultural and fishery occupation group, which included all types of farming. Table 2 shows that the number of subjects who classed themselves in this group actually declined by nine subjects from 1988 to 1993, from 34% of respondents to 26%. This decline appears to be due in part to some respondents having retired since 1988, and some changing occupations. This is supported in part, by figures which show that the number of retired respondents has risen from 1988 to 1993 by six subjects or 5%.

In 1988, the second largest occupation group was the 'houseperson' category, which in Table 2 is seen to contain 11% of respondents. A look at Table 3 reveals that no males fall into this category, while one quarter of the female respondents classify themselves as 'housepersons'. This is partially in line with the 1991 census report where no males classified themselves as a houseperson.

Nationally, the highest proportion of males fall into the trade workers category, however it is not a large proportion at only 18% of the male population. The next largest group is the administrators and managers at 14%. This differs in the Gisborne area, however, where the largest proportion fall into the agricultural and fishery category (25%). This indicates that male respondents in this study were representative, occupationally, of the Gisborne area.

Both nationally and for the Gisborne area, females fall mostly into the clerical and service categories. Female respondents in this study were different in that the majority for both 1988 and 1993 were categorised as houseperson (25%). The next highest proportion in 1988 was the agricultural/fishery category (14%), while in 1993 it was the professionals category (12%) jointly with the retired group (12%). This suggests that the women in this study were not entirely representative of the general population in regard to occupation, either nationally or for the Gisborne area.

For both 1988 and 1993 only 3% of respondents were unemployed. Table 3 shows that in 1988 that figure was broken down to 3 males and 1 female while in 1993 this was reversed, but still only 4 respondents were unemployed. This is out of line with the general population, where 11% are unemployed. Even though the Gisborne area unemployment figure (7%) is lower than the national average, it is still not as low as that of respondents. This is a little surprising. The national figures were taken in 1991 and it is likely that this number has risen in the two years since. This further demonstrates that the sample population is not completely representative of the general population.

CHAPTER THREE:

RESULTS.

All analyses in this study were performed using the Statistics Package for the Social Sciences (Personal Computer version) (Norusis, 1985).

3.1 DISASTER EXPERIENCE:

Individual experiences of Cyclone Bola varied widely. Nearly half the sample, 53 respondents (45%), suffered damage to private property. Within this group 17 respondents (14%) reported damage to house contents, 8 respondents (7%) structural damage to houses, and 14 respondents (12%) a combination of house contents, structural and land damage. Damage which affected respondents income, that is, the loss of crops, land and/or stock was reported by 38 (32%) people. Twenty seven (22%) respondents reported suffering no damage. This group contained those people who were evacuated and then returned to find that there had been no damage to their homes and property. In summary, 91 respondents (77%) suffered some type of damage to property as a result of Cyclone Bola.

Table 4 shows the frequencies and percentages of the financial cost of damage suffered by respondents. Table 4 shows that the majority of respondents were in the lower cost of damage categories with 33 respondents (28%) reporting zero damage and 32 people (27%) reporting that their damage was in the 1 - 9,999 dollar range. Having 33 people (28%) reporting that their

cost of damage was zero does not equate with the above paragraph which reports that only 27 people (22%) reported having no property damage. This discrepancy arises because some of the people who recorded having damage either declined to give the dollar value of this damage or could not remember what the cost of the damage was. The next two largest categories were the 20,000 to 29,999 dollar category (8%) and the 100,000 plus category (11%).

Table 4: Frequencies and percentages of the financial cost of damage (in dollars) caused by Cyclone Bola.

Value ($)	Frequency	Percent (%)
Zero	33	28.0
1 - 9 999	32	27.1
10 000 - 19 999	8	6.7
20 000 - 29 999	10	8.4
30 000 - 39 999	3	2.5
40 000 - 49 999	6	5.0
50 000 - 59 999	7	5.9
60 000 - 69 999	3	2.5
70 000 - 79 999	1	0.8
80 000 - 89 999	2	1.7
90 000 - 99 999	-	-
100 000 +	13	11.0

During the disaster nine people (8%) felt their lives were extremely endangered, while 80 respondents (68%) reported there lives were not endangered by the cyclone. Only one person reported suffering serious physical injury as a result of the cyclone and three people suffered mild injury. Two people reported someone else in their family had suffered serious physical injury while two respondents reported that someone in their family had suffered mild injury.

When asked how severely respondents felt they and their family had been affected by Bola, 33 people (28%) stated they had been "severely affected", while 26 people (22%) reported being "not really affected". The remaining 59 subjects (50%) stated they were affected in minor ways but not severely.

Twenty nine people (25%) said they received no warning about the disaster at all. Thirty six people (30%) received early warning and 51 (43%) received what they considered to be a moderate amount of warning.

The majority of respondents (64 people or 54%) were evacuated for a week or less. Twelve respondents (17%) were away from their homes for longer than a week, with eight of these (7%) having been evacuated for more than six months. Thirty four respondents (28%) were not evacuated at all.

3.2 DESCRIPTIVE STATISTICS:

This section gives the mean, standard deviations, number of cases and correlations of all the continuous variables examined in this study.

Table 5 shows the means, standard deviations and number of relevant cases for each of the variables. Noteworthy is the number of people who did not complete the social support questions.

Table 5: Means, standard deviations and number of cases for all variables.

	Mean	SD	N
PTSD	78.24	16.12	111
Psychological distress (HSCL-21)	34.46	10.83	115
Distress (IES)	31.86	15.80	107
Previous trauma	8.92	8.96	114
Trauma severity	17.77	4.41	115
Help satisfaction	14.21	6.35	116
Social support;			
Satisfaction	1.75	.92	90
Amount	2.56	2.08	104
Cost of damage ($)	37710	82596	118

Table 6 presents the correlations of all the variables. The correlations show that PTSD scores are significantly related to a higher level of psychological distress, both at the time of the cyclone and at the time of measurement. Having a previous trauma, other than Cyclone Bola, is also significantly related to PTSD scores. The PTSD scores were not related to the scores on the trauma severity measure. PTSD scores were significantly related to scores on both the help satisfaction and social support satisfaction variables. Finally, PTSD was not found to be related to the financial cost of damage suffered as a result of the cyclone.

The psychological distress scores at the time of measurement (measured with the HSCL-21) was significantly related with the distress reported at the time of Cyclone Bola. It was not related to the previous trauma, the trauma severity or the financial cost of the damage suffered variables. Table 6 shows there was a significant correlation for psychological distress scores with both help satisfaction and social support.

Distress reported for the time of Cyclone Bola is seen in Table 6 to be significantly related to the trauma severity, the social support satisfaction and the financial cost of damage variables. It was not connected with previous trauma or help satisfaction.

Whether subjects had any previous trauma other than Cyclone Bola was not significantly linked to any of the variables, other than those linkages already mentioned. This was also the case with the trauma severity variable.

The variable which measured how satisfied respondents were with the help they received from relief agencies after the cyclone was significantly related to the social support satisfaction variable but not to the financial cost of damage suffered. The social support satisfaction variable was not associated with the cost of damage variable. Finally, the amount of social support respondents reported having in the month following the cyclone was not significantly related to any of the other variables so it was not included in Table 6.

Table 6: Inter-correlations of variables

	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PTSD (1)	.6907**	.4408**	.2356*	.0367	-.2588*	-.3228*	.0328
Psychological distress (HSCL-21) (2)		.4969**	.1409	.1638	-.2356*	-.3192*	.1070
Distress (IES) (3)			.1874	.3869**	-.1786	-.3914**	.3297**
Previous trauma (4)				.0381	-.0711	-.1428	.0953
Trauma severity (5)					-.0886	.2205	.1938
Help satisfaction (6)						-.4642**	-.0079
Social support satisfaction (7)							-.0392
Cost of damage (8)							

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

3.3 PTSD CASES:

Figure 1 shows the distribution of frequencies of the PTSD scores. The distribution is slightly skewed, with a small group of respondents who show high scores.

For the PTSD scores cut-off points were calculated in order to distinguish between PTSD cases and non-PTSD cases. The present study used equivalent cut-offs to Watson's (1990) 102 and Long, Chamberlain and Vincent's (1992) 94. Watsons' (1990) cut-off was used because it was recommended for use with non-psychiatric subjects and Long et als. (1992) was used because using a conservative cut-off allows differences between the groups to be minimized when comparisons between groups are to be made. Furthermore, Long et als. (1992) study used a New Zealand population.

As mentioned in the method (section 2.5.6), at the present time no cut-off points have been established for the Civilian Mississippi. Furthermore, due to the increased number of questions used with the Civilian Mississippi the total score obtained is larger than that of the combat version, therefore cutoff scores used in past studies could not be utilised here. This meant equivalent cut-off points for the Civilian Mississippi had to be calculated. Using the sample information from Long et al.' (1992) study it was found that a cut-off score of 102 was 1.5 ($z = 1.520$) standard deviations away from the mean. This was found to be equivalent to a cut-off score of 103 for our sample.

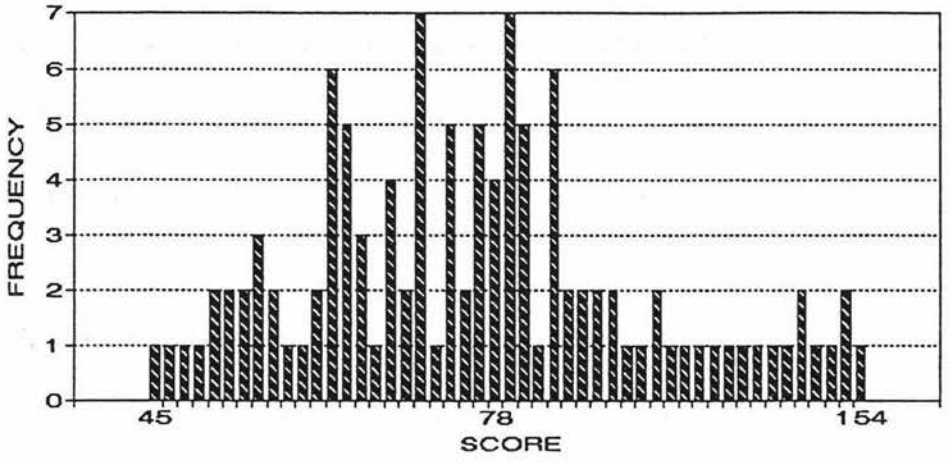

Figure One: Frequency of Post-traumatic Stress Disorder

A cut-off of 94 was calculated as being approximately one standard deviation (Z = 1.074) from the mean of Long et al.'s (1992) population, equating to 96 for the Civilian Mississippi with our sample. When 103 was used as cut-off, nine people (8%) from our sample were identified as PTSD cases. Using the 96 cut-off 14 people or 11.8% of subjects are classified as PTSD cases.

The 96 cut-off was used for the remainder of the analysis in order to minimize differences between the two groups (PTSD and non-PTSD).

After separating subjects into PTSD cases and non-PTSD cases differences between the two group means were examined on the demographic variables, using chi squared tests. There were no significant differences found.

3.4 GENERAL PSYCHOLOGICAL DISTRESS:

The Hopkins Symptom Checklist-21 was used to measure the general psychological distress of respondents at the time of the survey. Scores from our sample on this variable were compared with those of a normal New Zealand sample (Deane, 1993). The mean score for Deane's (1993) sample was 32.81 (sd = 8.74) while the sample from this study had a mean of 34.46 (sd = 10.83), this was not significantly different ($t(351) = 1.542$, ns). The PTSD group had a mean score of 53.58 (sd = 7.39) while the non-PTSD group had a mean of 30.99 (sd = 7.38), and this was significantly different, ($t(102) = 9.45$, $p < .001$). The range of scores for the PTSD group was between 35 and 67. Only one person had a score of 35 and this fell well below other subjects scores, so this score was deleted for further analysis. In Deane's (1993) study 44 was the mean score for psychotherapy clients so this was used as a cutoff score. With the current studies sample population, 17% scored above 44. In comparison, 11% of the normal population sample scored within this range. Using a test for the differences between proportions it was found that the difference between this sample and the normal sample was significant ($z = 3.45$, $p < .001$).

For further analysis it was decided to use those who scored above 44 as a high psychological distress group and those below this cutoff as the low psychological distress group. Chi-squared tests were run for these two groups on the demographic variables but there were no significant differences found.

3.5 HYPOTHESIS TESTING:

In section 1.5 six hypotheses were generated for investigation in the present study. This section examines each of these hypotheses in turn explaining what analyses were run to test these hypotheses and what the results were.

3.5.1 Hypothesis One:

The first hypothesis of this study was that those subjects who experienced more adversity as a result of Cyclone Bola would report having higher scores on both the current psychological distress and the PTSD variables. To examine this t-tests were run between the PTSD and non-PTSD groups and the high and low psychological distress groups on both the trauma severity and cost of damage suffered variables. There were no significant differences found for any of these variables. These results can be seen in Tables H-1 and H-2 (Appendix H).

3.5.2 Hypothesis Two:

It was proposed that those respondents who were more satisfied with the help they received from disaster relief agencies in the period immediately after Cyclone Bola would have lower scores on both the PTSD scale and psychological distress measure. This was again examined using t-tests, this time to determine if there was any significant differences between the groups on the help satisfaction variable. It was found that there were significant differences both between the PTSD groups ($t(106) = 2.30$, $p < .05$) and the psychological distress groups ($t(107) = 1.96$, $p < .05$).

Closer examination of the items on this scale revealed that 55 respondents (47%) reported that overall they were happy with the help they received after Bola, however, 13 respondents (11%) stated they were not at all happy. Forty six respondents (40%) felt the assistance given to them from helping agencies was "excellent", 18 people (15%) reported the help given was "inadequate", and 52 (44%) placed themselves somewhere in the middle of these two. Twenty nine people (24%) felt the financial aid available after the disaster was easy to apply for, however, 22 (19%) disagreed believing the aid was "extremely difficult" to apply for. Forty three respondents (36%) felt that although it was not extremely difficult to apply for aid neither was it easy to apply for. Finally it was noted that 40 respondents (34%) of the felt the financial aid provided was very satisfactory, 31 (26%) felt that although not entirely satisfactory it was not completely unsatisfactory, 9 people (8%) were leaning more towards being unhappy with the financial aid and 15 people (13%) were "not at all satisfied" with the financial aid given.

3.5.3 Hypothesis Three:

The third hypothesis for this study proposed that those individuals who were highly emotionally distressed at the time of the disaster, regardless of the amount of adversity suffered, would report higher levels of psychological morbidity. Distress in this study was measured using the Impact of Event Scale (IES), (Horowitz, Wilner and Avarez, 1979). McFarlane (1988) used the IES to measure distress in a group of Australian firefighters. As a comparison to our data it was noted that the mean score for his population was 18.2 (s.d.

= 15.8), while our mean was nearly double, 31.86 (s.d. = 15.8). T-tests were undertaken to test the above hypothesis. Significant differences were found between the PTSD and non-PTSD groups on distress ($t(99) = 3.97$, $p < .001$) and between the low and high psychological distress groups on distress ($t(99) = 4.44$, $p < .001$).

In order to test whether scores on the PTSD and psychological distress variables could be predicted by the emotional distress variable a standard multiple regression analysis was run on these variables. It was found that the emotional distress generated by the disaster accounted for 18% of the variance on PTSD scores ($F(1,99) = 23.87$, $p < .001$, beta = .4408). A second standard multiple regression run between the emotional distress and psychological distress variables found that the distress felt after the disaster accounted for 24% of the variation in the scores for the psychological distress measure, ($F(1,99) = 32.83$, $p < .001$, beta = .499).

The scores from the IES can be broken down into two separate subscales for more detailed analysis. One subscale indicates how subjects avoided thinking about the event whereas the other subscale evaluates whether thoughts about the event intruded into the persons mind. Table 7 shows the means, standard deviations and correlations of these two subscales with the other variables.

Both of these subscales were highly correlated to nearly all the other variables. The only variables they were not related to were previous trauma

and the amount of social support. Additionally, avoidance was not linked to the amount of satisfaction people had with the help they received after Bola.

Table 7: Means, standard deviations and correlations of avoidance and intrusion with the other variables

Variables	Avoidance	Intrusion
PTSD	.4359**	.3888**
Psychological distress (HSCL-21)	.4440**	.5028**
Previous Trauma	.1719	.1722
Trauma severity	.2562*	.4462**
Help satisfaction	.1182	.2300*
Social Support satisfaction	.3642**	.3558**
Social Support amount	-.1091	-.1306
Cost of damage	.2498*	.3420**
Mean	15.49	16.84
SD	8.29	8.69

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

Comparison of mean scores for the PTSD and non-PTSD groups on the avoidance and intrusion variables were significantly different. Avoidance; ($t(101) = 4.17$, $p < .001$), and intrusion; ($t(107) = 3.37$, $p < .001$). Further analysis found there were also significant differences between the high psychological distress group and low psychological distress group on avoidance ($t(101) = 4.26$, $p < .001$) and intrusion ($t(107) = 4.52$, $p < .001$).

3.5.4 Hypothesis Four:

The present study predicted that those individuals who had more social support at the time of the disaster would report lower levels of psychological morbidity. Results partially support this hypothesis.

Results supported a mediating influence from the social support satisfaction variable but not from the amount of social support variable. Table 8 gives the results of t-tests run between the psychological distress groups on the two social support variables while table 9 gives the results for the PTSD groups.

Table 8: Comparison of mean scores for Psychological Distress on the Amount of and Satisfaction with Social Support.

Variable	High Distress	Low Distress	t value
Social Support:			
- satisfaction	14.64	9.96	3.03**
- amount	12.50	16.44	-1.20

** $p < .01$

Table 9: Comparison of mean scores for PTSD on the Amount and Satisfaction with Social Support

Variable	PTSD	non-PTSD	t value
Social Support:			
- satisfaction	1.66	2.48	2.71**
- amount	2.15	2.66	-0.80

** $p < .01$

3.5.5 Hypothesis Five:

The fifth hypothesis for this study was that females would report higher levels of distress than males. A t-test run to examine this found no significant difference ($t(105) = -.72$, ns). T-tests were also run to determine if there were any gender differences on any of the other continuous variables. As already briefly mentioned in the method section (section 2.6) there was a significant

difference between males and females on income in both 1988 ($\underline{t}$ (116) = 3.78, $p < .001$) and 1993 ($\underline{t}$ (116) = 3.43, $p < .001$). Chi-squared tests were run for gender on all the demographic variables. Differences were found on marital status (x^2 (DF 3, $\underline{N}$ =118) = 10.75, $p < .01$), ethnicity (x^2 (DF 3, $\underline{N}$ = 118) = 20.39, $p < .001$) and both occupation in 1988 (x^2 (DF 33, $\underline{N}$ = 118) = 65.97, $p < .001$) and 1993, (x^2 (DF 33, $\underline{N}$ = 118) = 71.15, $p < .001$). There were no significant distinctions made between the sexes on any of the other variables.

3.5.6 Hypothesis Six:

One of the objectives of this study was to examine the influence of all the variables measured in this study on psychological distress following a natural disaster. It was hypothesised that this distress would be predicted by a combination of a few of these variables.

Two standard multiple regressions were run to examine how all the variables interact in predicting psychological distress after a natural disaster. The first regression was between PTSD and the remaining continuous variables and the second was between current psychological distress and the same variables.

Evaluation of assumptions, in particular significance tests of skewness and kurtosis, led to transformation of the majority of the variables. This reduced significant skewness or kurtosis in the distributions of the variables. It also reduced the number of outliers and improved normality, linearity and

homoscedasticity of residuals. To reduce substantial positive skewness a logarithmic transformation (L) was used on the measures of PTSD, satisfaction with social support and the dollar amount of damage. A square root transformation (S) was used on Bola related distress, psychological distress measured at the time of the survey, previous trauma and the amount of social support respondents reported having. This transformation was used to reduce less substantial positive skewness in these variables. These transformation decisions were based on information in Tabachnick and Fidell's (1989) book on multivariate statistics. No transformation was necessary for how satisfied subjects were with the help they received from authorities after Bola and the severity of the trauma. One multivariate outlier was removed from the model using current psychological distress as the dependent variable. Several cases had missing data so that N was reduced markedly to 58. Both models were run using a mean substitution for the missing data, however, this did not significantly alter the outcome of the multiple regression equation so it was decided to proceed with a listwise deletion of the missing data.

Table 10 displays the correlations between the variables, the unstandardized regression coefficients (B) and intercept, the standardized regression coefficients (Beta), the semi-partial correlations (sr^2) and R, R^2, and adjusted R^2 for the first model (with the transformation of PTSD as the dependent variable). The R for regression for this model was significantly different from zero, $F\ (7,50) = 3.729$, $p < .01$.

Only two of the independent variables contributed significantly to predicting respondents scores on the PTSD scale, square root of distress at the time of Bola ($\underline{sr^2}$ = .05) and square root of previous trauma ($\underline{sr^2}$ = .09). All the independent variables in combination contributed another .13 in shared variability. Altogether, 34% (25% adjusted) of the variability on PTSD scores was predicted by knowing the scores on these variables.

Table 10: Standard Multiple Regression on PTSD

Variables	PTSD (DV)	B	Beta	sr^2
SDistress (IES)	.418	.017*	.311	.050
SPrevious trauma	.367	.013**	.330	.097
Trauma severity	.039	.001	.070	.003
Satisfaction with Help	.202	-	-.010	-
LDamage ($)	.048	-.013	-.156	.016
SAmount of Social Support	-.253	-.008	-.183	.026
LSatisfaction with Social Support	.339	.052	.153	.013
	Intercept =	1.76		
			R^2 = .343[a]	
		Adjusted	R^2 = .251	
			R = .586	

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

[a] Unique variability = .21; Shared Variability = .13.

Table 11 shows the correlations between the variables, the unstandardized regression coefficients (B) and intercept, the standardized regression coefficients (Beta), the semi-partial correlations (sr^2) and R, R^2, and adjusted R^2 for the second model using the square root of the current psychological distress scores as the dependent variable. This regression was significant, $F(7,49) = 5.05$, $p < .001$.

With this model only the transformation of distress at the time of Cyclone Bola contributed significantly to the prediction of the transformation of current psychological distress (sr^2 = .17). The contribution of this variable is further supported by a confidence interval of .155 to .526. All the independent variables combined contributed .17 in shared variability. Altogether, 42% (34% adjusted) of the variability on current psychological distress can be predicted from knowing scores on these variables.

Table 11: Standard Multiple Regression on Current Psychological Distress

Variables	Current Psychological Distress (DV)	B	Beta	sr^2
SDistress (IES)	.582	.341***	.551	.161
SPrevious trauma	.266	.081	.187	.030
Trauma severity	.155	.019	.106	.008
Satisfaction with Help	.236	-	.002	-
LDamage ($)	.083	-.215	-.233	.038
SAmount of Social Support	-.176	-.018	-.038	.001
LSatisfaction with Social Support	.362	.456	.119	.008
	Intercept=	3.61		
			R^2 = .419[a]	
		Adjusted	R^2 = .336	
			R = .647	

*** $p < .001$

[a] Unique variability = .25; Shared Variability = .17.

CHAPTER FOUR:

DISCUSSION.

The purpose of the present study was to examine long-term post-trauma psychological reactions in a community sample of the New Zealand population. In addition, it was intended to identify whether certain factors are important in the development and long-term prediction of these psychological reactions.

4.1 RESPONSE RATES:

The present study had a response rate of 33%. One possible explanation for this low response rate is the length of time which has passed since Cyclone Bola occurred (over four years). The majority of similar studies utilising postal surveys were administered in the year immediately after the event and recorded higher response rates than the present study (McFarlane, 1987, 1988, 1989; Cook & Bickman, 1990; Clayer, Bookless-Pratz & Harris, 1985). Logue, Hansen and Struening (1979), had a similar five year post event time frame as this study and reported a comparable response rate of 37%.

It is further proposed that the low response rate could be partly a reflection of the population being sampled. The Gisborne area, where the sample was drawn, is an area of particularly high unemployment and with a largely transient workforce. Furthermore, it is a predominantly rural area. This suggests the majority of the population is widely dispersed, seasonal and constantly on the move. This increases the chances of subjects being absent

from the address the survey was sent to. Combined with the negative newspaper coverage received in the early stages of the survey posting, this could have contributed to the low response rate.

Additionally, the timing of the survey could further add to low response rates. Section 2.6 indicates the majority of respondents were agricultural and fishery workers. The survey was posted in late July and would have arrived in the end of winter/beginning of spring. This is one of the busiest times of the year for farmers with the start of lambing, calving and the preparation of soil for cropping. It is speculated that some of the subjects sent questionnaires may have been too busy to complete them. Moreover, the questionnaire took approximately 45-50 minutes to complete which some people may have considered too long to spend on something of this nature.

Another possibility is the presence of a phenomenon McFarlane (1989) describes as the 'trauma membrane'. This is where survivors of disaster set up a screen around themselves, of close friends and family, to buffer themselves from being exposed to any further external stress or reminders of the disaster. McFarlane (1989) claims "this phenomenon has been demonstrated in the low response rates that are common in disaster research, in contrast to other types of epidemiological research" (p 33). According to McFarlane (1989), survivors perceive that someone who did not experience the disaster has no first-hand knowledge and could therefore not possibly understand what it is they are experiencing. It is possible this membrane was

still in existence at the time of the survey, thus adding to the low response rate.

Furthermore, as McFarlane (1989) points out, one of the characteristics of PTSD is avoidance, including avoidance of anything reminding the individual of the event. It is conceivable then many of the people more seriously affected by the disaster would be likely to avoid a survey relating to it, also affecting the response rates.

4.2 PTSD CASES:

There has been some debate about cut-off points for the Mississippi PTSD scale and where they should be placed in order to identify PTSD cases. Keane, Caddell, and Taylor (1988), McFall, Smith, Mackay and Tarver (1990), and Schlenger and Kulka, (1987) all used different cut-off scores ranging between 107 and 94. Watson (1990), after reviewing all the above papers, suggested that a cut-off score of 102 be used in a non-psychiatric setting. Long, Chamberlain and Vincent (1992), adopted the least conservative classification, recommended by Schlenger and Kulka (1987), of a cut-off mark of 94. Long et al. state that adopting the least conservative classification provides the most rigorous test for PTSD, minimizing the difference between the two groups. In the present study, the least conservative point was adopted for the same reason.

This study identified 11.8% of respondents as PTSD cases. This result supports the suggestion natural disasters can cause PTSD.

The incidence of PTSD cases in this study was not as high as rates reported in North American disaster studies. For instance Buffalo Creek survivors had a rate of 44% in 1974 (Green, Lindy, Grace, Gleser, Leonard, Korol & Winget, 1990) and McFarlane (1988) found a rate of 18-24% in his sample of Australian firefighters. Nevertheless, the prevalence rate found in this study is believed to be significant because it is higher than PTSD rates found with community samples. Shore, Vollmer and Tatum (1989) found lifetime rates of 2.9% for men and 3.3% for women. Sutker, Uddo-Crane & Allain (1991), on the other hand, found prevalence rates in a community sample of between 1 and 2%. Additionally, the prevalence rate for this study falls within Norris' (1992) estimation that, depending on the nature of the event experienced, approximately 2-14% of a population could be expected to meet criteria for a diagnosis of PTSD. More specifically Norris (1992) states, approximately 5-8% of people exposed to various environmental hazards would be expected to develop signs of PTSD.

PTSD prevalence rates found in disaster studies have all varied. These differences between rates are difficult to assess accurately because of the considerable differences between the measures of PTSD used, the different methods of selecting samples, and the differences in the types and intensity of the events. Cyclone Bola, for instance, would be considered to be a

disaster of lesser magnitude than both the Buffalo Creek dam burst (Green et al., 1990) and the Mount St Helens eruption (Shore, Tatum & Vollmer, 1986). This is because the death toll for these two disasters was considerably higher, and in the case of Buffalo Creek many survivors witnessed the deaths of others. These factors could have contributed to the higher PTSD rates for these particular studies.

The time that has elapsed after the event until the measure is taken also influence' incidence rates. Green et al (1990) found PTSD rates for Buffalo Creek survivors fell from 44% in 1974 to 28% in 1986. Steinglass and Gerrity (1990) also found, with Parsons flood victims, incidence rates fell from 14.5% four months after the event to just 4.5% at 16 months. This implies PTSD rates may diminish over time and that the time of measurement may influence the PTSD rates which are recorded.

4.3 GENERAL PSYCHOLOGICAL DISTRESS LEVELS:

The HSCL-21 was used in this study as a measure of respondents general psychological distress at the time of the survey. Scores on the HSCL-21 for our sample were similar to those for Deane's (1993) community sample. A test of the differences between the two sample means found no significant difference. This implies our sample was no more psychologically distressed at the time of measurement than a normal community sample. However, further examination of the two samples (section 3.4) found there was a significantly greater proportion of subjects in the Cyclone Bola sample who

scored at the higher end of the scale than Deane's (1993) normal population. Although the majority of the sample fell into the 'normal' ranges of the HSCL-21 there were a small group who scored in the psychologically distressed region and this group is larger than what would appear to be expected from a community sample. This is consistent with PTSD rates also, where the majority of respondents score in the normal range and in this study only 11.8% score in the high end of the scale. This supports the finding that although the majority of the sample appear to have no long-term psychological effects from Bola there is still a percentage who show signs of having been affected. Furthermore, this percentage is of a magnitude to warrant studies into the factors which contribute to this long-term psychological distress.

4.4 EXTENT OF SUPPORT FOR HYPOTHESES AND COMPARISON OF RESULTS WITH THOSE FROM PREVIOUS STUDIES:

4.4.1 Trauma (Hypothesis one):

The hypothesis those people who suffered more adversity as a result of a natural disaster would report having more psychological problems was not supported by the results in the present study.

Results in this study revealed there was no significant link between the trauma variables (trauma severity and the cost of damage suffered), and scores on the psychological morbidity scales, the PTSD and psychological distress measures.

This lack of support for a significant association between these variables is in contrast to Vietnam Veteran studies which have found it was the intensity and length of the combat exposure which was a critical factor in predicting PTSD rates, (Ramsay, 1990; Green, Grace, Lindy, Gleser & Leonard, 1990; Tennant, Streimer & Temperly, 1990; Sherwood, Funari & Pierkarsk, 1990). Further, this result differs from disaster research which found respondents who suffered the most elevated amounts of damage more often reported psychological problems due to the disaster, (Bolin & Bolton, 1986; Shore, Tatum & Vollmer, 1986; McFarlane, 1987).

Although the present study does not support a direct link between the level of damage and psychological distress it does support an indirect relationship. There was support for an association between the amount of trauma suffered and the level of distress felt in the period immediately after the event. The link between this distress and current psychological morbidity is discussed later in this chapter.

4.4.2 Satisfaction with Help Received (Hypothesis two):

Results in this study support the hypothesis if a subject is satisfied with the assistance they receive from disaster relief agencies in the period following the disaster they will have lower levels of psychological distress in the long term.

The results supporting this hypotheses were the significant differences found between the PTSD and non-PTSD cases and the high psychological distress

and low psychological distress groups on the help satisfaction variable. This indicates that knowing how satisfied an individual was with the help they received after the event could help to place them in either a high or low risk group for later psychological morbidity.

This is consistent with previous research which has found environment-recovery factors, like aid given after a disaster, can be important in mediating long-term psychological morbidity as a result of a disaster (Baum, O'Keefe & Davidson, 1990; Horowitz, Stinson & Field, 1991). This result is also consistent with Bolin and Bolton's (1986) finding that the immediate and ongoing aid people receive is extremely important in their psychological recovery.

4.4.3 Distress as a predictor of Psychological Morbidity (Hypothesis three):

The present findings support the hypothesis the degree of emotional distress felt by subjects as a result of a natural disaster will result in respondents reporting higher levels of psychological morbidity.

This hypothesis is substantiated by results revealing significant differences between both the higher and lower scoring psychological distress groups and the PTSD and non-PTSD groups on scores for the Impact of Event Scale. Further, there were significant relationships between the emotional distress variable and the PTSD and current psychological distress variables. A

regression was run to determine how much of the variation on the psychological morbidity variables was accounted for by the emotional distress variable. This showed emotional distress accounted for 18% of the variation in PTSD scores and 24% of the variation on the psychological distress scores.

This result is consistent with McFarlane's (1988) findings that events exert pathogenic influence because of their emotionally distressing nature and not because of the life change produced. Results from this study also support McFarlane's suggestion there is no link between the amount of damage and psychological impairment. He states that in his study the amount of damage is related to how distressed subjects feel which in turn predicts the level of impairment. This is supported in (as mentioned earlier in this chapter) the current study as no direct relationship between the trauma variables and the psychological impairment variables was found. However, an association between these variables and the amount of emotional distress subjects felt as a result of the disaster, was reported. Additionally this distress has then been linked to current psychological impairment levels.

4.4.4 Social Support (Hypothesis four):

There was partial support in the present study for the hypothesis those individuals who had more social support at the time of the disaster would report lower levels of psychological morbidity. T-tests run to test this hypothesis found significant differences between the high and low psychologically distressed groups and the PTSD and non-PTSD groups on the

social support satisfaction variable but not on the amount of social support variable.

These findings are consistent with previous disaster research which suggests social support is an important factor in mediating the affects of disasters. However, there has been little agreement in the literature over which facet of social support is the most important (Solomon, Smith, Robins & Fischbach, 1987; Murphy, 1988; Cook & Bickman, 1990). These studies identified different aspects of social support as having the most impact. Cook and Bickman (1990) concluded the influence of social support as a mediator changes over time and results would alter depending on the time which elapsed before measurement took place.

The measurement of social support in the current study was performed over four years after the event had occurred. It is possible this result could have varied if the measurement had been undertaken at another time. The current study indicates that four years after a natural disaster the satisfaction respondents remember having with the social support received at the time of the disaster may mediate the level of psychological distress reported. This result needs to be treated with caution because only two facets of social support were measured in this study. This result could be considered a preliminary finding to support the influence of social support.

4.4.5 Gender Differences (Hypothesis five):

This study found gender differences on the demographic variables of marital status, ethnicity and occupation both for 1988 and 1993. The hypothesis females would report higher levels of distress than males was not supported. Tests of the differences between males and females on the mean scores of all the continuous variables also found no significant differences, apart from those on income. This is in contrast to the studies of Solomon, Smith, Robins and Fishbach (1987) which found gender differences on support needs after a disaster. It is also different from findings by Steinglass and Gerrity (1990) who found women reported being much more distressed than men. However, this study is consistent with Madakasira and O'Brien's (1987) study which found no significant gender differences.

It is possible the discrepancies in these results is a reflection of the different measurement techniques used in these studies. It is also feasible the nature of the event may have had some influence on the outcomes. There is a further possibility the type of population sampled may influence any gender differences found. For example, the population in the current study was predominantly rural and may therefore report different gender influences than an urban population. In conclusion, this study supports the view there are no gender differences in reactions to natural disasters.

4.4.6 Contributions of all variables to predicting psychological distress (Hypothesis six):

Results of the present study offer limited support for the hypothesis rather than it being any one variable from this study which causes psychological morbidity after a natural disaster it is a combination of more than one. This is supported by results that fail to identify any variable which can singly predict the level of psychological morbidity a person will experience as a result of a natural disaster. One or two of the variables in this study were found to have some influence but none could explain 100% of the variance. Distress, for instance, showed the strongest statistical relationship in this study and accounted for 18% of the variance on the PTSD scores and 24% of the psychological distress scores.

Multiple regressions run to test the influence of all the variables on PTSD scores found a combination of the variables accounted for 34% of the variance on these scores. This suggests there is a large percentage of variance unexplained. For the second multiple regression (run on the psychological distress measure (HSCL-21)), 42% of variance was explained by the variables in this study, leaving over 50% unexplained. However, having some variance explained supports the hypothesis it is a combination of factors which contributes to morbidity. It further suggests there are other variables not identified in this study which are important.

All the variables in this study contributed to the prediction of scores on both the PTSD and psychological distress variable, however, only a few are significant. For the first multiple regression on PTSD scores the significant variables were the distress subjects experienced as a result of the disaster and whether subjects had experienced any trauma other than Cyclone Bola. This finding supports previous findings that the emotional distress subjects experience at the time of the disaster appears to be an important factor in predicting future psychological morbidity. This result also introduces the influence of previous trauma. Therefore, those PTSD cases identified in this study may not have been directly linked to Cyclone Bola and may have resulted from another event in the individuals life. In other words, there is the possibility this is a confounding factor.

In the second multiple regression equation, using psychological distress (HSCL-21 scores) as the dependent variable, the only significant variable was again the level of emotional distress experienced at the time of the disaster. This again supports the importance of this variable in the prediction of psychological morbidity resulting from natural disaster.

In considering the present findings it is also important to be aware of the methodological limitations of the present study.

4.5 METHODOLOGICAL LIMITATIONS OF THE PRESENT STUDY:

4.5.1 Sample:

The main limitation with the sample used in the present study is the generalizability of the results because the sample was not chosen randomly. To try to maximise the effects of the trauma, this sample was deliberately targeted as those having been 'affected' by Cyclone Bola. Hence the findings may only be applicable to samples affected by natural disasters and should not be used as a comparison of a general population.

A further limitation of this sample is its size. It would have been desirable to have a much larger sample to limit the amount of sampling error and narrow the confidence interval. It is possible some subjects did not respond to the survey because the memory of the event was too traumatic. This suggests the reported morbidity rates may not be representative of the whole disaster population.

4.5.2 Instruments:

Using a postal survey may have effected the information found in this study. First, it would have been desirable to do a pilot study in order to minimize any problems which may have been associated with the survey. This however, was not possible due to the time and financial limitations of the present study. Additionally, surveys tend to allow for only simplistic answers and can miss some of the more complex responses which people may wish to give. This was illustrated in the present study by a few people who either wrote extra

comments on their surveys or included letters in with their replies offering extra information. Due to the design of the study this information was not used in any analysis.

Systematic psychiatric interviews were not conducted in this study which would have given more validity to the self-report survey. Although self-report surveys do reflect psychopathology, conclusions can only be considered tentative because of the lack of clinical validation. To overcome these problems it would have been desirable to use a structured interview as well as a self-report survey.

4.6 THEORETICAL IMPLICATIONS:

The present study supports findings in the literature which show natural disasters can have a substantial and long-term impact on those exposed. However, not all disasters will affect survivors in the same way and two people experiencing the same disaster may not react identically. Still, knowing a natural disaster can have a severe and long-lasting effect on even a small percentage of people has major implications. These implications are particularly relevant in the area of prevention.

One of the principal reasons for investigating psychological sequelae of natural disasters is to provide information which will assist with the prevention and treatment of the psychological morbidity resulting from future disasters. To date, most countries have in place plans of action in case of disasters. New

Zealand, for instance, has the Civil Defence as its primary disaster relief agency. However, these plans and organisations are predominantly designed to deal with the *physical* needs of survivors. There is no denying the importance of these needs, or the role of organisations such as Civil Defence. However, studies such as the present one show the importance of having a plan to cope with the emotional distress survivors may experience. Unfortunately, before anything can be done about an intervention procedure it is necessary to convince government bodies who finance current post-disaster assistance programmes that post-disaster psychological intervention is necessary. Furthermore, it is important to stress the preventive role post-disaster intervention could play in mediating future psychological morbidity.

Disasters are distressing and emotive events for all involved, including researchers and those who provide disaster relief. Such an environment engenders strong feelings and opinions and it is important any judgment be based on carefully validated and replicable measures, rather than on subjective opinion. This is particularly important because the majority of people working in disaster management are often unfamiliar with and suspicious of psychology and psychological terms.

The provision of a prevention service could best be focused if high-risk individuals or groups could be identified. Studies which try to identify the etiology of PTSD and other long-term psychological morbidity are, therefore, important. On the basis of disaster research predictions could be made about

which individuals and groups to target for intervention and, additionally, the time after the event in which intervention would be the most valuable.

Unfortunately, to date, there has been very little agreement in the literature about which factors could help to identify the high-risk survivors. The main finding from the current study was that the emotional distress respondents reported as a result of the disaster was the best predictor of later psychological morbidity. While this result is consistent with other studies there are unfortunately just as many which would refute these findings. Furthermore, few studies have reported with any confidence they can predict those people who will be most at risk. This implies there is still a great deal of scope for more research in this area.

4.7 RECOMMENDATIONS FOR FUTURE STUDIES:

There are three main areas which need to be taken into consideration in future studies. First, it would be desirable in any future studies to try and increase the size of the sample.

Second, a broad approach to the measurement of PTSD and other psychological morbidity resulting from natural disasters is needed. In future studies more detailed assessment of the nature and severity of the stressors to which the individual was exposed, individual factors which might affect post-trauma processing of the event, and the factors in the recovery environment that may enhance or impede recovery needs to be conducted. For this to

happen a scale or interview format should be constructed which encompasses all this.

Additionally, a well constructed and validated scale, or interview format, could then be used consistently in disaster studies, allowing findings from these studies to be compared. This would also assist in ruling out the role of different measurement techniques in the discrepancies which have been found in previous research.

4.8 CONCLUSIONS:

Findings from the present study show a natural disaster, like Cyclone Bola, can lead to long-term psychological morbidity, including cases of PTSD. Furthermore, results indicate the role of adversity from a natural disaster may not have a direct relationship with the etiology of long-term psychological morbidity. This study found no support for a direct link between the level of adversity and the level of reported psychological morbidity, including PTSD. However, results do suggest an indirect link between the amount of emotional distress the adversity caused each individual and recorded levels of psychological morbidity. In the present study the level of emotional distress reported as a direct result of Cyclone Bola was consistently the strongest predictor of later psychological morbidity. This indicates it may not be the actual event which caused the psychological problems but rather the meaning attributed to that event by each individual who experienced it. This would also

help to explain why two people exposed to exactly the same event would report different levels of psychological morbidity at a later date.

Results from the present study also supported a possible mediating role, in post-trauma stress reactions, of both satisfaction with help received from relief agencies and satisfaction with social support. Again these variables have the common link of being associated with an individual's perceptions of the situation. This indicates that how individuals perceive both the event and the assistance and support given to them at the time of the disaster may be important. This suggests it may not be an external factor which can be identified as the main causal factor in the post-trauma stress reactions. It is possible, for instance, an individual who normally perceives things in a negative light would perceive the whole event more negatively and therefore be more susceptible to long-term psychological morbidity. This inference is purely speculation, however, it is backed by the results from this study and is certainly an area which requires further study.

The present study also examined the possibility of gender differences in reactions to a natural disaster. There was no support found for any gender differences on any of the continuous variables. This included scores on both the PTSD and psychological distress variables as well as the emotional distress at the time of the disaster variable. There were some gender differences found, yet, these were only on the demographic variables (ethnicity, occupation, marital status). This indicates the female and male

members of the sample population were not exactly matched demographically. This may have influenced the gender results.

In conclusion, the present study found there is long-term psychological morbidity associated with natural disasters, including identified cases of PTSD. Additionally, there is evidence to suggest individuals' perceptions of both the event and the assistance and support provided after the event appear to be important factors in predicting later levels of psychological morbidity.

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APPENDIX A:

PRESS RELEASE.

July 1993

Dear Sir/Madam

Staff from the Psychology Department at Massey University are doing research in the Gisborne area in the next few months on the long-term psychological effects of Cyclone Bola. Much of the research is being done by a Masters student, Miss Kerry Eustace, under the supervision of Massey University senior lecturers, Dr Nigel Long and Mr Kerry Chamberlain.

Gathering of data for this research is being done through a postal survey. This survey is being sent to 500 people in the Gisborne area who were believed to have been in the region when Cyclone Bola struck. The survey takes about 50 minutes to complete and contains questions about the individuals experiences during Bola and also their feelings now. The success of this project depends on the support of the people who complete the survey.

The research is focusing on the possible psychological reactions people may be experiencing today as a result of being affected by Cyclone Bola. The research is based on findings from Psychologists in both North America and Australia. These findings have indicated that being exposed to a natural disaster can cause various psychological effects to occur. Furthermore, some studies have found that these effects can persist for anywhere up to twenty years after the event.

However, there is a lack of agreement over which aspects of disasters cause these effects. There has been some suggestion that it is the nature of the disaster itself and the amount of exposure each individual experiences which determines whether the people involved in the disaster will suffer any psychological reactions. Other researchers have argued that the help received at the time of the disaster, and in the days and weeks following, determines whether an individual has any long lasting psychological reactions.

There has been limited research in New Zealand on this subject, even though New Zealand is a country which has proven to have a high risk of experiencing natural disasters. This is best shown by natural disasters such as the Napier earthquake, the

Tangiwai train disaster and more recently Cyclone Bola. It is important that research be undertaken on how natural disasters have affected New Zealanders and in particular whether the findings by researchers overseas are also true for New Zealanders.

In conclusion, there is a general agreement among psychologists that natural disasters are traumatic enough to cause some people exposed to them to suffer ongoing psychological reactions. However, little is known about which aspects of the disasters actually cause these reactions and why some people are effected differently than others. This study is an attempt to answer some of these questions specifically for New Zealanders. It is hoped that answering some of these questions will allow relief agencies working during a disaster to identify individuals at high risk of suffering reactions and helping them to cope better.

Further information can be obtained from:

Miss Kerry Eustace
Dr Nigel Long

[redacted] or
Telephone (06) 3569 099
ext 5229
Fax. (06) 35 0611

Yours sincerely

KERRY EUSTACE (Miss)

APPENDIX B:

COVERING LETTER.

July 1993

Dear Sir/Madam

Your name has been selected at random from people living in the Gisborne area for inclusion in a study investigating the post-disaster adjustment of people directly affected by Cyclone Bola. This research is being undertaken by independent researchers from Massey university. Researchers include Senior Lecturers in Psychology, Dr Nigel Long and Mr Kerry Chamberlain and Masters student, Miss Kerry Eustace. Dr Lesley Frederikson, a Postdoctoral Fellow will also be involved with the research.

The present study will investigate whether the trauma associated with a natural disaster has any long-term effects. We would appreciate it if you would agree to take part in this study, we need to obtain information from as many people directly affected by Cyclone Bola as possible.

Details of the research are provided in the attached information sheet. Please read through this carefully and if you are willing to participate in the study complete the enclosed consent form and questionnaires and return them in the envelope supplied.

Please do not hesitate to contact either of the researchers if you have any queries about the questionnaire or research in general. You may wish to contact us at the above address, fax us at (06)35 0611 or phone Dr Nigel Long on (06)35 69099 extn 5229 or Kerry Eustace on [redacted] Your assistance with this research would be greatly appreciated.

KERRY EUSTACE

NIGEL LONG

KERRY CHAMBERLAIN

LESLEY FREDERIKSON

APPENDIX C:

INFORMATION SHEET

Researchers from Massey university are conducting research on the post-disaster adjustment of people directly affected by Cyclone Bola. Researchers are Senior Lecturers in Psychology, Dr Nigel Long and Mr Kerry Chamberlain and Masters Student, Miss Kerry Eustace. Dr Lesley Frederikson, a Postdoctoral Fellow will also be involved with the research.

WHAT IS THE PRESENT STUDY ABOUT?
The present study will investigate whether being directly affected by a natural disaster has any long-term psychological effects. In particular it will examine the long-term effects of Cyclone Bola on you. To do this, we will ask you a variety of questions, including some about traumatic events you may have experienced and how they have affected you. Questions will also ask about the services you received at the time of the cyclone.

ELIGIBILITY
You are eligible to take part in the study if you experienced the effects of Cyclone Bola, suffered any property damage or were evacuated from your home as a result of Cyclone Bola, March 1988.

WHAT YOU WILL BE ASKED TO DO:
You will be asked to complete a single questionnaire which should take about 45 minutes of your time. The questionnaire asks you about general demographic information, current thoughts and feelings, past experiences and your experiences at the time of Cyclone Bola. Questions about your satisfaction with the services you were given as well as the social support you received in the month following the cyclone will also be asked.

YOUR RIGHTS AS A PARTICIPANT:
All participants:

* have the right to contact the researchers at any time during the research to discuss any aspects of the study.

* have the right to refuse to answer any question, or withdraw from the study at any time.

* provide information on the understanding that it is completely in confidence to the researchers, to be used only for the purposes of the research. It will not be possible to identify individuals in any reports of the results.

* have the right to receive information about the results of the study on its completion.

APPENDIX D:

CONSENT FORM

I have read the information sheet about this study and understand the details of the study. I understand that I may ask questions at any time and decline to answer any particular questions in the questionnaire. I also understand that I am free to withdraw from the study at any time. I agree to provide the researchers with information on the understanding that it is completely confidential, and I will not be identified in any reports from the study.

Signed: _____

Name: _____

Date: _____

APPENDIX E:

SURVEY.

CYCLONE BOLA

RESEARCH PROJECT

Please read the following instructions carefully.

You should not write your name on this questionnaire. We have put a code number on the first page to provide an identification. Please remember that all the information that you give us is confidential and will be used only for the purposes of this study.

This questionnaire will take about 45 minutes to complete. We would like you to find a time when you will not be disturbed, and to answer all the questions in one session if possible. We ask you to make sure that all the answers are you own and please try to answer all the question and be careful not to skip any pages. Please do this at the earliest convenient time for you after receiving the questionnaire.

When you have finished please return the questionnaire in the envelope provided. You do not need to put a stamp on it.

Firstly we would like some general background information about you. Circle the number for the answer which is best for you, or give details in the spaces provided.

What is your date of birth?

_____/_____/19_____

What is your sex?

Male ☐ Female ☐

What is your present marital status?

Never married 1
Married/Remarried (including defacto) 2
Separated/divorced 3
Widowed 4

How many people are there in your family?

_____

What ethnic group do you belong to?

New Zealander of Maori descent 1
New Zealander of European descent 2
New Zealander of Pacific Island descent 3
Other, specify_____ 4

What is your **present** occupation?

_____

What was your occupation **at the time of Cyclone Bola** (in March, 1988)?

_____

What is your **present** gross annual income?

_____

What was your gross annual income **at the time of Cyclone Bola**?

_____

Everyone experiences traumatic events at some time in their lives. A traumatic event is any incident which is outside your normal range of experiences. Some people only ever have one or two traumatic experiences in a lifetime while some have many more.

Listed below are a few traumatic experiences which may have happened to you at some time in your life. We would like you to answer either 'Yes' you have experienced this event, or 'No' you have never experienced an event like this, and then to circle the answer that is the most accurate for you.

Did any one ever take something from you by force or threat of force, such as in a robbery, mugging or hold-up?

NO ☐ go to the next question

YES ☐ If YES did this happen 1 ---------- 2
once more than once

When did this happen? If it happened more than once please give the last time it happened.

1 ..... 2 ..... 3 4
< 6 mths ago 6-12 mths ago 1-5 yrs ago >5 yrs ago

Did anyone ever beat you up or attack you?

NO ☐ go to the next question

YES ☐ If YES did this happen 1 ---------- 2
once more than once

When did this happen? If it happened more than once please give the last time it happened.

1 ..... 2 ..... 3 4
< 6 mths ago 6-12 mths ago 1-5 yrs ago >5 yrs ago

Did anyone ever make you have sex by using force or threatening to harm you? This includes any type of unwanted sexual activity.

NO ☐ go to the next question

YES ☐ If YES did this happen 1 ---------- 2
once more than once

When did this happen? If it happened more than once please give the last time it happened.

1 ..... 2 ..... 3 4
< 6 mths ago 6-12 mths ago 1-5 yrs ago >5 yrs ago

Did a close friend or family member ever die because of an accident, homicide, or suicide?

NO ☐ go to the next question

YES ☐ If YES did this happen 1 ---------- 2 ☐☐

once more than once

When did this happen? If it happened more than once please give the last time it happened.

1 ..... 2 ..... 3 ..... 4 ☐

< 6 mths ago 6-12 mths ago 1-5 yrs ago >5 yrs ago

Did you ever suffer injury or property damage because of fire?

NO ☐ go to the next question

YES ☐ If YES did this happen 1 ---------- 2 ☐☐

once more than once

When did this happen? If it happened more than once please give the last time it happened.

1 ..... 2 ..... 3 ..... 4 ☐

< 6 mths ago 6-12 mths ago 1-5 yrs ago >5 yrs ago

Apart from Cyclone Bola did you ever suffer injury or property damage because of severe weather either a natural or manmade disaster?

NO ☐ go to the next question

YES ☐ If YES did this happen 1 ---------- 2 ☐☐

once more than once

When did this happen? If it happened more than once please give the last time it happened.

1 ..... 2 ..... 3 ..... 4 ☐

< 6 mths ago 6-12 mths ago 1-5 yrs ago >5 yrs ago

Apart from Cyclone Bola, were you ever forced to evacuate from your home or did you otherwise learn of an imminent hazard or danger to your environment?

NO ☐ go to the next question

YES ☐ If YES did this happen 1 ---------- 2 ☐☐

once more than once

When did this happen? If it happened more than once please give the last time it happened.

1 ..... 2 ..... 3 ..... 4 ☐

< 6 mths ago 6-12 mths ago 1-5 yrs ago >5 yrs ago

Did you ever serve in combat?

NO ☐ go to the next question

YES ☐ If YES did this happen 1 ---------- 2
once more than once

When did this happen? If it happened more than once please give the last time it happened.

1 ..... 2 ..... 3 4
< 6 mths ago 6-12 mths ago 1-5 yrs ago >5 yrs ago

Were you ever in a motor vehicle accident serious enough to cause injury to one or more passengers?

NO ☐ go to the next question

YES ☐ If YES did this happen 1 ---------- 2
once more than once

When did this happen? If it happened more than once please give the last time it happened.

1 ..... 2 ..... 3 4
< 6 mths ago 6-12 mths ago 1-5 yrs ago >5 yrs ago

Did you ever have some other terrifying or shocking experience, something I havn't mentioned yet?

NO ☐ go to the next question

YES ☐ If YES did this happen 1 ---------- 2
once more than once

When did this happen? If it happened more than once please give the last time it happened.

1 ..... 2 ..... 3 4
< 6 mths ago 6-12 mths ago 1-5 yrs ago >5 yrs ago

Now we would like your to think back to the actual time of Cyclone Bola and one month afterwards and answer the following questions from what your remember about that time. Circle the number of the answer which is the most accurate for you, or fill in the gap with an appropriate answer.

What was the dollar value of property you lost or had damaged by Cyclone Bola?

$_____

What was it that was lost or damaged, (i.e. stock, land, house)?

_____

What percentage of your losses were covered by insurance? ☐

1 ..... 2 ..... 3 ..... 4 5
0-20% 21-40% 41-60% 61-80% 81-100%

Did you suffer any physical injury? ☐

1 ..... 2 ..... 3 ..... 4 5
No injury Serious injury

Did any one else living in your home suffer any physical injury? ☐

1 ..... 2 ..... 3 ..... 4 5
No injury Serious injury

Did you at any time feel that your life was in danger? ☐

1 ..... 2 ..... 3 ..... 4 5
No danger Extreme danger

Had your property ever been flooded before Cyclone Bola occurred? ☐

1 ..... 2 ..... 3 ..... 4 5
Yes, at least once a year No, never

How much warning were your given before Cyclone Bola occurred? ☐

1 ..... 2 ..... 3 ..... 4 5
Early warning No warning

Overall, how severely were you (and your family) affected by Cyclone Bola? ☐

1 ..... 2 ..... 3 ..... 4 5
Not really affected Severely affected

Were you involved in helping others during Cyclone Bola? ☐

1 ..... 2 ..... 3 ..... 4 5
Not involved in helping others Spent most of time helping others

In your opinion, was the evacuation that occurred handled sensitively by authorities? ☐

1 ..... 2 ..... 3 ..... 4 5
Very sensitively Not at all sensitively

In your opinion, was the evacuation necessary? ☐

1 ..... 2 ..... 3 ..... 4 5
Very necessary Not at all necessary

If you were you evacuated from your home, how long was it for? ☐☐☐

In your knowledge, was the alternative accommodation provided satisfactory? ☐

1 ..... 2 ..... 3 ..... 4 5
Very satisfactory Not at all satisfactory

In your opinion, how good was the help from relief agencies (e.g. Civil Defence)? ☐

1 ..... 2 ..... 3 ..... 4 5
Excellent Inadequate

How easy did you find the process of applying for financial aid? ☐

1 ..... 2 ..... 3 ..... 4 5
Very easy Extremely difficult

In your opinion, was the financial help given to you satisfactory? ☐

1 ..... 2 ..... 3 ..... 4 5
Very satisfactory Not at all satisfactory

Overall, were you happy with the total help you received at the time of Cyclone Bola? ☐

1 ..... 2 ..... 3 ..... 4 5
Very happy Not at all happy

Below is a list of comments made by people after stressful life events. Please check each item, indicating how frequently these comments were true for you at for the month following Cyclone Bola. If they did not occur during that time please mark the "not at all" item.

I thought about it when I did not mean to. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all Often

I avoided letting myself get upset when I thought about it or was reminded of it. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all Often

I tried to remove it from memory. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all Often

I had trouble falling asleep or staying asleep because of pictures of thoughts about it that came into my mind. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all Often

I had waves of strong feeling about it. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all Often

I had dreams about it. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all Often

I stayed away from reminders of it. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all Often

I felt as though if it hadn't happened or it wasn't real. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all Often

I tried not to talk about it. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all Often

Pictures about it popped into my mind. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all Often

Other things kept making me think about it. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all Often

I was aware that I still had a lot of feelings about it , but did not deal with them.

1 ..... 2 ..... 3 ..... 4 5
Not at all Often

I tried not to think about it.

1 ..... 2 ..... 3 ..... 4 5
Not at all Often

Any reminder brought back feelings about it.

1 ..... 2 ..... 3 ..... 4 5
Not at all Often

My feelings about it were kind of dumb.

1 ..... 2 ..... 3 ..... 4 5
Not at all Often

The following questions ask about people who gave you help or support in the month following Cyclone Bola. Each question has two parts.

<u>Part one:</u> list all the people you know, but not yourself, who you could count on for help or support in the way described in the month following Cyclone Bola. Give the person's initials. Do not write more than one person next to each of the numbers beneath the question, and do not list more than nine people per question. If you had no support for a question, tick in the space ( ) beside the word "no one".

<u>Part two:</u> circle how satisfied you were with the overall support you received in each question area. Do this for all question, even where you have ticked "no one".

Here is and example which we have completed:

Who did you know who you could trust with information that could get you into trouble?

0 No one ( ) Tick	3 _____	6 _____
1 _____	4 _____	7 _____
2 _____	5 _____	8 _____

How satisfied were you with the support you received?

1	2	3	4	5
Very satisfied	fairly satisfied	a little satisfied	fairly dissatisfied	very dissatisfied

Who could you really count on to take your mind off your worries when you felt under stress?

0 No one ( ) Tick	3 _____	6 _____
1 _____	4 _____	7 _____
2 _____	5 _____	8 _____

How satisfied were you with the support you received?

1	2	3	4	5
Very satisfied	fairly satisfied	a little satisfied	fairly dissatisfied	very dissatisfied

Who could you really count on to help you feel more relaxed when you were under pressure or tense?

0 No one ( ) Tick
1 _____
2 _____
3 _____
4 _____
5 _____
6 _____
7 _____
8 _____

How satisfied were you with the support you received?

1 ..... 2 ..... 3 ..... 4 5
Very satisfied | fairly satisfied | a little satisfied | fairly dissatisfied | very dissatisfied

Who accepted you totally, including your worst and best points?

0 No one ( ) Tick
1 _____
2 _____
3 _____
4 _____
5 _____
6 _____
7 _____
8 _____

How satisfied were you with the support you received?

1 ..... 2 ..... 3 ..... 4 5
Very satisfied | fairly satisfied | a little satisfied | fairly dissatisfied | very dissatisfied

Who could you really count on to care about you, regardless of what was happening to you?

0 No one ( ) Tick
1 _____
2 _____
3 _____
4 _____
5 _____
6 _____
7 _____
8 _____

How satisfied were you with the support you received?

1 ..... 2 ..... 3 ..... 4 5
Very satisfied | fairly satisfied | a little satisfied | fairly dissatisfied | very dissatisfied

Who could you really count on to help you feel better when you were feeling generally "down in the dumps"?

0 No one ( ) Tick
1 _____
2 _____
3 _____
4 _____
5 _____
6 _____
7 _____
8 _____

How satisfied were you with the support you received?

1 ..... 2 ..... 3 ..... 4 5
Very satisfied | fairly satisfied | a little satisfied | fairly dissatisfied | very dissatisfied

Who could you count on to help you feel better when you were very upset?

0 No one ( ) Tick
1 _____
2 _____
3 _____
4 _____
5 _____
6 _____
7 _____
8 _____

How satisfied were you with the support you received?

1 ..... 2 ..... 3 ..... 4 5
Very satisfied | fairly satisfied | a little satisfied | fairly dissatisfied | very dissatisfied

Below are a number of sentences about how you may have felt during the past seven days, including today. Circle the appropriate number to describe how distressing you have found these things over this time.

1	2	3	4
NOT AT ALL	A LITTLE	QUITE A BIT	EXTREMELY

Difficulty in speaking when you are excited	1	2	3	4	
Trouble remembering things	1	2	3	4	
Worried about sloppiness or carelessness	1	2	3	4	
Blaming yourself for things	1	2	3	4	
Pains in the lower part of your back	1	2	3	4	
Feeling lonely	1	2	3	4	
Feeling blue	1	2	3	4	
Your feelings are being easily hurt	1	2	3	4	
Feeling others do not understand you or are unsympathetic	1	2	3	4	
Feeling that people are unfriendly or dislike you	1	2	3	4	
Having to do things very slowly in order to be sure you are doing them right	1	2	3	4	
Feeling inferior to others	1	2	3	4	
Soreness of your muscles	1	2	3	4	
Having to check and double check what you do	1	2	3	4	
Hot or cold spells	1	2	3	4	
Your mind going blank	1	2	3	4	
Numbness or tingling in parts of your body	1	2	3	4	
A lump in your throat	1	2	3	4	
Trouble concentrating	1	2	3	4	
Weakness in parts of your body	1	2	3	4	
Heavy feelings in your arms and legs	1	2	3	4	

The following are statements which could describe thoughts you may have had over the last month or so. Please circle the number that best describes how true you feel each statement is for you.

In the past, I had more close friends than I have now.

1	2	3	4	5
Not at all true	Slightly true	Some what true	Very true	Extremely true

I do not feel guilt over things that I did in the past.

1	2	3	4	5
Not at all true	Slightly true	Somewhat true	Very true	Extremely true

If someone pushes me too far, I am likely to become violent. ☐

1	2	3	4	5
Very unlikely	Unlikely	Somewhat unlikely	Very likely	Extremely likely

If something happens that reminds me of the past, I become very distressed and upset. ☐

1	2	3	4	5
Never	Rarely	Sometimes	Frequently	Very frequently

The people who know me best are afraid of me. ☐

1	2	3	4	5
Never true	Rarely true	Sometimes true	Frequently true	Very frequently true

I am able to get emotionally close to others. ☐

1	2	3	4	5
Never	Rarely	Sometimes	Frequently	Very frequently

I have nightmares of experiences in my past that really happened. ☐

1	2	3	4	5
Never	Rarely	Sometimes	Frequently	Very frequently

When I think of some of the things I have done in the past, I wish I were dead. ☐

1	2	3	4	5
Never true	Rarely true	Sometimes true	Frequently true	Very frequently true

It seems I have no feelings. ☐

1	2	3	4	5
Not at all true	Slightly true	Somewhat true	Very true	Extremely true

Lately, I have felt like killing myself. ☐

1	2	3	4	5
Not at all true	Slightly true	Somewhat true	Very true	Extremely true

I fall asleep, stay asleep and awaken only when the alarm goes off. ☐

1	2	3	4	5
Never	Rarely	Sometimes	Frequently	Very frequently

I wonder why I am still alive when others have died. ☐

1	2	3	4	5
Never	Rarely	Sometimes	Frequently	Very frequently

Being in certain situations makes me feel as though I am back in the past. ☐

1	2	3	4	5
Never	Rarely	Sometimes	Frequently	Very frequently

My dreams at night are so real that I waken in a cold sweat and force myself to stay awake. ☐

1	2	3	4	5
Never	Rarely	Sometimes	Frequently	Very frequently

I feel like I cannot go on.

1	2	3	4	5
Not at all true	Rarely true	Sometimes true	Very true	Almost always true

I do not laugh or cry at the same things other people do.

1	2	3	4	5
Not at all true	Rarely true	Somewhat true	Very true	Extremely true

I still enjoy doing many thing that I used to enjoy.

1	2	3	4	5
Never true	Rarely true	Sometimes true	Very true	Always true

My daydreams are very real and frightening.

1	2	3	4	5
Never true	Rarely true	Sometimes true	Frequently true	Very frequently true

I have found it easy to keep a job.

1	2	3	4	5
Not at all true	Slightly true	Somewhat true	Very true	Extremely true

I have trouble concentrating on tasks.

1	2	3	4	5
Never true	Rarely true	Sometimes true	Frequently true	Very frequently true

I have cried for no good reason.

1	2	3	4	5
Never	Rarely	Sometimes	Frequently	Very frequently

I enjoy the company of others.

1	2	3	4	5
Never	Rarely	Sometimes	Frequently	Very frequently

I am frightened of my urges.

1	2	3	4	5
Never	Rarely	Sometimes	Frequently	Very frequently

I fall asleep easily at night.

1	2	3	4	5
Never	Rarely	Sometimes	Frequently	Very frequently

Unexpected noises make me jump.

1	2	3	4	5
Never	Rarely	Sometimes	Frequently	Very frequently

No on understands how I feel, not even my family.

1	2	3	4	5
Not at all true	Rarely true	Somewhat true	Very true	Extremely true

I am an easy-going, even-tempered person. ☐

1 ..... 2 ..... 3 ..... 4 5
Never Rarely Sometimes Usually Very much so

I feel there are certain things that I have done that I can never tell anyone, because no one would ever understand. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all true Slightly true Somewhat true True Very True

There have been times when I used alcohol (or other drugs) to help me sleep or to make me forget about things that happened in the past. ☐

1 ..... 2 ..... 3 ..... 4 5
Never Infrequently Sometimes Frequently Very frequently

I feel comfortable when I am in a crowd. ☐

1 ..... 2 ..... 3 ..... 4 5
Never Rarely Sometimes Usually Always

I lose my cool and explode over minor everyday things. ☐

1 ..... 2 ..... 3 ..... 4 5
Never Rarely Sometimes Frequently Very frequently

I am afraid to go to sleep at night. ☐

1 ..... 2 ..... 3 ..... 4 5
Never Rarely Sometimes Frequently Almost always

I try to stay away from anything that will remind me of things which happened in the past. ☐

1 ..... 2 ..... 3 ..... 4 5
Never Rarely Sometimes Frequently Almost always

My memory is as good as it ever was. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all true Rarely true Somewhat true Usually true Almost always true

I have a hard time expressing my feelings, to the people I care about. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all true Rarely true Sometimes true Frequently true Almost always true

At times I suddenly act or feel as though something that happened in the past were happening all over again. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all true Rarely true Sometimes true Frequently true Almost always true

I am not able to remember some important things that happened in the past. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all true Rarely true Sometimes true Usually true Almost always true

I feel "superalert" or "on guard" much of the time. ☐

1 ..... 2 ..... 3 ..... 4 5
Not at all true Rarely true Sometimes true Frequently true Almost always true

If something happens that reminds me of the past, I get so anxious or panicky that my heart pounds hard; I have trouble getting my breath, I sweat, tremble or shake: or feel dizzy, tingly, or faint.

1	2	3	4	5
Never	Rarely	Sometimes	Frequently	Very frequently

Please check that you have answered all the questions and that you have completed the consent form.

Thank you for your help in completing this questionnaire; Your time and effort are greatly appreciated

APPENDIX F:

NEWSPAPER ARTICLE.

From: "Eastland Sun" 4/8/93.

Bola sex quiz is found offensive

Massey University's Cyclone Bola survey is more like a questionnaire from Playboy, according to a Gisborne resident who prefers not to be named.

The woman is one of 500 people in the district chosen at random to answer a questionnaire about the long-term psychological effects of Bola.

"I fail to see how details of your sex life during the past two weeks are relevant to a cyclone five years ago," she says.

She won't be filling in the questionnaire herself - "What if the postman reads it, sees I have sex 60 times a week and comes to visit me!?"

She says she will be sending her questionnaire back addressed to Hugh Hefner, Playboy, Massey University.

Out of 40 questions in the survey, a substantial proportion are about sex and personal finances.

One question asks how many times you and your partner have sex - more than once a week, less than once a month or not applicable. Another asks if you had any problems during intercourse and how you felt during it. Enjoyment of sex over the past two weeks is rated on a scale of 5 to 1.

Kerry Eustace, the Masters student who is doing the research says people need have no worries about the confidentiality of their answers. She had to go before an ethics committee before starting her research and one of the most important things stressed was not to link answers to names.

"It says on the form, people have the option not to answer the questions, but there is no way that anyone will be traceable," she says.

continued on page 4

Bola sex quiz

continued from page 1.

She is from Palmerston North and says the names would mean nothing to her anyway.

As to the sex questions, they were designed by another student Lesley Frederikson who is researching family functioning.

Kerry Eustace says that as far as she can see, the questions are relevant because sex is often the first area to deteriorate under stress.

"And we're asking about stress effects now to see if Bola had long term effects on people.

"Research from the States based on flood victims and war veterans indicates there are still major effects five, and even 20 years down the line."

She says she asked questions about people's finances as a way of gauging who was affected by Bola.

"We decided to call affected anyone who was evacuated or suffered monetary damage."

Kerry Eustace expects to have results from her research available by early September.

APPENDIX G:

FOLLOW-UP LETTER.

August 1993

Dear Sir/Madam

About a month ago you were sent a copy of a survey for a study I am conducting on the long-term effects of Cyclone Bola. I have had a very positive reaction so far with over 100 questionnaires returned.

One or two people have expressed concern over a few questions in the survey. I can understand that people may be reluctant to answer certain questions. However, I would like to emphasise that the experience of Bola did indeed have a major impact on people at the time and for some people this will remain both serious and ongoing. It is important to understand the variety of effects that disasters have on people and that is why the survey is so wide ranging.

The questions which I have asked have been widely used in many previous studies, and were carefully selected. For your part, you do not need to answer any questions that you do not feel comfortable answering. Also, your answers are both anonymous and confidential.

We believe that this research is important and will have considerable benefits for future populations experiencing a disaster. However, the success of studies like this depend on as many people responding to the questionnaire as possible. All responses are valid and useful, regardless of your current or past circumstances. If you do have any enquiries or concerns please do contact me at the above address or phone me on (06) [redacted]

[redacted] the many people who have already returned your completed questionnaire please accept our thanks. Otherwise, I hope to receive your questionnaire shortly.

Yours sincerely

KERRY EUSTACE (Miss)

APPENDIX H:

Table H-1: Comparisons of mean scores for PTSD cases and non-PTSD cases on Cost of Damage and Trauma Severity

Variable	Case	Non-case	t value
Cost of Damage	35846	38032	-.09
Trauma Severity	18.46	17.58	.68

Table H-2: Comparisons of mean scores for the High Psychological Distress groups and the Low Psychological Distress Groups on Cost of Damage and Trauma Severity

Variable	High Distress	Low Distress	t value
Cost of Damage	38157	33184	.30
Trauma Severity	18.63	17.58	.94