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**Indicators of Community Resilience: A Study of  
Communities Facing Impending Natural Disasters**

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A Thesis Submitted in Partial Fulfillment of the Requirements for the Award of  
Doctor of Philosophy  
at the Faculty Community Services, Education and Social Sciences,  
Edith Cowan University

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## **ABSTRACT**

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Disasters are defined as a 'crisis event in which the demands being placed on a human system, by the event, exceed the systems capacity to respond' (Bolin, 1989, p. 62). In the literature the negative consequences of disasters are focused at the individual level and fail to take into account the context in which individuals live and where the disaster occurred. Few studies utilize residents within a disaster community to define the factors that are relevant to their disaster experience especially in Australian settings. This present studies view of disasters places the individual within an ecological system to understand their disaster experience and the disaster experience of the community. In viewing the disaster experience the present study seeks to identify the stress and growth outcomes as a more holistic account of the disaster experience. The present study utilizes residents from a Western Australian disaster community to identify the salient factors related to the disaster experience. The research questions addressed by the current study are (1) What factors are important in understanding the experience of community members living with the threat of natural seasonal disasters in Western Australia? (2) What is the relationship between the community, individual and disaster experience variables in different communities in Western Australia? (3) What is the best predictor of posttraumatic stress? (4) What is the best predictor of posttraumatic growth? (5) What variables differentiate high and low stress groups? (6) What variables differentiate high and low growth groups? (7) What are the community and individual factors that mediate the disaster experience in communities in Western Australia? Specifically a) which

community variables act as antecedents of the individual variables; b) which individual variables impact the posttraumatic stress and posttraumatic growth associated with disasters.

In order to address these key questions the first study aims to determine what factors are important in understanding the experience of community members living with the threat of natural seasonal bushfires through thematically analysing 15 resident interviews from the community of Darlington, Perth, Western Australia. Results indicated that self-efficacy, coping style, social networks, sense of community and community competence were salient factors, which were included in the second study. In addition to the factors identified in stage one, factors identified in the literature, as relevant to the disaster experience (posttraumatic stress and posttraumatic growth), were included through the use of scales in a survey, which was completed by four communities in the Northwest of Australia. In order to understand the results, data was analysed using different statistical methods such as correlations, regression analysis, and discriminate function analysis. The results provided a comprehensive view of the relationships between these multiple factors and their importance to the disaster experience variables. Path analysis ordered the importance of the variables within each community to the disaster experience of each community. To further highlight the contexts of each individual community a combined path model was produced. The present study provides contributions to theory in that it comprehensively links the community context, (sense of community and community competence) to the individual context (self efficacy, coping style and social networks). Resilience of the

community is mediated by the resilience of the individuals in relation to the disaster experience (stress and growth). Results indicate the relative importance of self-efficacy to the experience of stress and growth in disasters and that different styles of coping are inextricably linked to each other. Contributions to practice indicate that for emergency management organizations there is no universal method of practice. Local communities need to be understood in terms of their contexts to effectively develop and implement prevention programs. Methodological considerations for future studies are addressed. First, response rates of participants need to be addressed, however as there is little psychological research on these communities and this present study provides a basis for future research. Second, the cross-sectional nature of this study could be strengthened through longitudinal studies of these communities and the strength of the current research is the multilevel, multifactorial approach taken. Future studies need to determine what other variable/s, not included in this study, are important to the disaster experience of these communities. Lastly this research provides evidence for the important contribution of the social sciences and in particular community psychology to the disaster arena.

**DECLARATION**

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any Institution of higher education; and that to the best of my knowledge and belief does not contain any material previously published or written by another person except where due reference is made in the text.

Signature.. ..

Date..... 13 April 2005 .....



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## CHAPTER 1

### Introduction

"During the last cyclone and flood I had a phone call from a bureaucrat from Western Power in Perth who asked "Is your house surrounded by water"? "Yes" I replied, "the water is two and a half feet deep like most of the properties around here". "Well" he said "we are going to cut the power", "what for" I asked, "all the houses are one foot above the water and the power switches are another four feet above that". "It doesn't matter it could be dangerous" he replied, and that was it off went the power. We being experienced with cyclones and floods had laid in stock of frozen food and other perishables so we would be self-sufficient and not be a problem to anyone. Needless to say that we lost all the food, couldn't pump water for showers or for the toilet although we did have plenty of drinking water. So the result was we plodded around in the bush to find a high spot for a toilet and washed in the muddy floodwater, all because some stupid person 600 miles away."

(Comment by a 54 year old man who lived in the Carnarvon for all his life.)

This paragraph was returned in a letter attached to the data collected for the present thesis. The description highlights some of the feelings a resident experiences when they are faced with events over which they have no control. This description emphasizes the reality that people in rural and remote areas of Australia often have to deal with decisions that are made a great distance away by people that have little idea of the actual nature of the issues that the resident has to deal with. However this response indicates the ability of this resident to prepare and respond to events over which they have no control – a natural disaster.

### The Australian Context

---

Australia is a diverse continent of 7.7 million square hectares of land surrounded by 25 000km of coastline ([www.ema.gov.au](http://www.ema.gov.au)). There are many varied

physical environments; cities, snowfields, tropical wetlands, deserts and, possibly the one Australia is most well known for, the Outback. Australia has long been regarded as, and continues to be, a destination for many migrants and refugees worldwide with currently 52% of Australia population growth coming from overseas migration. Presently 23% (4.6 million) of the Australia's population (19.6 million) are overseas born ([www.abs.gov.au/3.4.12](http://www.abs.gov.au/3.4.12) Migration Australia). As one of the most urbanized countries in the world, Australia has 70% of its population living in capital cities and 83% of Australians live 50kms or less from the coast ([www.abs.gov.au/ausstats](http://www.abs.gov.au/ausstats)).

On balance, around 30% of Australians live in rural and remote areas of Australia, of which 10% live in remote areas. The classification most commonly used is that of the Rural, Remote and Metropolitan Classification (RRMA) scale (see Table 1.1), which was developed in 1994 by the Commonwealth Departments of Human Services and Health (DHS), and Primary Industries and Energy (DPIE). This classification system is based only on the size of the population in each town or location.

Table 1.1

*Structure of Rural, Remote and Metropolitan (RRMA) classification*

<b>ZONE</b>	<b>CATEGORY</b>	<b>POPULATION (%)</b>
<b>Metropolitan Areas</b>	Capital Cities	63
	Other Metropolitan centres (urban centres $\geq 100\ 000$ )	7
<b>Rural Zone</b>	Large rural centres (urban centres population 25 000 - 99 000)	6
	Small rural centres (urban centres population 10 000 - 24 999)	7
	Other rural areas (urban centres population < 10 000)	14
<b>Remote Zone</b>	Remote centres (urban centres population $\geq 5\ 000$ )	1
	Other remote areas (urban centres population $\leq 5\ 000$ )	2

Adapted from Welfare, 2002, p. 216

Over the past forty years, the historical view of Australians being a nation of farmers and miners has changed. During 1910-1911 it is reported that approximately 52 % of the population were employed in farming and mining, at the present time only 16% of the population remains employed in these industries (www.abs.gov.au/Year Book Australia 2002/ Labour Special Article - A century of change in the Australian labour market). For those Australians living in the rural and remote regions of Australia changes in the landscape have also included changes in the availability of resources and services like banks, police stations, schools, health services (Gray & Lawrence, 2001). When you compare the

characteristics and conditions for people that live in rural and regional Australia, to their urban dwelling counterparts, there are real differences in terms of income levels, education levels, literacy levels, life expectancy and access to health services (hospitals and General Practitioner consultations) as outlined below (Welfare, 2002).

Population characteristics, in the rural and remote areas, differ to the metropolitan areas. In regard to the indigenous population comprises 40% of the population compared with the metropolitan areas (the indigenous constitutes about 1% of the total population). The proportion of children to adults in rural and remote populations is also greater. Children comprise 10% of the population in rural and remote communities compared to 7% in the metropolitan areas. Remote communities have fewer older people (over 60 year olds), 3% for remote and 5 % for metropolitan areas ([www.abs.gov.au/ausstats/census](http://www.abs.gov.au/ausstats/census) 2001).

With regard to other socio-demographic characteristics on average, household incomes, education and literacy levels are all lower in the rural and remote communities. Consistently rural and remote people have a lower life expectancy than their metropolitan counterparts. Currently life expectancy rates for rural and remote males are 74 years (78 years for metropolitan males) and 80 years for rural and remote females (83 years for metropolitan females). In terms of the four major causes for deaths (cancers, cardiovascular disease, respiratory disease and injury) all are greater for rural and remote males and females with cardiovascular disease and injury being significantly greater for males and respiratory disease being significantly greater for females (Welfare, 2002).

Many of these health issues relate to the availability of health services in rural and remote areas. The choice and variety of commodities is more limited in these regions and the price of many commodities is reportedly 10-23% higher in rural and remote areas. There are fewer number of GP consultations (50% less in some remote locations), fewer GP's work in remote locations (only 15.4 % of GP's are servicing 30% of the population), fewer specialists, fewer hospitals, lower levels of access to hospitals, which all influence access to health services (Welfare, 2002). The disadvantage for rural and remote communities raised by many of these issues is in part due to the sheer isolation and distance from regional locations. This clearly indicates why many suggest why rurality or remoteness is considered a health risk factor (Worley, 2004). These contextual factors are important when thinking about or researching issues relevant to rural and remote communities as they impact on the level of health of individuals and communities. In terms of the present study rural and remote communities are central to the Australian disaster experience as these communities experience disasters (natural and seasonal) more frequently/severely than Australia's metropolitan areas (Blong, 2003).

### **Natural Disasters in the Australian Context**

---

On average Australia endures approximately ten disaster events every year. Many of these occur in the rural and remote areas of Australia (Blong, 2003). In terms of definition Emergency Management Australia defines a 'disaster' as a serious disruption to community life which threatens or causes death or injury in

that community and/or damage to property which is beyond the day-to-day capacity of the prescribed statutory authorities and which requires special mobilization and organization of resources other than those normally available to those authorities (Koob, 1998, p. 42). A 'serious disruption' is recorded as a disaster when a single event, i.e. a cyclone that hits *different* communities is the same event, exceeds A\$10 million in costs.

Within Australia the costs associated with natural disaster events are quite small compared to other parts of the world. However in terms of annual cost to Australians the figure is A\$1.25 billion dollars a year with over 6000 injuries and around 500-550 deaths recorded the past two to three decades (Australia, 2001). It is important to note that these figures do not include drought, which is also a significant cost to the Australian economy. Since 1980 there has been a significant increase in the amount of disasters recorded in Australia. Potential reasons for this are suggested to be 1) the actual increase in the number of disasters in Australia; 2) better reporting and recording of events, and 3) a larger and more concentrated population, especially in coastal regions (Australia, 2001).

There are a number of organizations responsible for the administration and support of natural disasters in Australia. Emergency Management Australia (EMA) is the main administrative organization at the federal level. At the State levels there are a number of organizations (police, state emergency services, Fire authorities, marine services, ambulance etc) that are responsible for the response, recovery and mitigation. These responsibilities vary from state to state depending upon the legislation available. However the Federal and State levels coordinate

when the needs arise. Disasters are more often dealt with at the local level until such a time where extra ordinary resources are needed i.e. air transport, food etc. State authorities are called if assistance at the local level is exhausted or not adequate. Federal assistance is generally in terms of administration and support of resources needed to deal with the event itself ([www.ema.gov.au/menu](http://www.ema.gov.au/menu)).

Underpinning the structural characteristics of disaster management in Australia are the disaster policy and research perspectives that have developed at the international level over the past few decades. During the late 1970's and early 1980's there was a distinct change in the direction of disaster policy and research. Traditionally the focus was on understanding the hazard with a view to reducing the likely occurrence of the hazard. However, in 1979 the United Nations adopted a definition of risk, which changed the way in which studies examined disasters (Fournier d'Albe, 1986). The focus moved from not only understanding the hazards but also incorporating an understanding of what elements were at risk and trying to understand vulnerability. This new definition stated that *Risk* is determined by the interaction of the *hazard*, the *elements* at risk, and *vulnerability*, which is represented by the following formula

Risk (Total) = Hazard\*Elements at Risk\*Vulnerability.

- Hazard is identified under four categories: geological (i.e., earthquakes), meteorological (i.e., cyclones), anthropogenic, and biological.

- Elements at Risk are identified as people (residents), structures (buildings), eco systems (flora, fauna and landforms) and the economy (business).
- Vulnerability identifies individuals, communities, structures and nations as areas that may be vulnerable (Buckleton, 2002).

This 'Comprehensive Approach' moved toward including the hazard, and the impacts of the hazard (Buckle, Marsh & Smale, 2003) therefore adopting the notions of mitigation (prevention, preparedness), response, and recovery as central to the development of emergency and disaster arrangements (Cronstedt, 2002). Besides being more comprehensive, as indicated the adoption of these additional notions provides avenues for a more wholistic and systemic approach to the disaster arena. In addition the emergency management bodies, in Australia and in the United States, have also adopted several other overarching approaches. The All Hazards Approach indicates that the same set of management arrangements are used for all type of emergencies, disasters or issues of civil defence. The All Agencies Approach indicates that an active partnership occurs between all levels of government, statutory authorities, and voluntary and community organizations where needed in regard to all type of emergencies, disasters or issues of civil defence. Finally the Prepared Community approach requires that arrangements are made at the local levels which result in an alert, active and involved community, with respect to prevention, preparedness, response and recovery, in regard to all type of emergencies, disasters or issues of civil defence ([www.ema.gov.au/menu](http://www.ema.gov.au/menu)).



The benefit of the adoption of these policies is that it challenges the way in which emergency service organizations think about their role in disaster management. The tradition of a hazard management (response focus) approach is significantly different from the comprehensive approach now adopted. Paton (1997) argues that many of the traditional services assumed that their organizations response focus i.e., dealing with the physical and economic issues arising from a disaster event, would in turn resolve the social, psychological and community issues that arose from the same event in both the immediate aftermath and the longer term. The shift in focus of the hazard management policies and adoption of the comprehensive approach indicates that social, psychological and community issues that result from an event may not be adequately addressed by focusing only on the resultant physical and economic issues immediate after an event.

Within Australia the potential for this shift has been seen in the adoption of the risk management paradigm, which has resulted in the development of the Standard of Risk Management 4360:1995. This standard has challenged emergency organizations from delivering a response-based service to adopting a more community-centred focus (Cronstedt, 2002). Salter (1998, p. 11) indicates this shift in table 1.2

Table 1.2

*Shift from Internal Agency to Community-centred focus*

FROM	TO
Hazards	Vulnerability
Reactive	Proactive
Single Agencies	Partnerships
Science Driven	Multi-Disciplinary approach
Response Management	Risk Management
Planning For Communities	Planning with Communities
Communicating To Communities	Communicating with Communities

In order to fully realise this shift emergency organizations need to undertake strategies that involve working with other professions and communities. Many authors (e.g. Buckle et al., 2003; Paton, 1997; Salter, 1998; Schneider, 2002) argue that to deal with a multi-faceted issue like disasters a collaborative effort is need in understanding the very nature of the disaster experience In order to identify practical problems and solutions.

For many rural and remote communities in Australia the experience of a disaster event is another factor of living where they do. However in terms of the disaster literature there is an abundance of studies about the consequences of a disaster for individuals, groups and communities. The results are varied, for example they include disaster stress, issues with coping and disruptions to social

support networks. What is clear is that disaster studies are usually about the resultant negative consequences for individuals groups and communities (Padgett, 2002).

One of the shortcomings of the disaster literature is the lack information and research within Australian disaster communities. Although research has generally followed after each large disaster (i.e., Cyclone Tracey in Darwin, Newcastle Earthquake in New South Wales) this research tends to be response and recovery focused. Communities in rural and regional Australia that deal seasonally with disasters may offer an alternative insight into the disaster experience for Australian communities.

### **Significance of Study**

---

The adoption of many policies within the Australian emergency management area requires that communities are alert, active and involved in the prevention, preparedness, response and recovery of disasters. At the present time there are few studies within the Australian disaster literature that are aimed at understanding the psychological, social, and community variables relevant to the disaster experience. This thesis attempts to understand the disaster experience for communities facing natural disasters in Australia. First by seeking to identify the individual and community variables relevant to residents of an Australian disaster community and then second, to utilize these variables and variables in the disaster literature to develop an understanding of their importance and role in different Australian disaster communities.

With the mandate requiring Federal and State organizations to work collaboratively (Salter, 1998) with communities to mitigate potential natural hazard threats, the social sciences, and in particular community psychology, is well placed to provide to these agencies an understanding of the dynamics at the individual and community level of analysis. Theoretically this study seeks to understand the experience of Australian communities facing natural seasonal disasters utilizing an ecological framework. Practically, this study aims to obtain information about Australian disaster communities to aid communities, community development workers and emergency management organizations in formulating solutions to mitigate the threats through enabling communities to become resilient.

### **Structure of the Current Thesis**

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An ecological approach has been adopted to study the disaster experience of communities in Western Australia. In doing so it is important to identify the factors that mediate the experience of natural disasters in the literature and in a disaster community and explore these factors in more depth.

Therefore Chapter 2 presents an overview of the disaster literature to identify the consequences of disasters, at the individual and community level. The literature provides examples of the response and recovery focus of disaster studies across different types of disaster events. The term disaster is defined and the salient factors in relation to disaster studies are identified and discussed.

Chapter 3 provides the theoretical framework for the present study. Systems theory and the ecological framework that underpins the current study is

outlined. Chapter 4 presents research related to disaster vulnerability and resilience, which brings together the links between the disaster literature and ecological theory. The research questions that the present study addresses are presented.

The first stage of the current study is presented in Chapter 5, which uses the suburb of Darlington as a case study. This qualitative study was designed to determine the factors that are important to a community that has experienced, and faces, natural seasonal disasters.

Chapter 6 describes the second stage, where the factors identified in the literature and the factors identified in the first stage are utilized in a quantitative study seeking to determine the relevance of the factors in four different disaster communities in the Northwest Australia. Chapter 7 presents the results of the second stage. This chapter also discusses the results for research questions two to six which scaffolds the presentation of the analyses (Path analysis) associated with the final research question.

Finally Chapter 8 presents a discussion of the path models presented in chapter 7. This chapter then discusses the results in relation to the themes in the literature, and outlines methodological issues that should be considered in future research. Finally the contributions of the present study are outlined.



## **CHAPTER 2**

### **Psychological Consequences of Disasters: Response and Recovery**

**"These things are natural phenomena and there is not much you can do about them, you have to learn to live with them. If you can't, better go somewhere else to live."**

**(Comment from a 52 year old man who has lived in the Kimberley for all his life)**

#### **Aims of This Chapter**

This chapter opens with defining the meaning of the term disaster in order to illustrate the complexity of describing the term and to direct the reader to the definition adopted by this thesis. This is followed by a discussion of the psychological consequences arising from natural disasters especially for the individual, the group and the community. The discussion is centered on illustrating the different levels of analysis within disaster studies. Within the individual level the concepts of stress, coping and self-efficacy are defined and discussed in terms of their use and measurement. At the group level a review of the socio-demographic characteristics utilized in disaster studies is undertaken highlighting the adult centric gender-neutral view of disaster research. The consequences for communities are highlighted through research in social support and social networks, sense of community and community competence. Finally a summary of the main issues relating to the psychological consequences of disasters for individuals, groups and communities is presented.

## The Meaning of Disaster

There are four main elements that have been used to define a disaster Alexander (1997). First, the number of deaths from the event, second, the value of the damage and loss associated with the event, third, the impact on the social system from the event, and finally, geophysical definitions, for example, a combination of the magnitude, frequency and spatial patterns of the geophysical event. In addition, a further consistent theme in the disaster literature is that disasters are perceived to be negative, and render social contexts/communities incapable of coping with them (van den Eynde & Veno, 1999). For example Bolin (1989, p.62) defines a disaster as a 'crisis event in which the demands being placed on a human system by the event exceed the systems capacity to respond'.

In the past there has been a general understanding that there are two categories of disasters, those that are person made or technological and those that are natural. Person made or technological disasters refer to those that have some human cause, for example, airplane crashes, war, terrorism, hostage situations or gun massacres etc. Disasters that evolve through cyclones, hurricanes, volcanoes, storms bushfires etc are deemed 'acts of god' and therefore are termed natural disasters (Ursano, McCaughey, & Fullerton, 1994). Recently, with the increase in the number of studies examining different aspects of disasters, there is a blurring of the lines between what is termed a technological or natural disaster.

The line between natural and technological disasters has become less clear as researchers start to look toward the root cause of the disaster. Some natural disasters, like earthquakes, are a natural event, however it is often the placement



of the village, which is subsequently badly damaged that has essentially resulted in the earthquake being called a disaster. In many cases the trigger for an event may be some natural phenomenon however decisions that have been made about where human populations are built and how they are built, is an important backdrop on which this natural phenomenon takes place (Blaikie, Cannon, Davis & Wisner, 1994). In summary, Susman, O'Keefe and Wisner (1983, p.264) have defined disasters "as the interface between an extreme physical event and a vulnerable human population". What is evident is that the events we call disasters, vary greatly, are complex, defy all boundaries and, have many consequences (Kaniasty & Norris, 1999).

Over the past few decades there have been many events that have been deemed disasters. With regard to person made or technological disasters, some of the most well known have centred on nuclear plants. In the United States in 1979 a reactor at a nuclear power facility overheated and went into meltdown causing the evacuation of hundreds of thousands of people. The Three Mile Island disaster has been heralded as America's worst nuclear accident (Gifford, 1987). Possibly the worlds largest nuclear disaster is that of Chernobyl in 1986 in the former USSR (now Ukraine) where more than 30 people were killed immediately and 135,000 people needed to be evacuated ([www.chernobyl.com.uk](http://www.chernobyl.com.uk)).

One of the main issues emerging from a human made disaster is the issue of control. As we become more and more technologically advanced we have a heightened sense of control over our environment. We regulate how we build and structure nuclear power plants, dams, apartment buildings, towers etc but what

becomes evident is that during an event or when something malfunctions we have little or no control over the fault and resulting aftermath. This renders people looking to place blame for the disaster as it is perceived that someone had control in the first place and lost it (Baum, Fleming & Singer, 1983).

In contrast, natural disasters refer to events over which we have little control, for example earthquakes, hurricanes, cyclones, floods, and volcanic eruptions. Many incidents recorded in history and reviewed in the literature indicate that each continent has been affected by natural disasters such as the Armenian earthquake in 1988 that killed 25 000 people, a cyclone in Bangladesh in 1991 that killed 145 000 people, and a flood in the mid west of the United States of America in 1993 that killed 52 people. In reflecting on the study of natural disasters Alexander (1997) reviewed a list of 68 natural disasters that have occurred world wide between 1977-1997, many of which still impact on communities today. Although natural disasters are widespread it is the complexity of the situation, which affects how we can come to understand, cope and mitigate disasters (Alexander).

Contemporary views question the systemic failure of our ability to examine communities that are prone to disasters. For example, the four causes of the Chernobyl disaster have been reported as the organizations in control of the plant not having a *safety culture* where they were able to rectify problems that had been identified, a *design fault* in the reactor which, when other mechanisms were put in place, was rectifiable, a *violation in procedures*, which was the result of a *communications breakdown* between those running safety checks and those in

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charge of the reactor ([www.chernobyl.com.uk](http://www.chernobyl.com.uk)). However, in a detailed review 16 years after the disaster, the Nuclear Energy Agency (NEA) indicates that there were many problems, which included a range of local and national authorities and their inability to cope with Chernobyl. The NEA clearly recognises the political, social and economic conditions of the context prior to the Chernobyl incident, during and in the resulting aftermath. This issue of context supports Hewitt (1983) and Quarantelli (1985) who argued that disasters have been understood only in terms of the immediate event or incident without taking into consideration the social conditions present at the time of the disaster. This means that the context in which the disaster occurs needs to be considered and is of paramount importance.

A further contextual variable is the costs associated with disasters. The cost of natural disasters is often inversely related to the number of lives lost. Therefore community of disaster researchers are very quickly seeing the link between the variables of poverty and impending disasters. The consistent finding is that the largest death toll from natural disasters occurs more often in nations that are stricken with poverty (Alexander, 1997). When you overlay just some of the issues being presented it is very easy to conclude that there are multiple causes or sources of a disaster. However the area of disaster research that attracts the most attention is the disaster impact and the consequences of the disaster.

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## **Disaster Consequences**

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The consequences of disasters relevant to this thesis are those that focus on the outcomes for people, namely the psychological and social effects of being involved in a disaster. There are a number of discipline areas that have contributed to the development of understanding the impact of a disaster on people such as anthropology, sociology and psychology. These disciplines have different perspectives and use different methodologies to describe and understand the consequences of the disaster for individuals and communities. However, a number of fundamental concepts have emerged in studying the impacts of disasters, namely, the impact on the individuals, and how individuals cope (e.g., Carr et al., 1995), levels of anxiety and depression (e.g., Bowler & Mergler, Huel & Cone 1994), manifestations of stress (e.g., Bolin & Klenow, 1983; Powell & Penick, 1983; Bravo, Rubio-Stipec, Canino, Woodbury, 1990; Freedy, Saladin, Kilpatrick, Resnick, & Saunders, 1994; Gillard & Paton, 1999; Galea et al., 2002), disaster effects on social support (e.g., Solomon, Smith, Robins & Fischbach, 1987; Hultaker, 1983; Kaniasty & Norris, 1993), to the impacts on the family and community, how communities cope after a disaster (Eranen & Liebkind, 1993), sense of community (Bachrach & Zautra, 1993, Paton, 1994), and community competence (e.g., Cook, 1983; Armour, 1993; Buckland & Rahman, 1999). These impacts have an affect on individuals, groups and communities and will be described in detail in the following sections.

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## **Consequences for Individuals**

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### **Stress**

The most researched concept is the area of disaster stress (Ursano et al., 1994), which has been defined as 'a response with characteristic feelings, behaviors and coping mechanisms following a catastrophic event' (Hardin, Carbaugh, Weinrich, Pesut & Carbaugh, 1992). Within this literature there are many psychological studies with a clinical focus, describing and understanding a person's response to disaster (Kaniasty & Norris, 1999). Most studies were focused on adults between 18-60 years of age, however, some studies have specifically studied adults over the age of 60 years (Norris & Murrell, 1988), a few have studied children's stress responses (Aptekar & Boore, 1990; Milne, 1977b; Ollendick & Hoffman, 1982; Ronan, 1997b) and some have examined adolescents' stress responses (Hardin et al., 1992). Despite the focus on the middle adult age group, a review of existing studies indicates that children, adolescents and the elderly are more at risk of developing stress upon the impact of a disaster (Gist, Lubin & Redburn, 1998).

A number of studies have tried to ascertain the stress response of different categories of individuals in the disaster situation. Different categories include direct disaster victims and those not directly involved (Carr et al., 1995) people that stay to 'clean up' and those that are relocated to then return later (Milne 1977a, 1977b), response volunteers (Armstrong et al., 1995), and emergency workers, i.e., firefighters (McFarlane, 1993), nurses (Waters, Selandor & Stuart, 1992), medical

workers (Freedy, Shaw, Farrell & Masters, 1992), and emergency managers (Paton & Flin, 1999). All of these individuals have had varying degrees of stress responses to different disaster events. The group that has consistently been reported to have had the greater stress response are those directly involved in the disaster. Within this category of 'disaster victims' those that have not been involved in the 'clean up' or the resolution to the disaster, report higher levels of stress than those victims that have helped with the 'clean up' operation (Milne, 1977a, 1977b). Victims that have lost more, in terms of their resources (i.e., housing, clothing), are also more likely to report greater stress (Freedy et al., 1994). Therefore the degree of involvement of an individual could be seen as a key factor related to the stress response.

The types of short-term stress responses experienced by victims are demoralization, discontentment, and disconnectedness (Crabbs & Heffron, 1981), irritability, fatigue, and loss of concentration (Armstrong et al., 1995) and posttraumatic stress disorder (Waters et al., 1992; McFarlane, 1995). In the long term the stress responses that are reported are mainly depression and anxiety (Bowler et al., 1994), psychic numbing (Crabbs & Heffron, 1981), posttraumatic stress disorder (McFarlane, 1995) and past temporal orientation (Holman & Silver, 1998).

This literature on stress responses for individuals indicates that there are a range of socio-demographic characteristics that are associated with higher post disaster stress. Some researchers have utilised this information to develop interventions for particular groups. For example Ronan and Johnston, (1999)

developed a video based intervention which educated children about volcanoes, safety, and psychological reactions to eruptions in an attempt to normalize the experience to alleviate the likelihood of developing greater stress responses to such an event. Other studies have utilized scales to predict those individuals that are likely to need clinical support for posttraumatic stress following a disaster. For example Koopman, Classen and Speigel (1994) utilized a number of different self-report scales to measure stress within the first few days after the firestorm and then again 7-9 months later. From this they determined that the single biggest predictor of posttraumatic stress for 149 victims of the Oakland firestorm in 1991 was the presence of dissociative symptoms immediately after the fire.

An important area underpinning our understanding of the stress response is the measurement of disaster stress. The range of measurement techniques described in the literature indicates that there is no agreed upon method of measuring disaster stress. Measurements used include interviews, scales, checklists, inventories and physiological measures. In some cases the measurement of stress involves qualitative interviews that have been developed specifically for the study at hand (Eyre, 1998) in others, a mental health interview that identifies posttraumatic stress has been adapted to the disaster situation has been utilized. The Diagnostic Interview Schedule (DIS) (Bravo et al., 1990; Solomon et al., 1987) has been utilised in a number of studies (in different languages) to determine a number (34) of DSM-IV diagnoses, within disaster events. However, in terms of disaster situations the schedule has been adapted to include questions about disaster exposure, attributions of blame and exposure and

response of significant others. The use of the DIS requires specialist training in order to make diagnoses based on the information gained and therefore is often used to determine a treatment program for disaster victims.

The necessity to have specialist training in administering and interpreting psychological tools is not uncommon and is also required for use of some stress measurement instruments. For example the Posttraumatic Diagnostic Scale (PTDS), developed by Foa, Cashman, Jaycox, and Perry (1997) is a clinical assessment tool to screen for PTSD. Physiological measures (blood pressure, pulse, and cortisol level) have also been utilised to measure stress associated with disastrous events (Bowler et al., 1994). Self report scales are possibly the most utilised scales in the assessment of disaster stress such as the Impact of Events scale (IES and IES-R) which provides an indication of the stress associated with an event, but can be utilised again within a short period of time. Therefore the use of self-report scales is more prolific because of the ease of administration.

The literature related to disaster stress has covered many areas from how stress develops, its measurement, and who is more susceptible to the effects of a stressful event. Other concepts in the disaster literature that have also been studied include how people cope after a disaster event.

### **Coping**

Research aimed at understanding coping has generally focused on the strategies that people use to manage in any given disaster (Hallman & Wandersman, 1992). Studies report three broad ways in which people cope, by



avoiding the issue (avoidant coping), by focusing on the emotions evoked (emotion coping) or by focusing on the task to problem solve (task focused coping). The indication is that different coping strategies are related to different outcomes (Baum et al., 1983; Pearlin & Schooler, 1978).

The identification of different coping mechanisms has become increasingly important to the area of post disaster interventions in order to focus programs specifically to obtain better coping outcomes (Baum et al., 1983). For example, Ronan and Johnston (1999) developed a video-based intervention program to aid children to cope with volcanic eruptions. The objective of the intervention was to normalize fears by discussing volcanic eruptions and in turn reduce self reported PTSD symptoms and increase coping strategies. This intervention was successful in that it did increase the active coping ability of the children following a volcanic eruption.

However, some interventions, which have been and still are standard practice, are being challenged on the basis that they may be doing more harm than good (Regehr & Hill, 2000). One of the most frequently used interventions after any disaster event is the practice of debriefing. There are many different types of psychological debriefing models such as Critical Incident Stress Debriefing (Mitchell, 1983) and Critical Incident Debriefing (Regehr & Hill). Most are based on the premise of crisis intervention where an opportunity is given for those that have experienced a common crisis to share their responses to extreme circumstances (Litz, Gray, Bryant & Adler, 2002). Questions are being raised about debriefing models where emotions are targeted soon after a critical event as it is thought that

this may be harmful to the recovery efforts of individuals (Moran, 1998). Further to this the concern that critical incident debriefing is of any benefit at all and may actually have a negative impact (Redburn, 1992). Gist and Woodall (1998) suggest that in some cases harm is the result of the use of debriefing, in other words it is iatrogenic.

Research on coping has also focused mainly on adults (e.g., Carr et al. 1995; Bachrach & Zautra, 1985) although there are a few examples of attempts to understand the coping mechanisms of adolescents (Hardin et al., 1992), children (Ronan & Johnston, 1999), and disaster workers (Holaday, Warren-Millier, Smith & Yost, 1995). From these studies it has been ascertained that the greater the physical impact and the younger the person the more likely negative coping strategies (avoidant) will be utilised (Bolin & Stanford, 1998).

Coping has been measured in various ways such as using scales and self-report methods. For example the Ways of Coping Inventory is a 68 item self report checklist that classifies the respondent into either the emotion focused coping category or the problem focused category (Folkman & Lazarus, 1980). Due to the ease with which adults are able to complete these measurement techniques it is not surprising that more research is carried out on adults therefore giving us an adult-centric view of coping and coping strategies.

Alongside stress and coping, other concepts such as self-efficacy are important to understanding the impact of disasters on individuals.

### **Self-Efficacy**

The concept of self-efficacy was developed by a number of authors most notably Bandura (1977, 1986) who proposed that self-efficacy is the mediator between knowledge and action and is defined as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391). Self-efficacy taps into a person's appraisal of their ability to act in a given situation regardless of the skill repertoire they may have (Gist & Mitchell, 1992; Rutter, 1985), and is regarded as an important motivational construct (Gist & Mitchell, 1992). Thought to relate closely to the construct of hardiness (Kobasa, 1979) and self reliance (Pearlin & Schooler, 1978), Bachrach and Zautra (1985) argue that self-efficacy may be related to well-being. Self-efficacy is also seen as related to the type of coping style used by individuals. For example, it is argued that individuals who are likely to utilize a task focused coping style have a degree of confidence in their ability to perform in a given situation than individuals that utilize an emotional or avoidant coping style (Bachrach & Zautra). Further to this it is recognized that individuals that are more attached to their place or community are more likely to develop self-efficacy, which is important in guiding actions (Twigger-Ross & Uzzell, 1996).

Self-efficacy has been seen as a moderator and protective attribute and has often been studied in contexts that are considered stressful (Cicchetti & Garnezy, 1993). In coping with a community stressor, such as a hazardous waste treatment facility, which residents interpreted as a threat to their well-being, the residents of a

small rural community who reported increased levels of self efficacy were more likely to become involved in mobilizing action against the placement of the treatment facility (Bachrach & Zautra, 1985). In this study self-efficacy was measured through the use of Pearlin and Schooler's (1978) seven-item mastery scale. Self-efficacy has also been implicated in a community under threat of volcanic eruption in New Zealand. Increased self-efficacy was related to the use of a problem-focused coping style and to lower stress scores for the residents of the community (Millar, Paton, & Johnston, 1999). Self-efficacy is seen as important to disasters as it is likely that increasing efficacy provides people with a sense of control in their life, which facilitates coping, at a time where control may be at its lowest (Bandura, 2002).

In terms of the measurement of self-efficacy scales have been mainly utilized. Traditionally the typical scale format required participants to indicate if they were able to perform (a task) at a level and how confident they were in the rating they provided (Wood & Locke, 1987). More recently Maurer and Pierce (1998) have argued that measuring self efficacy using a likert scale results in similar empirical evidence to that suggested by Wood and Locke.

At the individual level much of the disaster research has been adult centric and has focused on stress, coping and self-efficacy. These concepts are clearly important to our understanding of the disaster impact, however more recently the concept of posttraumatic growth has emerged as an important addition to understanding the response to adverse events like disasters.

### **Posttraumatic Growth**

Whilst posttraumatic stress studies have provided much insight into the consequences for people facing adversity, Cordova, Cunningham, Carlson and Andryowski (2001) argue that research that focuses only on the negative (stress) does not provide a full appreciation of what is taking place in adverse situations. In their education matched sample study of 70 breast cancer survivors, the incidence of life appreciation, relating to others and spiritual change was significantly higher than their healthy education matched counterparts. These breast cancer survivors indicated higher levels of posttraumatic growth. McMillen (1999) concurs with this argument that many individuals not only survive but also benefit from adversity.

Although there are numerous studies citing benefits from adversity, for example, women suffering from AIDS (Dunbar, Mueller, Medina & Wolf, 1998), survivors of a ferry disaster (Stephen, Yule, & Williams, 1994), combat forces in Vietnam (Fontana & Rosenheck, 1998), and sexual assault survivors (Frazier, Conlon & Glaser, 2001), the concept that has recently emerged conceptually and empirically in the literature, is posttraumatic growth (PTG).

Therefore, posttraumatic growth has been likened to other concepts i.e., perceived benefits (McMillen, 1999), stress related growth (Park, Cohen & Murch, 1996) and thriving (O'Leary & Ickovics, 1995). PTG, grounded in existential theory, and is the reevaluation of ones life in the aftermath of adversity (Cordova et al., 2001). In this vein posttraumatic growth is thought of as the antithesis of

posttraumatic stress, and importantly the greater the adversity faced the greater the reported growth (Tedeschi, Park & Calhoun, 1998).

A meta analytic review of 39 studies about positive changes following trauma and adversity carried out by Linley and Joseph (2004) indicates that there are a number of different predictors of positive growth, these include personality variables such as self-efficacy, coping strategies, social support and psychological distress.

The most comprehensive model of PTG has been developed by Tedeschi and Calhoun (1998). In their functional descriptive model, PTG is described as a significant beneficial change in cognitive and emotional life that may have behavioral implications (Tedeschi, Park & Calhoun, 1998, p3). With regard to the measurement of PTG both qualitative and quantitative techniques have emerged. Qualitative approaches utilized include interviews, documents and observations. For example McMillan, Smith and Fisher (1997) interviewed 195 people across three different types of disasters, a tornado, a mass killing and a plane crash. The participants were interviewed between 4-6 weeks after, and then again at 3 years, post event to determine perceived benefit and mental health adjustment. The measurements utilized were interviews for determining perceived benefits of the tornado, and the Diagnostic Interview Schedule- Disaster Supplement (DIS/DS) was utilized to assess mental health and satisfaction with friends and family. In terms of the type of disaster that reported the most benefit the participants in the tornado were first, followed by people involved in the mass killing, and plane crash participants. The authors suggest that these results indicate that factors relevant

to the community context were important in shaping these results. In particular, the indications are, the size of the community, (the smaller the community the more perceived benefit), and the response to the disaster from the corporate sector in terms of resource aid (the more resources available the greater the perceived benefit). The type of disaster may also invoke more social out-pouring to those involved, as the needs may be recourse based, for example clothes and shelter, rather than providing emotional support. Finally the authors note that growth appears to increase over time (McMillen et al., 1997). This concurs with other researchers that argue that even though PTG can be detected within two weeks of an event it takes years to see its full expression (Schaefer & Moos, 1992).

Recently Tedeschi and Calhoun (1998) developed a quantitative measure to ascertain an individual's posttraumatic growth based on the different ways growth is manifested for different individuals, for example, perception of self (survivor vs. victim, self reliance and vulnerability), interpersonal relationships (self disclosure, emotional expressiveness, compassion and giving to others), and philosophy of life (priorities, appreciation of life, sense of meaning, spiritual development and wisdom). The Posttraumatic Growth Index (PTGI) contains 21 items within 5 subscales measuring relating to others, new possibilities, personal strength, spiritual change and appreciation of life. Psychometric properties include an internal reliability of .90 (Cronbach Alpha) (Cohen, Hettler & Pane, 1998). Whilst the PTGI index has been used, it is generally utilized with individuals in individual trauma situations i.e., those with diagnoses of cancers or heart attacks, experiences

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of incest, and assaults, where as little work has been carried out with groups or communities that have experienced adversity (Tedeschi et al., 1998).

### **Consequences for Groups**

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The impacts of disasters are most often reported, for age groups and gender (males and females). The age groups most affected by a disaster event are children and the elderly. Children's responses to a disaster have been characterized in two ways: namely, intrapsychic and extrapsychic. Intrapsychic refers to their developmental stage, general and mental health and their vulnerability. The types of behaviors reported for children include emotional and behavioral disturbances (Crabbs & Heffron, 1981), irritability and sleep problems (Ollendick & Hoffman, 1982), nervousness, restlessness and school problems (Milne, 1977b). More recently the consequences for children have been related to the developmental level of the child as there are differences in the way in which children respond to disaster events depending on their developmental level. A child that is able to cognitively work through the disaster events will be better able to cope with the impact of the disaster (Aptekar & Boore, 1990).

The second way children's responses have been characterized is extrapsychic where the difference lays in the ability of the community to help, the different custodial arrangements of the child, i.e., living with which parent and reaction of significant others, i.e., reaction of mother or father. However neither of these distinctions (intrapsychic or extrapsychic) has produced clear interventions for children at any level (Aptekar & Boore, 1990).



This may be illustrated by an example. A series of investigations in New Zealand indicated that while children with asthma are more psychologically vulnerable to the effects of a disaster than children without asthma, neither group of children rate as having clinically significant levels of post traumatic symptomatology (Ronan, 1997a, 1997b). One implication of this finding is that a pre-existing health condition may interact with future disaster events to increase stress responses. The second implication brings into question the reported rates of clinically significant levels of stress of children in disaster situations. As indicated earlier children are reportedly at risk of clinically significant levels of stress from disasters yet Ronan's study does not support children having clinically significant levels of stress after a volcano eruption.

In many disaster studies the elderly have also been cast as a vulnerable group in the wake of disasters. However when this is examined further there are variables other than age which are important. It would seem that prior experience with disasters benefits this age group. Those elderly individuals that have experienced previous disasters seem to be 'inoculated' in some way to the effects of the disaster. This does not mean that they are immune to the effects but they are able to cope better than those that have not previously experienced these situations (Norris & Murrell, 1988).

This may also explain why the elderly have a greater congruency between their expectations of support, post disaster, and actual support received (Kanlasy, Norris & Murrell, 1990). In terms of emotional coping the elderly are able to deal with the consequences of the disaster impact, but they may take longer to recover

economically (Bolin & Klenow, 1983). Economic recovery is a different issue to emotional recovery, and few studies have investigated these differences.

With regard to gender, although most studies provide demographic information about their participant groups, most indicate there is no gender effect. However, for children it is different, and girls and boys express distress differently. The reporting of symptoms are different, for example, girls are more likely to show stress symptoms like anxiety or depression whereas boys exhibit behavioral symptoms like reckless behavior or sleep disturbances (Vernberg, 1999). Even though there is reporting of the gender breakdown in most disaster studies, few studies have used a gendered lens when examining a disaster (Enarson, 1988). When considering the impact of disaster events on different sociodemographic groups (white, African American, male, female, younger, middle-aged and older) Norris (1992) found that young people (18-39 years) showed the highest rates of stress and African American males were the most vulnerable. Whilst this study included events other than natural and technological disasters the findings are still indicative.

Another way in which groups of people have been defined and studied in relation to disasters has been to look at religious groups and their ability to cope. Studies suggest that religiosity does mediate the coping ability of people (Smith, Pargament, Brant & Oliver, 2000), however depending on the type of religious denomination held, there is a difference in the level of disaster stress reported. For example in a study looking at the role of religious differences following a Hurricane in the Fijian Islands, religious beliefs were found to be helpful in coping by Fijian

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Christians (89%), Fijian Hindus (76%) and Fijian Muslims (63%) (Gillard & Paton, 1999).

With regard to the measurement aspects of groups, those scales that measure adults rarely target one particular gender or age group. Generally a gender breakdown is undertaken during the course of the research, which highlights that little consideration is given to the gender bias/neutrality of the methods and measurement techniques utilized (Enarson, 1998). Within the last decade studies have started to look specifically at the older age group however they still utilize the same methodology for all adults (Buckle, Marsh & Smale, 2000; Kanlasy, et al. 1990). Studies that have involved children often use reports from parents and teachers (Milne, 1977b) whilst some also involve self report measures from children such as the Children's Depression Inventory (CDI) and the State-Trait Anxiety Inventory for Children (STAIC) (Ronan, 1997a, 1997b).

Whilst various groups are affected by disasters, interventions are often aimed at the individual level. Once the focus turns outward from the individual attention is focused on the broader community.

### **Consequences for Communities**

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The consequences for communities, where disasters take place, are dependent somewhat on the event that has taken place. Often there are physical consequences for the community, in that some part of the built or natural environment is affected, which then directs the community activities to a greater or lesser extent. A cyclone that devastates most of a small town may have a much

greater impact on that local community than a cyclone that hits a small part of a suburb within a large metropolitan city. The important concepts in determining the consequences for communities are the intensity and magnitude of the disaster (Wenger, 1978).

This discussion focuses on the impact of a disaster on a community's social system, as this area of research is relevant to the current thesis. There is a double impact from a disaster on a community's social system as there are consequences in terms of the initial events followed by the social disruptions which often continue longer than the impact from the event itself (Horowitz, Stinson & Field, 1991).

### **Social Support and Social Networks**

Social support refers to a transaction between one person and another, which may be about providing information, an appraisal, showing emotions or by aiding the person (Murphy, 1987). A social network refers to how many people a person accesses and the type of relationship they may have to each other, for example, the amount (size) and structure (family, friends, neighbours) of people around an individual. Social support and social networks bridge the gap between the individual and the community's social structure. These concepts have consistently been shown to buffer the stress associated with the disaster aftermath (see for example Fleming, Baum, Gisriel & Gatchel, 1982; Kaniasty & Norris, 1993; Padgett, 2002). These networks are important systems that transport resources, such as instrumental support, to and from individuals and therefore do become constrained by other social processes. Disasters interrupt social processes

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specifically in terms of networks being able to provide social support (Milne, 1977a, 1977b; Wellman, 1981).

Social support is the social connection that individuals have to their community. Social support has been identified as important in protecting and buffering individuals from harmful physical and psychological consequences (Cassel, 1974). It is suggested that when personal losses and/or community destruction (physical) increases then there is a greater likelihood of social support networks being eroded. This was highlighted during the Cyclone Tracy disaster experienced in Darwin, in the Northern Territory, in 1975. As the community destruction was so complete (80% of the houses were destroyed) it was determined that the best way to deal with the population was to relocate the women and children while the men remained to recover and rebuild the local communities. The physical relocation of a large proportion of the population eroded the normal social support structures for many individuals. As a result, the women and children reported higher levels of emotional disturbance, psychosomatic disturbances and many relationship problems and the men reported better adjustment (Milne, 1977a).

Importantly for victims of flood disasters the amount of social support they expect to receive is related to the amount of support they actually receive (Kaniasty, et al. 1990). However as the authors point out expectations of support is about three times higher than actual support received. In regard to the sources of support, kin (family) sources provide more support than non-kin sources. Further to this, where there are restrictions in terms of potential social network size (i.e.,

rural communities) less support is also received. Therefore the role of social support networks during and after a disaster seems to be important to an individual's ability to recover from the effects of the disaster.

There is some research to suggest that disasters don't always erode social support networks, they can in fact mobilize them. For example, Padgett (2002) argues that a shared disaster experience provides a cushion through shared meanings and understandings in contrast to a professional support relationship, which is devoid of context and could be stigmatizing. It is argued that social support and social networks are critical in providing a link between individual and community wellbeing (Orford, 1992). The context of community provides the place for social organizations to develop (Schumaker & Brownell, 1984). Understanding a person's attachment to community (sense of community) is important to the social support networks individuals create in disaster communities.

### **Sense of Community**

More recently researchers have identified that an individual's sense of belonging and attachment to their community is important to every age group within a community in terms of psychological wellbeing, workplace satisfaction, political participation, crime prevention, community resilience, community participation, and community development (Chavis & Wandersman, 1990; Davidson & Cotter, 1989; Rich, Edelstein, Hallman & Wandersman, 1995; Perkins, Florin, Rich, Wandersman & Chavis, 1990; Pooley, Pike, Drew & Breen 2002; Sonn & Fisher, 1998). The operationalization of the attachment and belonging to

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community has been through the development of the concept of psychological sense of community or sense of community (SoC).

In 1974 Sarason argued that individuals who have an emotional interconnectedness to the collective created healthy communities and that to understand this we needed to define and measure a person's SoC. One of the most developed and researched models of sense of SoC, by McMillian and Chavis (1986) argues that there are four components of SoC: namely membership; influence; integration and fulfilment of needs; and a shared emotional connection.

Membership encompasses shared history, emotional safety, common symbols and personal investment. Influence accounts for the two way process where an individual has influence within the collective and the collective has influence over the individual. Integration and fulfilment of needs reflects that an individual's needs and community needs can both be met at the same time thus the fulfilment of belonging to the collective is realised. Finally, shared emotional connection characterises the bond that develops between members of the collective through important, salient events (McMillian & Chavis, 1986).

SoC has been tested in various settings including small neighbourhoods, midsize communities, large cities, organisations and schools (Brodsky, 1996; Pooley et al., 2002; Pretty, Andrews, & Collett, 1994; and Pretty, Conroy, Dugay, Fowler, & Williams, 1996). In regard to disaster community's SoC has been directly related to a community's involvement in the placement of a hazardous waste facility (Bachrach & Zautra, 1985), farming communities involvement in the Australian salinity crisis (Bishop, Paton, Syme & Nancarrow, 2000), and in

assessing the long-term impact of disasters, communities and mental health (Paton, 1994).

In regard to the measurement of sense of community there is some debate in the literature about the value of utilising qualitative methods to determine SoC or whether to utilise quantitative methods such as a scale (Bess, Fisher, Sonn, & Bishop, 2002). To date few measurements of SoC have developed from a well articulated model of sense of community (Chipuer et al., 1999). The Sense of Community Index (SCI) is a measure of sense of community that was developed from McMillan and Chavis's (1986) model of SoC (cited earlier), and is the one of the most utilised and validated scales for sense of community (Chavis & Pretty, 1999; Chipuer et al., 1999). The SCI is a 12-item scale, that was presented in the appendix of Perkins et al. (1990) but based on the article by McMillan and Chavis (1986), describes the 'block' as the referent group for measurement scale. The items were responded to in a true/false format however some researchers (Nasar & Julian, 1995) have utilised a five-point (strongly agree to strongly disagree) likert response format. The internal consistency of the scale has been reported to range from .71 - .8 (Chipuer et al., 1999).

The concept of sense of community has greatly increased our understanding of what community means to people and how it becomes a resource for people, particularly in times of stress. However, people's attachment to community may be integral to how the community operates or works, essentially how competent it is.



### **Community Competence**

The concept of community competence has been addressed by different disaster studies in diverse ways. In describing community competence Iscoe (1974) argues that a competent community is one that utilizes, develops or otherwise obtains resources, including human resources in the community (p. 608). Therefore Goepfinger, Lassiter and Wilcox (1982) argue that community competence is seen as an indicator of the health of a community. In terms of understanding the concept of community competence, Cotrell (1976) argued that a competent community consists of several components (1) the community is able to collaborate effectively in identifying needs and issues; (2) the community can achieve a working consensus; (3) the community can agree on ways to implement agreed upon goals; and (4) the community can carry this out collaboratively and effectively (p. 197). A competent community is thought to have a constituency that has a commitment to the community; is aware of their own and others identities and positions; can clearly articulate views on community matters; can hear what others are saying; can accommodate to differing views; has a willingness to be involved; can manage community relations; and, has interaction and decision-making processes (Armour, 1993).

Sonn and Fisher (1998) in their exploration of oppressed or nondominant communities argued that communities that are able to provide resources, both social and psychological and that are organized are competent communities which have the capacity to cope with adversity. Cook (1983) also argued that

communities with a higher level of competence or capacity can respond better to environmental threats. Residents that felt threatened by a proposed hazardous waste treatment plant, and were more attached to their community, utilized processes in their community (attendance at community meetings, rallies, and petitions) to harness support against the plant being established. In concert with this Buckland and Rahman (1999) argue that a community that has high social capital (similar to sense of community, see Perkins & Long, 2002; Pooley, Cohen & Pike, 2005) underscores a community that is soundly structured and able to respond to a disaster more effectively. In their study of the aftermath of Red River flood in Canada in 1997, Buckland and Rahman (1999) found that of the three communities studied the community that was better resourced and organized and had greater internal capacity (community competence), was better placed to cope with the flood. These arguments indicate the importance of a competent community in coping with disasters.

Community competence has been measured by using qualitative interviews and scales. Many studies utilize only qualitative data collecting techniques, for example in-depth interviews to ascertain the relationship between community organizing and community competence (Denham, Quinn, & Gamble, 1998), others utilized quantitative scales, for example Goepfinger and Baglioni (1985) developed a 22 item likert scale to assist practitioners and researchers in studying the concept. A project set up to evaluate the interface between program evaluation and empowerment in the Mississippi region of the United States, utilized both qualitative and quantitative methods to determine the shift in community

competence over a one year period (Eng & Parker, 1994). In addition to Cottrell's eight dimensions of community competence, Eng and Parker included a measurement of social support. Baseline data was gathered from stakeholders in the project communities and repeated one year after implementation of a health promotion program utilizing the same questions. What resulted was an understanding of the issues associated with implementing a health program in different communities. The project team was able to clearly trace the processes that were significant to each community in the adoption and running of the health program. These authors, Eng and Parker (1994), also argued that when it is important to understand/evaluate at the community level of analysis, then community competence is important to the understanding of health and health behaviors.

### **Summary and Conclusions**

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The consequences of a disaster for individuals, groups and communities are varied, for example they include disaster stress, issues with coping and disruptions to social support networks. This review has illustrated the many consequences of disasters by describing salient concepts identified in the literature with regard to the individual, group or community level.

At the individual level disasters are argued to be traumatic with extreme emotional and psychopathological reactions becoming dysfunctional in that they are persistent and continue for a long time after the event. At the individual level the concepts of stress and coping are pervasive and most studies refer to either or

both of these concepts. The concept of self-efficacy has received less focus at the individual level and this in itself is interesting. Self-efficacy may be an important link for studies that go beyond the individual level of analysis as Bandura (2002) argues that efficacy is important to adaptation and change, which starts to bring into focus the context of individuals.

Disaster studies tend to focus at one level (individual, group or community) where a number of concepts will be examined in terms of how they relate to the disaster experience. For example studies that utilize stress and coping as concepts to understand the disaster impacts. Relatively few studies (i.e., Bachrach & Zautra, 1985) have included a number of variables to understand disaster events. Future studies could benefit from looking at a more comprehensive and integrated approach, that is look at the relationships between a number of these variables.

Disaster studies are usually about the resultant negative consequences for individuals groups and communities. Few studies recognize that most 'victims' of disaster go on to survive and some even thrive (Padgett, 2002). Quarantelli (1985) argues and cites the work of Tyhurst as the author primarily responsible for providing the original figures of what proportions (10-25%) of a disaster community would be psycho-pathologically impacted. Even though there is no basis to the figures Tyhurst produced, they are often used by researchers and clinicians. This 'individual trauma' perspective is perpetuated by belief systems based on folk wisdom and the mass media. Society has developed common stereotypes for reactions to extreme stress, which aided by the mental health area, works from a

deficit model). An alternate view, known as the social sponge approach, suggests that the impacts on the community may be positive rather than negative and relatively short term rather than long term, as is commonly perpetuated Quarantelli (1985).

The articulation of the consequences for groups has also been through a narrow lens in that our understanding of groups is based around socio-demographic characteristics. Whilst this starts to 'widen' the view, from the individual focus, there is little understanding of what is happening at a deeper level. A broader research focus, which includes community concepts, enhances the importance of the context and understanding the consequences at all levels. Further to this by including *both* individual and community level variables the relative understanding of each can be understood (Bachrach & Zautra, 1985) and may provide avenues to enhance the resiliency of individuals and communities in the future. In addition to this argument, understanding the social mechanisms for disaster recovery is a welcome and much needed addition to the economic and technological focus that has prevailed (Paton, 1994).

The disciplines of Anthropology and Sociology explore a broad and expansive view of disaster communities in order to understand the broad ramifications of a disaster event but, do not however, tend to include the individual variables that the discipline of psychology aims to understand, namely social (social support, social networks) and psychological variables (i.e., stress, coping, self-efficacy). What many theorists and researchers are keen to argue is that studies that are vital in understanding disasters need to take into account the

psychological variables through to variables that relate to the broader community context (Smith, Smoll, & Ptacek, 1990; Wandersman & Nation, 1998). This type of study would require utilizing variables at different ecological levels to determine what factors are associated with disaster communities. For this reason the next chapter will explore systems theory and ecological frameworks, which can be used as a vehicle to aid the present study in determining what factors mediate the disaster experience in Western Australian communities.

## CHAPTER 3

### Systems Framework

**"Community processes are not necessarily related to natural disasters in Kununurra. Pressures are remoteness with state, no governance relating to Northern Australia and subject to other state/territory influences. Community not well connected to state even though many services are delivered by the government."**

**(Comment from a 41-50 year old male who has rented in Kununurra for 5 years)**

#### Aims of This Chapter

This chapter initially presents a brief overview of the origins of the systemic approach through describing the relevance of the ecological framework to human communities. This is followed by a discussion of how psychology has developed and utilized systems theories to understand the interactions between individuals and their environment. Finally the importance of system's theory is explored in relation to understanding communities that face natural disasters. This chapter provides an interpretive framework to understand the different ways that systems theory has developed and ultimately how it can be applied to understanding living systems such as disaster communities.

It is self evident that people do not exist in isolation. Our understanding and examination of the interactions of individuals in relation to others, and the environment, has been through the development of systems theories. Systems impact on individual at every level socially, economically, politically and psychologically. In order to examine how the psychological and social consequences of disasters relate to the broader community an understanding of the ideas and knowledge that have been generated by ecological and systems theories is warranted. Systemic theories have developed under the auspice of ecological models, which have been utilised to provide a means of understanding the impact of the environment on individual behavior, group behavior and interventions (von Bertalanffy, 1968).

### **Origins of Systemic Approach**

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The beginnings of the systemic approach can be seen in the work of ecologists, who argued that to understand individual phenomena, such as a cell or a tree, you need to examine it at different levels, that is, study the environments or systems (e.g., biosphere, the ecosystem, communities and populations) within which individual organisms exist and impinge on other organisms (Stokols, 1992). This systemic approach was developed within environmental biology and is referred to as the ecological paradigm. Underpinning this paradigm is the belief that the environment plays a significant role in influencing those individual organisms within it. Individual organisms have the ability to adapt over time and therefore changes



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can and do occur because of the system in which the individual organism interacts (Levine & Perkins, 1997).

Darwin and others (Bogdanov, and von Bertalanffy (1968)) recognized that the ideas inherent in the ecological paradigm extended to the human world. For example Bogdanov, a Russian researcher, philosopher and economist, developed the theory of tektology, between 1912 and 1917, which refers to the science of structures, and clarifies modes of organization for all living (human and non human) and non-living things (Capra, 1996). Tektology posited that there were three kinds of systems, organized, disorganized and neutral. The organized system refers to the whole being greater than the sum of its parts. The disorganized system is when the whole is smaller than the sum of its parts and the neutral system is when the first two system's activities cancel each other. Bogdanov's theory was advanced for this period, however researchers rarely refer to his work, not even, for example, by von Bertalanffy (1968), who is often cited as the father of general systems theory (Capra, 1996).

General systems theory as proposed by von Bertalanffy (1968), is known as the theory that established systems thinking in the scientific arena, and sought to challenge the mechanistic view of Newtonian science by considering the general science of "wholeness" (p.37) and applying mathematical equations to studying generalized systems. Although never applying his theory, von Bertalanffy provided the gateway for more contemporary researchers to challenge a nineteenth century science built on Newtonian mechanics. This science suggested that the living world engine would run down and that we would be in a continual and increasing

state of disorder (entropy) (1968). von Bertalanffy's views were based in his understandings of biological systems and he argued that the living world system more closely resembled a biological rather than a physical system, thereby suggesting the living world unfolds in order and in increasing complexity (Capra, 1986).

General systems theory (von Bertalanffy, 1968) views living organisms as open systems in that they interact with their environment. There are a number of common characteristics of open systems 1] Importation of energy – this is the inputs the system receives from the environment; 2] The through-put which is the activity of the system dealing with the energy from the environment; 3] The output – the product delivered to the surrounding environment; 4] Systems as cycles of events- the output becomes part of a cyclical process which provides new energy into the system; 5] Negative entropy – the system stores energy for the future, it gets more complex and changes; 6] Steady and dynamic homeostasis – stability that preserves the system but gradual changes to occur; 7] Differentiation – Open systems become increasingly more complex and differentiated overtime (Murrell, 1973). Therefore von Bertalanffy's work enabled the application of general systems theory to living systems.

The ecological paradigm and its link to living systems has afforded the researchers of human populations an analogy that has resulted in theorists developing understandings about people in their natural settings. Ecological communities and human communities are both open living systems that have some level of organization (Kiter Edwards, 1998). Human systems are structurally

organized and inherently take into account their own history and networks. Human populations also have to deal with other dimensions bestowed upon them through their higher cognitive abilities i.e., language, politics, culture, justice (Dodgson, Duckett, Garwick & Graham, 2002). Therefore the ecological perspective provides a framework for community level interventions. Kelly's (1966) work was significant in providing useful ways for researchers and practitioners to develop community level interventions in human community problems.

Based on an ecological process Kelly (1966) proposed four principles that useful for community intervention (Tricket, 2002). There are the processes of interdependence, cycling of resources, adaptation and succession and indicate the propensity of systems to change. Interdependence refers to the mutually dynamic and interactive relationships between components in a social system. If one component changes then others are also affected or change. A community is made up of different populations; using the notion of interdependence any changes to one population, for example, an ethnic population, will result in changes in the total community. Therefore the community needs to be the unit of concern. This principle allows one to shift focus from the whole to the parts of a system (Capra, 1996).

The second principle, cycling of resources, suggests that, there is a utilization of materials and resources that are passed through the system. The relevance of this principle at the community intervention level is the recognition of differences based on the distribution of property and resources (energy) in terms of the ability of people to transact. Different populations have resources and relate to

other populations within the community, with their resources (Kelly, 1966; Trickett, 1996). Further to this, in human communities some systems are not cyclical but linear (i.e., industrial) and therefore the human system as a whole often produces more waste than it can use (Capra, 1996).

Adaptation refers to the way the human system is able to alter in a way that enables it to cope. This would involve reworking and analyzing the different constraints (environmental or resources) the system is under. Finally, succession, allows us to understand change in a community, which takes place as environments are dynamic, however the change that takes place often dictates the conditions under which one population may thrive and another may not (Kelly, 1966). This principle is similar to Darwin's concept of survival of the fittest. Individuals who are well adapted survive; others do not continue to exist.

These four principles highlight that human systems are change oriented, dynamic and fluid and therefore it is difficult to predict what the response of a human system will be. Human systems are also transactional, which refers to the flow of relationships and resources within the system. Finally, human systems are based on a structure, and this has an impact on all individuals. Therefore, the structure needs to be exposed in order to understand the impacts from the components (individuals) through to the ecosystem (society) (Kelly, 1966; Kelly 1986; Trickett, Kelly, & Todd, 1972; Trickett, 2002). Anything that takes place at a community level (e.g., a disaster) reverberates through the community to each individual. The impact of the reverberations are based on how a community is structured (history and networks) the distribution of energy (property and

resources) and the ability to cope with constraints (environmental and resources). For example, Benight (2004) in his study of community efficacy following a series of natural disasters argues that the greater the resource loss in a community following a disaster the lower the levels of perceived community efficacy (judgments about the community's ability to make decisions). An understanding of how this impacts on individuals and how individuals enact change is the focus of psychology.

### **Psychology and the Systems Approach**

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The focus for the discipline of psychology has been on the individual with a view to understanding human behavior. The main focus for the study of human behavior was traditionally intra-psychic in nature. In recognizing this Kurt Lewin (1951), in 1935, a field theorist challenged the idea that the social environment had no role to play in the prediction of human behavior. Drawing upon the work of Durkheim (1952) and Murray (1938), who both argued that the social environment/context imposed some influence on behavior, Lewin (1951) developed his view of human behavior by proposing that  $B = f(P, E)$ . He defined that behavior (B) is a function (f) of the Person (P) and the Environment (E). Lewin's field theory argued for the importance of what happens around the individual, one's life space. Life space refers to what occurs within and influences the social and physical environment around the individual. In order to understand the person in context one needs to take into account all the different subsystems (i.e. the social and physical environment), which impinge upon the individual. Therefore one could not

view a person's behavior in isolation of the environment if the intent was to understand the behavior (Levine & Perkins, 1997). This recognition that people were more than their internal workings encouraged Roger Barker (1978) to develop the concept of behavior settings.

Barker (1978) developed the area of behavior settings as he observed that people in everyday settings interacted similarly in these natural environments the same, regardless of their apparent individual differences. In developing this theory Barker set up a field experiment that involved a small town in Kansas, becoming a Psychological Field Station. The 800 residents of the town were studied for a year as they went about their normal lives, which resulted in the concept of behavior settings. Barker was interested in the links between a person behavior and the physical features of the setting. Underlying Barker's work were three main points. First that behavior was not necessarily affected by the physical environment; second, that in behavior settings individuality is to some extent lost; and finally when identifying the ecological environment of the behavior setting, the person is blotted out and the events around them are observed. Therefore Barker argued that people's behavior is inextricably bound to the environment and that people behave in certain ways because the environment encourages them to do so. In other words people generally behave in similar ways in environments that are familiar and natural to them. In contrast to Lewin (1951), Barker (1978) would argue that behavior is the function of the environment or  $B = f(E)$  (Orford, 1992; Smith, Littlejohns & Thompson, 2001).

Importantly, Barker's (1978) work allowed researchers to ascertain the common behaviors within these settings, which then provided opportunities to modify environments in order to change behavior. One of the most significant findings was that behavior was better predicted from identifying the setting than from knowing the characteristics of an individual (Murrell, 1973; Smith et al., 2001). However there are some criticisms raised about Barker's behavior setting theory. Interestingly these criticisms are mostly reported in texts books (community and environmental psychology texts) rather than reported in the context of ecological studies. The main criticisms reported are first, that the theory is more descriptive of the behaviors rather than trying to integrate the individuals' behavior into the results specifically (Bell, Fisher, Baum, & Greene, 1986); second, that the impact of change in a setting is not properly considered (Heller, Price, Reinharz, Riger & Wandersman, 1984) and finally; Orford (1992) argues that Barker's theory does not properly consider the person in the behavior setting. In regard to systems theory these criticisms indicate the need to understand and integrate the person's behavior in context.

Whilst Barker's (1978) theory points to the importance of the environment, Bronfenbrenner's (1977; 1979) theory of nested systems provides a focus on the individual perspective, as the theory centred on the individual's interpersonal experience of the systems in which they find themselves. Although Bronfenbrenner's (1977) focus was to identify the importance of the transactions that take place within the context of the developing child, what he added was a temporal understanding of systems, as we are compelled to think of the parts of

the system that are important for the health and wellbeing of the child, thus, recognizing the importance of the whole system. The ecology of Bronfenbrenner's human development model locates the child at the centre of a set of four concentric circles, which are conceptualized as levels and are labeled, starting at the centre with the micro, then the meso, the exo and finally the macro-level. Within these levels are systems that Bronfenbrenner (1977) has identified which impact upon the individual personality and development of a child (Bronfenbrenner & Morris, 1998).

Within the micro-level are systems that are important to an individual person and include those where they fulfill certain roles i.e., home – daughter, son, parent; school – parent, teacher; workplace – employee. The meso-level contains more than one of the micro systems and includes the links between the micro systems i.e., home and school. The exo-level extends the meso level in that it incorporates other social structures like the local neighborhood, and the education department. These are social structures that impinge on the individual and are interconnected through the micro and meso levels. Finally the macro-level is the overarching social structure in which the individual is located. Thus, for any given society there will be differences given the nation, culture and history of the development of that social fabric. Bronfenbrenner's (1979) theory concurs with Kelly's (1966) work, in that both theories focus on the importance of the change process within human systems, in contrast to Barker's (1978) theory.

Even though Bronfenbrenner's (1979) theory is systemic it places the person at the centre and thus Orford (1992) criticized Bronfenbrenner for not



attending to the relationships between the various levels of the systems. This gap was addressed by Murrell's (1973) framework of social systems. Based on the premise of the need for goodness-of-fit between individuals and the environment Murrell (1973) developed a comprehensive conceptual framework about social systems. Importantly the key aim of this framework was to determine ways to intervene in systems. At the individual – social system level of interaction Murrell draws upon different theories (Role taking theory, Social Identity theory, Interpersonal theory and Interaction Processes) to explain the role of personality in the transactions between people. At the social system - individual level, Murrell argues for the complexity of the way human network transactions are determined, assigned and accommodated to derive what he calls psychosocial accord. This refers to the degree of harmony between the person's requirements and his/her networks requirements. These concepts are then examined at different stages of development from infancy through to adulthood (Murrell, 1973).

At the population – social system level Murrell (1973) draws upon von Bertalanffy's (1968) General Systems Theory, concepts from organizational theory and Barker's (1978) ecological psychology to explore the 'big picture', which is the suprasystem comprised of many social systems. The social systems encompass populations, which are made up of individuals, all transacting within and between networks. Within the suprasystem social systems are connected through specific agents (agents of the systems structure), and through the concepts of power and communication.

Murrell (1973) argues that survival of a suprasystem (whole or society) is dependent on the interrelationships between the subsystems (parts or levels) within the suprasystem (whole or society), and between the subsystem (parts or levels) and the suprasystem (whole or society). Therefore In order to perpetuate the system the relationships between the structures are as important as the structures themselves.

Recently the work of Prilleltensky (2003) provided an example of how the relationships within the system are as important as the system structures through his work on wellness. Prilleltensky utilizes systems theory to argue that the concept of wellness can only be understood from an ecological standpoint. Wellness he argues is only achievable with the simultaneous satisfaction of personal (i.e., control and self- efficacy), relational (i.e., sense of community, community cohesion) and collective needs (i.e., equitable distribution of resources). Wellness at the individual level is inextricably bound to wellness at the collective level. As such, needs at the personal level (health) cannot be separated from needs at the collective level (health care). Between the satisfaction of needs at the individual and collective level is the concept of relational wellness, which enables the mutual satisfaction of personal and collective needs. Relational wellness are the factors which enable process to facilitate needs being met, factors such as respect for diversity, social cohesion and democratic participation. In this sense Prilleltensky is arguing that the structures are the parts of the system at individual end and the collective end, these are also outcomes in that each system, individual (health) or collective (health care system) and may be good or they may

be poor. However the relationship between these structures (individual and collective) is the relational wellness, which provides a connection between the structures and also recognizes a process orientation (Prilleltensky, 2003).

Within psychology there has been the emerging recognition of the role of the individual and the environment in understanding behavior. Barker's (1978) work argued for the recognition of behavior settings and alternatively Bronfenbrenner's (1977; 1979) theory recognized the developing role of the individual in an interpersonal system. Further to this Murrell's (1973) and Prilleltensky's (2003) work acknowledges the value in understanding the interrelationships between systems in order to understand behavior. Previously, Reiff (1968) argued that the area of psychology that is best able to intervene to modify an individual's behavior, and then move towards changing the behavior of all people in a system is community psychology as it takes into account the social systems influence on behavior.

### **Community Psychology and the Ecological Analogy**

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Within the discipline of psychology, community psychology has adopted the ecological analogy to study the human community. Community psychology, as argued by Murrell (1973), "is the area in the science of psychology that studies the transactions between social system networks, populations, and individuals... to enhance the psychosocial opportunities for the individuals" (p. 23). The term community psychology was coined at the Swampscott conference in Massachusetts in 1965 with the central aim of optimizing the wellbeing of

communities and individuals (Duffy & Wong, 1996). What was, and still is important is that the field of community psychology is committed to finding solutions to real world/social problems within the context of the scientific method (Thomas & Veno, 1992). Community psychologists work with individuals, groups, organizations and communities to emphasize strengths and competencies rather than their adversities and incompetence. Community as such is therefore defined as 'the idea of persons coming together in some shared endeavor or at least geographic proximity, and connotes groups, neighborhoods, and larger structures (Dalton, Elias & Wandersman, 2001:4). There is a strong recognition that psychology has traditionally worked from a treatment model, however in understanding that many problems may occur because of the person-environment fit, community psychologists try to 'intervene' in social systems before problems occur. In this regard community psychologists work from a platform of competence as opposed to the incompetent, deficit orientation.

The adoption of Bronfenbrenner's (1979) human develop model has provided a metaphor for community psychology in terms of understanding and researching the different levels of analysis of individuals in society. See Figure 3.1.

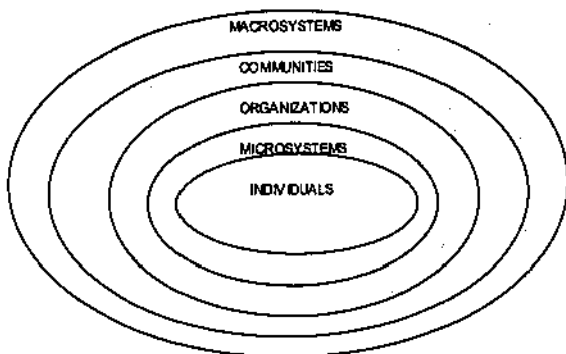


Figure 3.1. Levels of analysis for community psychology

For example at the individual level understanding the outcomes of community problems for individual people; at the microsystem level where understanding of how and why people engage in interaction; at the organizational level where larger settings or a system (education) is involved; at the community level where the influence of the wider collective is the focus and finally; at the macrosystem level where studies may look at the cultural and societal forces that are taking place (Duffy & Wong, 2001).

Further to these four facets have been identified by researchers as constituting the ecological approach in community psychology research (Kingry-Westergaard & Kelly, 2000). The first is the adoption of theoretical propositions that characterize the interrelationships between people and places; the second is that the emphasis is on the social construction of social settings and the resulting behavior; the third concerns the collaboration between researcher and participants

and understanding the shared meanings of social phenomena in context, and the fourth is the participant's realization of the social processes that create and perpetuate social structures. The implication for community psychology research that is congruent with these four facets of the ecological approach is the acquisition of knowledge that is empirical, exploratory, collaborative and contextual in its theoretical and methodological assumptions, about the complexity and uniqueness of any given system (Kingry-Westergaard & Kelly, 2000; Shinn, 2000).

There are a number of examples of the ecological orientation in community research. For example Wicker (1989) suggested an ecological approach to theory, which he termed substantive theorizing. Wicker argues that we need to focus on conceptual frameworks and more specific substantive domains. Therefore we need to select methods to study individuals in context that are appropriate to and, importantly, include the context. In his explanation of substantive theorizing Wicker describes three components of research (1) the conceptual domain – which contains the ideas and concepts held within the wider literature, (2) the methodological domain – which are the methods, techniques and strategies used to examine phenomena, and (3) the substantive domain – which contains the processes and problems as experienced by the individual (Brinberg & McGrath, 1985; Wicker, 1989). Wicker argues that research needs to be contextualized not only to understand what is being researched, but also to choose appropriate methods and strategies for undertaking the research. He suggests probing substantive domains that are similar, so that the phenomena at hand are better understood at both the level of theory and within the domain itself (Wicker, 1989).

Elaborating on Wicker, Seidman (1989) argues that both the substantive and conceptual domains should be considered simultaneously, that both the concepts in the wider literature and the processes experienced by individuals in context need to be considered.

In a more elaborate but directive model Strauss and Corbin (1990) detail their conditional matrix that enables a researcher to view a transactional system of conditions, interactions and consequences related to the issue under investigation. The conditional matrix consists of a set of concentric circles (Figure 3.2), which represent different contexts in which interactions may occur.

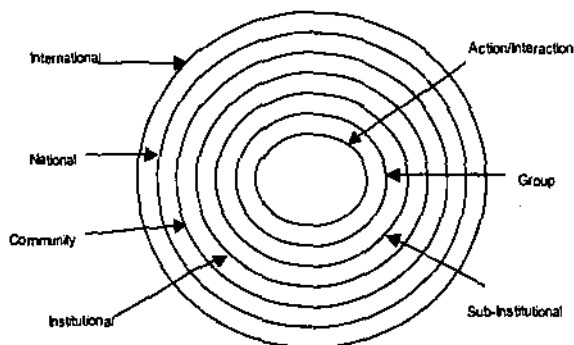


Figure 3.2. Strauss and Corbin's Conditional Matrix

Each level represents a condition or feature relevant to the issue being investigated. The conditions or features are drawn from the literature, from research and from experiences. Levels are connected to and between each other

by conditional paths that are created by tracing the interaction/actions across the various levels. Strauss and Corbin (1990) have used a simple example of, *being unable to obtain proper sized gloves for a medical procedure at a particular time*, to describe the matrix and the levels within it. The levels and *example* are as follows

- Action level: this is the centre of the matrix and represents the actions performed in relation to the interactions occurring.
- Interactional level: the direct communications between people. Could also include self reflections derived from interactions.
- Collective group and individual levels: these would include features of the groups such as knowledge, biographies, philosophies and experiences. *A doctor chooses to wear oversized gloves as other are not available.*
- Sub-organisational and Sub-institutional levels; which includes the sectors within an institution or organization. *There is a short supply of gloves*
- Organisational and Institutional levels: which can include the structure, rules, problems, histories relevant to organisations and institutions. *Short supplies of gloves means they are kept under lock and key by staff unavailable at the specific time the medical procedure is scheduled.*
- Community level; includes both the features of national and international levels however they are in relation to the community. *Supply of gloves is limited by national guidelines that ensure all medical services within the community receive an equal quota of gloves.*



- **National level:** this includes culture history, values, economics, national politics, government regulations, problems and issues. *National Health Standards regulate the use of gloves in medical procedures.*
- **International level:** the outermost level, which includes features such as international politics, regulations, culture, economics, history, philosophies, values.

Wicker (1989) and Strauss & Corbin's (1990) models provide examples of the way in which community psychology has drawn upon the ecological framework to develop models for doing research in community settings. Both these models allow community psychologists to apply systems theory to real world settings, to study the transactions within a social system and thereby gaining a better understanding of the person-environment fit.

Contemporary researchers (Perkins, Brown & Taylor, 1996) use an ecological framework to investigate participation of individuals and communities in issues of concern to their communities. These researchers have identified that an individual's participation in either religious or community organizations will enhance their involvement within their communities. This research recognizes the individual factors which contribute to the person-environment fit.

The work of Kelly (1966) and Barker (1978) argues for the importance of understanding the individual within a system. Murrell's (1973) and Bronfenbrenner's (1977) work describes the importance of interconnections between various parts of a system. Finally Wicker (1989), and Strauss and Corbin's (1990) models provide different vehicles for researching within a systems

framework with the aim of understanding the context and the factors that impinge upon it. These ecological frameworks and models provide an understanding within community psychology for the importance of human action occurring across different levels (Reiff, 1968) and thus the ability to be engaged in substantive issues within the community.

### **Ecological Framework and Disaster Studies**

Within many communities disasters are an important issue that have already benefited from research grounded within an ecological framework. For example, in the United States of America, after Hurricane Andrew in 1992, Peacock and Ragsdale (1997) utilized an ecological perspective to examine the questions raised and solutions offered to families, households, businesses and other groups in the restoration and recovery process. From their socio-political analysis of the sociology of hurricane Andrew, the authors argue that social inequality, the complexity and heterogeneity of the community, the coordination of disaster recovery activities and the competition aspect of a free market economy all impacted the community, in the post disaster period. These issues emerged in part because of the limited view of what a community is. Community was thought of by Tobin and Whiteford (2002) as a single bounded autonomous social system and not as an ecological network of interacting social systems that made it difficult for any structured or organized response effort. Alongside of this were inequalities in access to resources (physical and social) based on existing inequalities in social structure and the failure to develop and distribute infrastructure to withstand the

event itself. Therefore what emerged was the recognition of the role that preexisting social structures within a community has in understanding, and in some part determining, the impact of a hurricane event. The authors concluded that an understanding of the nature of the community itself, prior to an event, is paramount in being able to aid recovery.

Similarly, Tobin and Whiteford (2002) argued that attention needs to be paid to the contextual conditions of a community in order to respond appropriately to a disaster event. In their qualitative study of the eruption of Tungurahua in Ecuador in-depth interviews and focus groups were undertaken with a total of 131 government officials, evacuees and remaining residents to explore the processes that took place at the community level with particular regard to; what aided resettlement, perceptions of risk, and prevailing health conditions. From the analysis and interpretation of the data it became evident that differences that arose post disaster were a consequence of the perceived inequities pre-disaster. Specifically groups that are removed from the mainstream through social, political or economic means prior to any disaster event taking place, tend to be disproportionately disadvantaged in the event of an event. Therefore, Tobin and Whiteford (2002) support the argument that attention needs to be paid to understanding the contextual conditions pre disaster in order to mitigate the impact of an event.

The human ecology framework underpinning these studies (Peacock & Ragsdale, 1997; Tobin and Whiteford, 2002) was utilized in order to gain a broad understanding of how disaster communities are impacted at varying levels.

Systems theory has also been utilised as a framework to analyse research relating to child and environment characteristics, and disaster exposure and recovery, with a view to developing disaster interventions specifically for children. For example, Vernberg (1999) indicates that gender, age, ethnicity, dispositions and certain psychological resources (resilience) all possibly influence a child's reaction to a disaster. In terms of exposure to a disaster event the level of threat, level of injury, the level and threat and injury witnessed to a loved one or to another person are aspects that are indicated in the literature as potentially impacting for children. Finally with regard to the recovery environment there are characteristics of the microsystem, mesosystem, and community that are important aspects of children's response and recovery. For example, work with children during the recovery period of different disasters indicated that strengthening the quality of relationships at the microsystem level, such as the relationships with family, friends, and schools is paramount to how children coped and recovered from the disaster experience (Vernberg, 1999).

Whilst Vernberg (1999) argues that there is little research on which to develop an understanding of disaster impacts on children her work has utilised an ecological framework to explore how different levels of the system impact on children in different disaster events. From this Vernberg has been able to give some examples of specific interventions that have been developed based on her analysis. The work of both Peacock and Ragsdale (1997), and Tobin and Whiteford (2002) have similarly tried to articulate, the impact of different types of disasters in different communities utilizing an ecological approach. Whilst both

have drawn similar conclusions that an understanding of the pre-existing conditions is needed to understand post disaster events and recovery, neither was able to put forward interventions based on their particular studies. This would seem to suggest that more studies utilizing an ecological framework in other disaster areas are needed in order to substantiate the claims being made by Peacock and Ragsdale (1997), and Tobin and Whiteford (2002) or to aid in the development of interventions for communities.

### **Summary**

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Last century psychology and psychologists, moved "from the armchair to the laboratory" (Levine & Perkins, 1997, p.114) and, in the latter part of the century incorporated the environment. The importance of the environment or context was suggested initially by Lewin (1951) and Barker's (1978) research substantiated it as an important aspect in describing people's behavior. The development of Bronfenbrenner's (1979) systems theory, the ecology of human development, enabled developmentalists to take into account how different contexts impact on children. Systems theory has impacted on schools, education and program development to support children within and outside the school system (Plas & Lewis, 1996). Murrell (1973) and Prilleltensky (2003) argue that merely identifying different ecological levels (child, parent, family, community and society) is insufficient in understanding what is taking place. Each level needs to be considered/studied when trying to understand and facilitate the human condition.

Community psychologists seek to illuminate the complexity of human communities through their systemic frameworks, and in doing so look toward building capacity and competence. The approach taken by community psychology is inherently ecological in nature. The use of multiple perspectives and multiple factors, in order to understand, and ultimately, to intervene in addressing issues of concern for human communities, needs to be considered.

One area of concern for many communities is natural disasters. Studies within the context of a disaster that have utilised systemic theories have generally been retrospective and theoretical. The importance placed on the ecological perspective ensures that it is not possible to isolate individuals and study them in a vacuum (Duffy & Wong, 1996; Thomas & Veno, 1992; Levine & Perkins, 1997). Much of the literature already presented neglected the context when studying the disaster impact on individuals. This review of systems theory suggests that in order to fully understand the impact of a disaster the context both pre and post a disaster event need to be considered. Therefore, this current research utilizes an ecological framework to further understand disaster communities. The next chapter discusses contemporary issues in disaster research by exploring issues of vulnerability and how the ecological framework develops the concept of resilience in relation to the disaster experience.

## **CHAPTER 4**

### **Vulnerability and Resilience: Preparedness and Prevention**

**"I have not, nor will be, the victim of a flood or cyclone"**

**(Comment from a 51-60 year old female who has lived in the Kimberly for 4.5 years)**

#### **Aims of this Chapter**

This chapter moves forward from the response and recovery focus of chapter 2 and draws on the systems theories and the ecological frameworks previously detailed to understand the contemporary focus of disaster research. Current views of disaster research do not deny the importance of the response and recovery period, however there are many researchers, and practitioners, who are now seeking ways to intervene and prevent the threat of a disaster becoming the reality. It is necessary then, to consider and discuss the importance of disaster vulnerability in relation to individuals and communities in order to outline the development toward resilience and community resilience in the disaster arena. Finally this chapter details the need for the present study in examining the indicators of community resilience in communities facing seasonal natural disasters in Northwest Australia. The last section of this chapter presents the research questions addressed in this thesis.

It is recognised that in order to respond and recover from disasters most of the effort needs to be in organizing the preparation effort prior to the occurrence of a disaster (Quarantelli, 1985). The major focus of this preparation effort has been the identification of vulnerabilities, which are seen as an important aspect in helping to mitigate hazards and reduce disasters (Blaikie et al., 1994). Current risk policies have focused the identification of vulnerabilities through understanding the elements in communities that are at risk, such as residents, structures, ecosystems and the economy. More recently with the move toward a preparedness and prevention perspective the focus on vulnerabilities has broadened to encompass a focus on resilience in disaster communities (Handmer, 2003).

This following chapter outlines disaster vulnerability and the movement toward a resilience focus for disaster research.

### **Disaster Vulnerability**

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In order to understand and determine what aspects of places and populations make them vulnerable to disastrous events there is a need to first define vulnerability. Generally vulnerability is described as being open to attack or damage ([www.m-w.com/cgi-bin/dictionary](http://www.m-w.com/cgi-bin/dictionary)). However, Blaikie et al., (1994) sought to refine the concept of vulnerability to incorporate the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard (p. 9). Blaikie et al., (1994) argued that in order to determine the risk to a natural hazard you need to not only understand the natural



hazard, but, you also need to consider the vulnerability that has been socially produced. Therefore, the term vulnerability is used in different ways and refers to both the vulnerabilities to a natural hazard as well as to the outcomes of a natural hazard.

A main focus for vulnerability research has been economic and/or social disadvantage or marginalisation that limits the capacity of many people or groups to cope with disasters (Blaikie et al., 1994; Bolin & Stanford, 1998; Buckland & Rahman, 1999; Morrow, 1999). This notion of vulnerability has been described as the social construction of vulnerability and is referred to as disaster vulnerability (Morrow, 1999). Traditionally disaster vulnerability (economic and social disadvantage) has been examined within the developing nations of the world, and this remains an important area for enquiry. However, disaster vulnerability has recently been examined in developed nations, such as the United States of America. For example, the analysis of vulnerable groups to hurricane Andrew (in 1993) identified low income people, single mother families, the elderly and recently settled residents as more susceptible to the effects of the disaster (Morrow) these are groups that may generally be considered to be economically and or socially disadvantaged.

In Australia, Buckle (2001-2002) reports that one of the lessons learnt from the 1998 State of Victoria gas crisis was the differential impact, and thus vulnerability of segments of the population. Victoria's gas supplies were severely reduced when an explosion shut down most of the gas supply. The services were unable to deal with a disruption of this magnitude and therefore gas supplies were

not restored to full capacity for many months. Traditionally, the elderly population were seen as more vulnerable, however, Buckle found that during the crisis, which saw large parts of the state without gas supplies for a significant period of time, the elderly managed and coped better with the stress associated with having no gas, than younger people, even though the elderly required gas for heating. The elderly generally had more capacity in terms of past experience of dealing with different resource needs and supplies, and different expectations about the aid they may receive. The understanding that different segments of a community, at different times, have diverse capacities was an important aspect of the Victorian community dealing with the gas crisis. Therefore traditional concepts of disadvantage are not necessarily indicative of disaster vulnerability nor do they take into account factors that draw on strengths and capacities of individuals or communities.

Within the United States, factors such as language, housing patterns, building construction, community isolation and cultural insensitivities have all been identified as community vulnerability factors for disasters (Fothergill, Maestas & Darlington, 1999). The identification of these factors enables community vulnerability maps to be developed, which aid emergency managers in decision making for disaster responses and disaster planning for community needs (Morrow, 1999). The maps are based on a community vulnerability inventory developed by emergency planners and managers, which identify vulnerable groups within the community (i.e., all types of group homes, renters, poor households, ethnic minorities, recent residents, homeless, concentrations of children/youth). The maps combine geographical, social and political patterns and are then

integrated into geographical information systems (GIS) for use in planning and preparation or for response needs in the event of a disaster (Morrow, 1999).

The research by Morrow (1999) in the United States is supported by that of Sullivan (2003) in Australia. In his theoretical exploration of communities that experience emergencies, Sullivan indicates that communities fall on a high to low vulnerability continuum based on whether they are high or low on factors such as geography, isolation, self-sufficiency, social capital, mobility, elitism, conflict, awareness, preparedness, economic viability, susceptibility to risk and resilience. The result is a community vulnerability profile that is meant to aid emergency managers in recovery planning. Although these factors are useful they generally represent a narrow view of vulnerability factors as they focus primarily on socio-demographic characteristics.

Other authors, such as, Bachrach and Zautra, (1985), Millar et al., (1999), and Bishop et al., (2000) have identified psychological factors that may also be vital in understanding vulnerability. These authors have attempted to understand the influence of psychological factors such as self-efficacy, coping styles and sense of community with regard to community vulnerability. Each study focused on a different event e.g., Bachrach and Zautra, (1985) focused on a hazardous waste facility, Millar et al., (1999) on volcanic eruptions and Bishop et al., (2000) on salinity. All of these studies found some utility in using these psychological mechanisms (self-efficacy, coping styles and sense of community) to determine community vulnerability. However, the authors argued for further research utilising these psychological factors with different vulnerable communities.

In terms of understanding vulnerability, sociodemographic, community characteristics and psychological factors have been shown to be important. The identification of vulnerabilities has also challenged emergency managers and researchers to look more systemically as disasters strike whole communities as well as the individuals within them (Boyce, 2000). It is also recognised that critical to any crisis is the need to harness psychological and community factors as capacities for future threats (Buckle, 2001-2002).

Paton, Johnston, Smith and Miller (2001) argued that a focus on vulnerabilities to hazards is not appropriate to planning and encouraging adjustment. Identification of the factors that facilitate individuals and communities and with the emphasis moving toward a positive, strength based, capacity building approach, the focus needs to move beyond the identification of vulnerabilities to understanding resilience (Handmer, 2003; Paton et al, 2001).

### **Resilience- Beyond Vulnerability**

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Recently within the emergency management field researchers are now looking at the link between vulnerability and resilience. Resilience is seen as promoting a positive, strength based, capacity building focus, which is broader than the negative focus of vulnerability research (Handmer, 2003). However Tobin and Whiteford (2002) do suggest that in order to understand resilience you still need to look at vulnerability.

The resilience approach echoes Antonovsky's salutogenic orientation, which suggests that the pathogenic orientation most experts use may in fact be restricting

the view of understanding what is happening in disaster communities (Antonovsky, 1993). Resilience is seen as important in the area of prevention as it could provide salient information and direct programs to reduce the effects of negative experiences by focusing on the strengths and capacities of individuals and communities (Kumpfer, 1999). The concept of resilience will now be discussed.

Resilience, according to the dictionary, is an ability to recover from or adjust easily to misfortune or change (<http://www.m-w.com/home.htm>). From a research point of view finding an operational definition of resilience is not an easy task. Resilience is used interchangeably with other terms, for example, thriving (Massey, Cameron, Ouellette & Fine, 1998), invulnerability (Anthony & Cohler, 1987), stress resistant (Garmezy, 1993), hardiness (Kobasa, 1979; Tarter & Vanyukov, 1999), and toughening (Dienstbier, 1992).

Over the past 50 years there has been considerable effort in understanding what impact adverse conditions/events/situations have upon the development of children and adults. A comprehensive longitudinal study, by Werner, Bierman, and French (1971), of children raised in adverse circumstances followed a cohort of children from the island of Kauai in Hawaii. These children were subject to many adverse circumstances such as poverty, perinatal stress, and familial instability. In terms of developmental outcomes many of these children grew into competent and capable adults despite the apparent risks associated with their upbringing. This study was initially interested in vulnerability, however they were able to address the concept of resiliency based on the information gained from the identified competent adults (Werner, 1993).

The explanation as to why some children do well in disadvantaged circumstances is that they are resilient (Baldwin et al., 1993) which also indicates why some researchers regard resilience and vulnerability at opposite ends of a continuum (Kaplan, 1999). Resilience is a complex concept with many definitions that has made the acceptance of any one definition difficult. However, for many researchers in using the term resilience difficulties arise in relation to the focus, whether resilience is an outcome or a process. That is to say, is resilience the end point or is it the qualities possessed by the individual (Kaplan, 1999, p.19). "Resilience is based on a characteristic of the individual that is demonstrated in the overcoming of obstacles to optimal development" (Baldwin, et al 1993, p.743).

In contrast, Jacelon (1997) identified that some resilience definitions identify the traits or characteristics present in a resilient individual, whereas others, define resilience, as a process, which Jacelon argues, would be better termed resiliency. "Resilience is characterized as the ability to draw on personal or social resources, the ability to detect contingencies and predictability in complex situations, and the ability to react flexibly" (Rauh, 1989, p.165).

In order to study resilience an adverse situation needs to exist for a resilient outcome or process to occur. These adverse situations constitute a potential threat to well-being and the normal healthy development expected, for example, a stressful experience (Grant, Compas, Stulmacher, Thurm, McMahon & Halpert, 2003). It is understanding the role of these stressful experiences that is important in determining interventions to reduce the potential harm that may ensue.

Protective and risk factors have formed the operationalisation of the resilience concept and therefore have directed the measurement of resilience through the identification of specific risk and protective factors (Kumpfer, 1999). Risk factors are those that are associated with maladjustment and protective (competence) factors are those associated with positive outcomes (Luthar & Zelazo, 2003). Research to determine what risk and protective factors are involved has identified many different conditions and variables. For example, Windle (1999) indicates that there are four categories of conditions and variables that are important: background conditions (e.g., poverty), community resources (e.g., teachers), social relations (e.g., with peers) and personal characteristics (e.g. cognitive functioning). Werner and Smith (1982) and Garmezy (1983) put forward three protective factors {1} a positive temperament, {2} a warm supportive family environment, and {3} positive extra familial support. As Kumpfer (1999) suggested nearly every direct or indirect variable associated with positive outcomes is implicated in determining resilience. There is a general acceptance within the literature that protective factors support increased self-esteem, healthy coping and opportunities for positive social interaction (Aldwin, Sutton & Lachman, 1996; Garmezy & Masten, 1986; Werner & Smith, 1992). The diversity in variables and conditions results in the use of many measurement methods in resiliency research (Luthar & Cushing, 1999).

Few specific scales that measure resilience have been developed as many authors feel that it is not possible to measure resilience with one scale (Luthar and Zelazo, 2003). A scale that has been developed by Wagnild and Young (1993)

was specifically designed for older adults (55-93 year olds) as they were interested in this age group. It consisted of 25-items designed to measure two factors, personal competence and acceptance of self and life. To date, this scale has had limited utility as traditionally researchers have been more interested in establishing what factors determine resiliency. In children these have been primarily regarded as protective and risk factors (Sandler, Wolchik, MacKinnon, Ayers & Roosa, 1997). Luthar and Zelazo (2003) argue that you can never directly measure resiliency, it will always need to be inferred from risk and competence (protective) factors.

There has been much critical analysis concerning the concept of resiliency. Tolan (1996) argued that the term lacks definition, has a too narrow focus and ignores context. Other researchers have echoed these concerns (Garmezy & Masten, 1986; Rutter, 1987) and argue that effort should go toward further refinement of the concept (Brodsky, 1997). For example clarifying the definition of resiliency; designing studies that are domain specific, as few individuals are resilient in every domain; contextualizing the definition so that one can obtain a greater understanding of resilience; include multilevel factors, and recognize that we do not define risk accurately. Cowen, Wyman, Work and Parker (1990) suggest that resiliency in an individual may be due to competencies in some areas but that the individual may still have vulnerabilities in others. Therefore resiliency may be better understood in terms of the interaction between an individual and their environment (Rutter, 1987). In terms of looking at the interaction between the individual and the environment ecological theories provide the framework to further



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our understanding of resilience through recognition of the effect of the context at different levels.

As indicated, the concept of resilience has mainly been studied in relation to children and adults at the individual level even though the salience of the family, community and environment are recognized as risk modifiers (Luthar & Zelazo, 2003). For example the role of poverty is frequently highlighted as a risk factor (Owens & Shaw, 2003). Cauce, Stewart, Rodriguez, Cochran and Ginzler (2003) suggest that low socio economic status of a family per se is not an absolute risk factor; however neighborhoods characterized by concentrated poverty severely limit any type of resilience. The opportunity for positive interactions is seen as a powerful protective factor even in the face of potent risk factors (mentally ill parent, (Garnezy, 1983) troubled past (Vaillant, 1993)). Therefore, although poverty is clearly documented, neighborhood organization and structure have also been reported, as risk and protective factors, which is an area that requires further research (Gorman-Smith & Tolan, 2003; Luthar & Zelazo, 2003).

In recognizing that there are issues with the development of the resilience concept researchers (see for example Brodsky, 1997; Sonn & Fisher, 1998; Tolan, 1996) have argued that to further our understanding of resilience there is a need to consider the wider context and our connection to it, which is discussed in the next section.

### **Community Resilience and the Disaster Arena**

Within the media and the literature the term community resilience has recently emerged (Handmer, 2003) and has been identified as important to a range

of different issues such as oppression (Sonn & Fisher, 1998), risk management (Paton et al 2001), and hazard planning (Tobin and Whiteford, 2002). Kulig (1995, p.2) defined community resilience as 'the ability of a community to not only deal with adversity but in doing so reach a higher level of functioning', and thereby arguing that the concept of resilience may be applied to whole communities. In considering the context of the community an appreciation or understanding of community resilience may address some of the concerns raised by Tolan (1996) in relation to individual resilience. For example, understanding resilience in context, and trying to determine the multilevel factors that may be involved at the individual level.

In trying to conceptualise community resilience Brown and Kulig (1996/97) argued that the movement from an individual to a community focus to infer community resilience, would understate the complexity of processes and systems involved. They argued that community resilience is 'grounded in the notion of human agency' (p.41) where the community engages in intentional meaningful action, it does not just 'bounce back' from adverse situations, the community actively chooses change, despite any limitations the community may possess. Factors contributing to community resilience include community capacity, the assets and skills of community members; community sustainability, that is meeting individual needs within a culture that harmonizes with nature, and; community competence, a process by which a community works together to identify needs and determine ways to meet those needs (Brown & Kulig, 1996/1997). These are not to be seen as risk and protective factors, as with individual resilience, but as

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dynamic enabling and constraining qualities of a community. To this end at any point in time what is enabling for one community may be restraining for another and therefore understanding the dynamics of any given community is the goal in moving a community toward being more resilient (Brown & Kulig, 1996/1997).

In the area of oppression Sonn and Fisher (1998), in endeavoring to understand community resilience, liken the concept to that of community competence. They suggest that community competence is a problem solving process in which the community has the processes and ability to clarify and resolve differences within itself. Therefore a competent community would be able to explore and resolve negative impacts, like oppression, as the competence is the community's ability to facilitate diversity of views. In this view community competence focuses on the functioning of the collective unit (Goepfinger, Lassiter & Wilcox, 1982) which is central to a resilient community.

The concept of community resilience has also emerged in the disaster literature within the areas of hazard planning (Tobin, 1999) and risk management (Paton, Smith, & Violanti, 2000; Paton & Johnston, 2001; Paton et al. 2001). Tobin (1999) utilizing an ecological approach developed a conceptual framework for understanding how sustainable and resilient communities may be created. He describes these communities as those that are low risk, low vulnerability, have ongoing planning initiatives, a high level of political support, having partnerships between government and private sectors, as having independent and interdependent social networks and appropriate planning taking into account local and national stability.

Tobin's (1999) conceptual framework combines three theoretical models, (1) a mitigation model which involves reducing risk in the community through the use of design standards and policies, (2) a recovery model which involves governmental policies to aid relief and recovery with a view to re-accumulating capital and distributing resources, and (3) a structural-cognitive model which incorporates issues to do with structural (societal) changes, situational factors (sociodemographic and community characteristics) and cognitive (psychological/attitudinal) variables. Although quite comprehensive Tobin (1999) recognizes that in reality the transition of this framework from theory to practice would be difficult. He suggests that in hazard planning in the United States there is the perpetuation of the 'disaster- damage cycle' (p. 23) where current response and mitigation policies maintain and sustain communities, as they are, with all inequalities and injustices intact. He argues a way forward would be to address the root of the problem through understanding the social, economic and political nature of hazard planning.

Following the eruption of Tungurahua, in Ecuador In 1999, Tobin and Whiteford (2002) utilized Tobin's conceptual framework of community resilience, to understand the response and recovery effort of officials and residents of three small communities. Government officials, relief workers, leaders and community people were interviewed and surveyed at three months and eight months after the initial eruption of Tungurahua. The data collected was organized and interpreted within the bounds of the models and conceptual framework. The most salient finding was that the official response and recovery efforts exacerbated existing

health issues and created social and economic issues for some community members. The authors suggest that by identifying health problems early and evacuating families together to similar environments there is an increase in the capacity of community members to participate in their own recovery process. By increasing the resilience of each community member an effective community recovery is more likely to follow.

This study (Tobin & Whiteford, 2002), which utilizes a human ecology model, is one of the first attempts to understand the socio-political nature of a disaster community and its relation to community resilience. Through qualitative interviews at various levels of the community (resident through to government level) information from the disaster impact across three different communities provides an understanding of the contextual nature of disaster recovery and response. Importantly it also provides a framework with which empirical research can start to look at the notion of resilience in disaster studies.

To understand further the role of the structural-cognitive model, Paton et al (2001) sought to focus on one element from Tobin's model, psychological resilience and operationalise it in relation to volcanic eruptions around Ruapehu in New Zealand. The three factors (self efficacy, problem focused coping and sense of community) previously identified by Bachrach and Zautra (1985) and Bishop et al., (2000) were utilized to examine psychological resilience to volcanic hazard effects at Ruapehu in New Zealand. The results indicated that self-efficacy and problem focused coping were indicators of psychological resilience, which concurs with Bachrach and Zautra (1985). The third factor, sense of community, was not

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found to be indicative of resilience by Paton et al., (2001), which does not concur with Bachrach and Zautra (1985). The failure of sense of community to be indicative of resilience in Paton et al (2001) was explained by the authors as a result of the pre existing social fragmentation of two groups in the community, which was then exacerbated by the effect of the volcanic hazard.

The results of Tobin and Whiteford (2002) and Paton et al., (2001) indicate the importance of the context in disaster studies. Further to this Paton et al., (2001) highlighted the role of different psychological variables (self efficacy, problem focused coping and sense of community) in concert with the context. This suggests that to understand the resilience component of community you need to determine the variables that mediate the disaster experience within the context of the disaster community. Recently Kulig (2000) refined and clarified her model of community resilience. Community resilience is comprised of three components, {1} interactions that are experienced as a collective, {2} the expression of sense of community, and {3} community action (p. 380). It could be argued that Kulig has centralized the concepts of community competence, through looking at collective interactions (component one) and community action (component three), and sense of community (component two) in measuring community resilience.

## **Summary**

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Previous studies that have measured resilience or mediators of resilience concentrate on the individual level. The challenge is to translate these results into

community resilience in disaster communities. The differentiation between individual factors and community factors is paramount as both levels may be important as contributors to the formation of beliefs (individual and collective) and actions (individual and collective). At the individual level there are a number of variables that have been identified as indicative of resilience, self-esteem, healthy coping and opportunities for positive social interaction (Aldwin et al., 1996; Garnezy & Masten, 1986; Werner & Smith, 1992). Within studies specifically related to disasters, the relevant individual variables are self-efficacy, problem focused coping and sense of community (Bachrach & Zautra, 1985; Bishop et al., 2000; Paton et al., 2001). The variables indicative of resilience at the community level are sense of community, and community competence (Kulig, 2000; Paton et al., 2001).

### **Current Study**

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Within Australia, the northern coastline of Western Australia is reportedly the most disaster prone (Blong, 2003). For the communities that are situated in this area, the seasonal threat of cyclones and floods is ever present. More recently federal and state organizations that deal with natural disaster events in Australia for example, Emergency Management Australia, GeoScience Australia and authorities such as Fire and Emergency Services Authority (FESA) in Western Australia, have become aware that changes in policy and ideology surrounding emergency events require collaborative work with communities to try to mitigate potential natural hazard threats.

The social sciences, and in particular community psychology is well placed to work in collaboration with these agencies and communities to aid the mitigation process, as they work within an ecological framework and have an understanding of the dynamics at the individual and community level of analysis.

One of the difficulties surrounding this work is the lack information and research with Australian disaster communities. Although research has generally followed after each large disaster (i.e., Cyclone Tracey in Darwin, Newcastle Earthquake in New South Wales) this research tends to be response and recovery focused. For mitigation purposes, communities that have stood the test of time and events (seasonal disaster communities) may offer insight into the disaster experience for Australian communities.

For this reason chapter 2 explored the many consequences of disasters by describing salient concepts identified in the disaster literature. At the individual level, these include stress, coping and self-efficacy. At the community level concepts of social support and social networks, sense of community and community competence has been researched. Traditionally disaster studies have focused on understanding a particular concept i.e., stress, or related concepts for example, stress and coping. More recently studies such as those by Bachrach and Zautra (1985), Bishop et al., (2000) and Paton et al., (2001) have included a number of concepts (self efficacy, sense of community and coping) in trying to understand different disaster communities. The focus seems to be shifting from understanding the concepts themselves to recognizing that a number of these issues may be involved and related to each other. In addition, there is the concern



that traditional disaster studies are only looking at part of the picture, addressing the negative outcomes (i.e. stress) and not recognizing the benefits or growth that may also ensue from traumatic events (Padgett, 2002). Future research would benefit from including both of the aspects, stress and growth, in other words taking a more holistic look at the disaster experience.

Systems theory provides a framework to understand and integrate the socio political influences in the response and recovery of disaster communities (Tobin, 1999; Tobin & Whiteford, 2002). However with the focus being broadened to the preparedness and prevention of communities facing disaster events, the literature suggests that both individual and community variables may be important indicators of community resilience. Paton and Johnston (2001) and Bachrach and Zautra (1985) identify individual variables that are relevant to resilience and Kullig (2000) provides factors that determine the resilience of communities. Further to this Paton and Johnson (2001) propose that the factors that comprise community resilience may not be context specific, however Bachrach and Zautra (1985) suggest people need to be considered within the context of their own community. Studies within the disaster context that have utilized systemic theories have generally been retrospective and theoretical. The present study explores the factors relevant to a Western Australian disaster community and then empirically determines which of these factors (individual and community) mediate the whole disaster experience. The research questions are presented below in an order that represents the scaffolding approach taken. The scaffolding approach firstly identifies local contextual variables and then builds upon these with variables drawn from the

literature that are relevant to understanding the whole disaster experience (stress and growth). All of these variables are then empirically tested to understand them in different disaster communities in Western Australia.

### **Research Questions**

The research questions to be addressed in this thesis are:

1. What factors are important in understanding the experience of community members living with the threat of natural seasonal disasters in Western Australia?
2. What is the relationship between the community, individual and disaster experience variables in different communities in Western Australia?
3. What is the best predictor of posttraumatic stress?
4. What is the best predictor of posttraumatic growth?
5. What variables differentiate high and low stress groups?
6. What variables differentiate high and low growth groups?
7. What are the community and individual factors that mediate the disaster experience in different disaster communities in Western Australia?

## **CHAPTER 5**

### **Study 1 Methodology, Results and Discussion – A Case Study of Darlington**

**"If I were to say that the community had a *theme* I would call it prevention. Darlington residents are very conscious of their environment and their local council supports them very strongly"**

**(Comment from a 54 year old female resident from Darlington)**

#### **Aims of This Chapter**

This chapter presents the case study of Darlington. The research question addressed in this study is to determine which factors are important in understanding the experience of community members living with the threat of natural seasonal disasters in Western Australia. The purpose of this chapter is to 1) outline the design of the study; 2) review the methodology utilized; 3) detail the participants involved; 4) present the results, and finally 5) discuss the results in relation to the literature and as a prelude to the second study.

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## Research Design

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In order to address the research question, *what factors are important in understanding the experience of community members living with the threat of natural seasonal disasters in Western Australia?*, an in-depth descriptive qualitative approach was utilised to obtain an understanding of a phenomena in a contextual, holistic way, which emphasises the understanding of the meanings that people assign to the issue being targeted (Wiesenfeld, 1997). The qualitative methodology employed in this study allowed the researcher to examine the experiences, thoughts, feelings and ideas of participants, in order to determine the different ways in which the participants experience living in a disaster threatened community. Qualitative data contributes a quality of 'undeniability' through a source of well-grounded, rich descriptions and explanations of processes occurring in communities (Miles & Huberman, 1994; Smith, 1978). Techniques, such as interviews and focus groups allow researchers to obtain knowledge and an understanding of issues for a smaller sample of participants in far more depth (Patton, 1990). These methods are also most appropriate when the researcher is attempting to understand complex systems, values or emotions.

Central to understanding the experience of individuals is to investigate those who have the relevant experience (Seidman, 1998). This present study aimed to enlist individuals that have the experience of living in a disaster community, in order to understand what this is like from their perspective (Dewey, 1960). There are many different approaches to collecting qualitative data through interviews. These include: the informal conversational interview; the general interview guide approach; and the standardised open-ended interview; (Patton, 1990). While each approach has its

strengths and weaknesses, the appropriateness of the technique utilised depends on the research question/s the researcher wishes to explore. In order to gain a rich understanding of a person's experience there is a need to utilize an approach that enables a person to share openly their views, values and reality. The assumption is that the best understanding of an individual's experience, is through their construction of reality, which suggests a conversational or narrative methodology. Gaining access to and understanding of the story of the socially constructed reality of an individual, gives rise to the salient themes around the phenomenon under investigation.

For the purpose of this research a narrative approach was considered most appropriate as this would provide access to the salient views, values and reality of living in a Western Australian community. Further to this, the study utilised two different techniques in order to obtain a rich and full understanding of the experience of living in a bushfire community. Narrative interviews were utilised in order to understand the complexities and processes that emphasised the participants' experience (Mishler, 1991), and a focus group was utilised to validate the findings that emerged from the interviews with regard to what factors are important in living in a seasonally threatened community. These methodologies will now be discussed.

### **Narrative Methodology**

The use of narratives in the present research was important in understanding how the individuals, who make up a community, view their experiences. Narratives are essentially stories (Rappaport, 1995) that allow individuals to make sense of their experience, (Cohler, 1982) and then explain their

perceptions through the act of story telling (Reissman, 1993). Cohler (1982) suggested that this telling of an individual's story is one of the most important ways to give meaning to life experiences. In this way they represent a person's cognitions about events and therefore when represented as a story they have a familiar structure, a storyline - a beginning, a middle and an end. Rappaport (1995) argues that individuals, organizations and communities have stories to tell about their experiences.

Different narrative models have been developed and often they are embedded in the philosophical underpinnings of the discipline from which they arose. For example, Mishler (1995), an historian, developed a model of narrative analysis where the order of events, the coherence and structure of the discourse and the context and consequences were all identified as they are seen as paramount to understanding the narrative. Reissman (1993), as a social scientist, was more interested in personal narratives. She based her model of narrative analysis on concern for representational decisions, which researchers make during the interviewing process and therefore she suggested five levels of representation for the research process (see Figure 5.1)

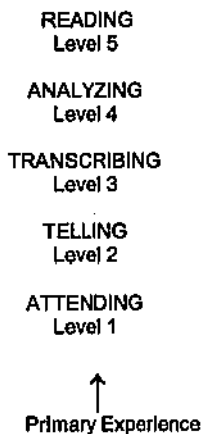


Figure 5.1 Levels of Representation in the Research Process (Reissman, 1993, p.10)

Level 1 refers to attending to the experience and alludes to the initial contact the individual has with their experience. Information is gathered from their perceptions by "reflecting, remembering and recollecting" (p.9). The second level is the narrative or story, which tells about the experience. The way in which the story is told also involves the way in which the listener asks questions. Level 3 includes the methods for recording the narrative. Every method loses some information. In the fourth level, the analysis is dependant on the values and theoretical approach of the researcher as they determine similarities across interviews and the significance of the content of the interviews. Finally level (5) is where participants who contributed their stories see their stories or other researchers read them.

Reissman (1993) suggests that as the researcher and the interpretation are inextricably entwined there are limitations that result, however, the resource narratives provide far out way the costs. Using a narrative analysis for interviewing allows the interviewee to construct a story and therefore the interviewer gains an insight into not only what is said but how the interviewee constructs their story, and the meaning they derive from the events (Bruner, 1993; Reissman, 1993).

### **Focus Groups**

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Focus group methodology dates back to the 1920's where market researchers developed a way of exploring a set of issues on an issue or topic, usually based around a certain product (Robinson, 1999). Focus groups are group discussions organized to explore a specific set of issues (Kitzinger, 1994, p110). The use of focus groups in market research has centred around obtaining feedback on all aspects of products from packaging to advertising (Reed & Payton, 1997). These groups have also been used to explore areas of communication, in particular the effects of film and television programs (Merton, Fiske & Kendall 1956) and more recently to explore public understanding of health communication messages (Ritchie, Hørscofitch, & Norfor, 1994).

Possibly one of the main attractions for market researcher's use of focus groups concerns flexibility, ease and cost effectiveness of the methodology. Focus groups are fairly easy to organize and execute, and the experience for participants can be less threatening than an interview. The dialogue is often spontaneous and



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candid and therefore can be a less constraining experience (Drayton, Fahad & Tynan, 1989).

This methodology has only recently been adopted by the social sciences. During the 1950's and 1960's there was little interest in the introspective (motivations or underlying causes) nature of focus groups in social research (Morgan, 1988). As times begin to change the access to normative understandings of concepts and phenomena was a welcomed addition to social research in the form of focus groups. Focus groups provided for a socially legitimized occasion for participants to collectively articulate assumptions and attitudes about their community (Bloor, Franklind, Thomas & Robson, 2001). Focus groups provide for "retrospective introspection" (p 6), which has enriched the types of qualitative data that can be obtained.

Focus groups have become an important method of gathering qualitative data. By utilizing this methodology one can, in a limited space of time, gather large amounts of data based on interactions between people on a specified topic. The type of information gathered in a focus groups may be in the form of what is said about a topic/issue or about how participants interact with one another (Sim, 1998; Morgan, 1988). Therefore, focus groups obtain data from multiple participants on a particular issue, which is relevant to the research topic (Hennink & Diamond, 1999). Focus groups have been used as a stand-alone methodology for much social research (Tom & McNichol, 1998; Robinson, 1999). They have been utilized in areas of program evaluation, action research, applied research and areas of basic research (Patton, 1990).

Focus groups are however, more often used in conjunction with other methods (qualitative or quantitative), where they can provide preliminary information on specific issues or to generate further hypotheses. A focus group may also be used as a method of validating data already gathered as a form of triangulation (Blaikie, 1991). Triangulation relates to the utilization of different methods of data collection within a single study to confirm or validate the focus of the investigation (Lincoln & Guba, 1985).

### **Research Context**

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The setting for this study is the community of Darlington is a semi – rural eastern suburb of Perth, Western Australia. The reason for examining the context of Darlington is largely based on two reasons: first, the recency of a bushfire event at the time of examination, second, pragmatics related to research methodology. Located in the heavily timbered hills that lie to the east of Perth (40 kms from the city centre), Darlington forms a backdrop for the city of Perth and the Swan River. Dr. Alfred Wayten established Darlington vineyard, in reference to the town of Darlington in England, in 1886. In 1892 a railway station was constructed which took the name of the Vineyard and the local identity was born. Darlington continued to grow with residents supporting themselves through different endeavours, such as providing a holiday place for the city dwellers (Wiltshire, 1997).

Today Darlington (see Appendix G) has a population of 3 441 (1703 males and 1738 females) residents with 1 244 dwellings located in the area (Statistics, 2001). Of these residents 69% were born in Australia with a majority of others (31%) being born

in the regions of North-west Europe (UK, Ireland, Scotland). Darlington's most notable attributes have been described as "its sense of community and its strong sense of place" (Wiltshire, 1997, p. 67). Whilst its location in the hills provides a main attraction for many residents, the natural environment contributes to the seasonal threat of bushfires. The shire area, of which Darlington is a part of, has historically been one of the most threatened, in the metropolitan region of Perth. It is estimated that there were approximately six "really big" fires per year (and a lot of small ones) about twenty years ago. The bigger fires rarely occur today as there have been many changes in the shire prevention activities and brigade response activities, however there is still a larger number of small fires (Holmes, Personal Communication). For example, the total bushfires (referred to as GSBF - grass, scrub, bush and reserve fires) in the area as recorded by Fire Emergency Services Authority (FESA) operations are reported in table 5.1 for the years preceding and following the present study.

Table 5.1

*History of Bushfire Activity around Darlington*

<b>Year</b>	<b>Number of Fires Recorded</b>
1995-1996	201
1996-1997	162
1997-1998	260
1998-1999	241
1999-2000	82

## **Stage One Methodology**

Narrative interviews were utilised in order to understand the complexities and processes that emphasized the participant's experience (Mishler, 1991).

### **Participants**

In order to build a sample of participants, the researcher utilized a snowballing method of sampling, which allowed for divergence of the sample (Patton, 1990). The sample comprised 15 participants, 10 females and 5 males, whose ages ranged from 18 to 68 years ( $M = 38.31$ ;  $SD = 15.59$ ). The participants came from various parts of the community, for example, some lived and worked in the local community while others lived in the local community but worked outside it. Three participants were unemployed. The length of time they had lived in the local area ranged from 3 years to 68 years. All participants had recently experienced a major bushfire in the area.

### **Materials**

A narrative interview schedule developed by Reissman (1993) was utilized for all of the interviews. The researcher referred to the narrative storyline and read the following instructions to the participants.

*"Tell me in your own words the story of the bushfire you were in. I have no set questions to ask you. I just want you to tell me about what happened to*

*you, your family and your friends. Just tell it to me as if it were a story with a beginning, middle and an end. There is no right or wrong way to tell your story. Just tell me in a way that is the most comfortable for you"*

To facilitate the recall, the researcher presented a storyboard to the person.

*"To help think of your story, this describes most people's storyline. You see that the story for disasters may include some of these parts: when the disaster happened, what happened to your immediate property, what happened to the community, where did people shelter, what type of support was there, what people were involved, what happened after the immediate shock of the disaster, was there on going support and who did it come from"*

The researcher prompted if necessary with:

*Can you tell me more about this?*

*What was this experience like for you?*

A journal was also kept, by the researcher, to record notes during and after the interview.

## **Ethics**

An introduction letter and information sheet (Appendix 1) explaining the nature of the study was provided for all participants. All participants completed a consent form (Appendix 2) prior to the interview or focus group. Participants were informed that they were able to withdraw at anytime during or after the interview or focus group process. They were also ensured confidentiality and anonymity.

**Procedure**

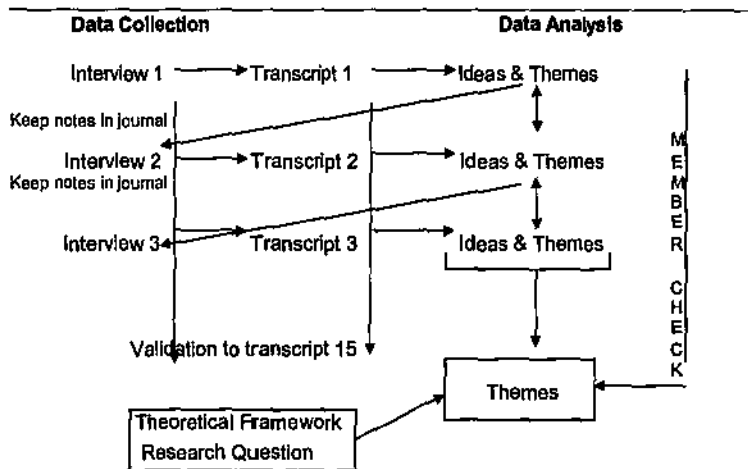
Initially participants responded to a notice placed at the Darlington library. After participating in an interview respondents were asked to recommend other participants who might be able to assist with the research. Through this technique more people were subsequently identified and interviewed. Prior to each interview, participants were informed about the purpose of and the nature of the research and the intended use of the data collected. Once the individual agreed to participate in the study, a suitable time was arranged for the researcher to conduct the interview. Interviews were conducted in participants' homes when mutually convenient. Each participant was provided with the information sheet and consent form with the interview lasting for approximately 45 minutes. A total of 15 interviews were conducted as saturation point was reached. Saturation point occurs when no new information elicited from subsequent interviews (Miles & Huberman, 2002). At the conclusion of the interview, participants were thanked, and asked if the researcher could return later to confer and confirm the researcher's interpretations of the interviews.

**Data Collection, Analysis and Rigour.**

For each interview, data collection and analysis occurred simultaneously, and throughout the data analysis process the data was organised categorically, and was repeatedly reorganised and recoded according to themes recognised by the researcher. A list of the major ideas and themes generated were chronicled for each

narrative interview and then compared with the ideas and themes resulting from previous narratives. Utilising thematic analysis allows the researcher to organise qualitative data coherently (Miles & Huberman, 2002). When utilizing qualitative methodology it is important that rigor of the data and resulting information is maintained. Therefore, throughout the data collection for the present study a journal was kept recording information pertinent to the collection and analysis of the data. This audit trail ensures the verification of the resulting information, which is imperative to the dependability (reliability) of the data (Breakwell, Hammond, & Fife-Schaw, 2000). To ensure the credibility (validity) of the data a peer and two participants served to check the analysis process as it was being completed, this is referred to as 'member checking' (Breakwell et al., 2000; Cresswell, 1998).

A summary of this process is illustrated in Figure 5.2.



**Figure 5.2 Representation of method used to analyse interviews**

The result was a set of themes that were derived from the participants' narratives, the research question and theoretical frameworks.

**Stage Two Methodology - Triangulation**

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In order to validate the information obtained in stage one this second stage utilized a focus group to triangulate the data (Searle, 1999). Therefore a focus group was held to explore the perspectives of a range of members in relation to living in a bushfire threatened community.

**Participants**

Participants in the focus were 6 female Darlington residents whose ages ranged from 24 to 72 ( $M = 35.28$ ,  $SD = 17.59$ ). Four participants worked part time within the local community, the others did not have any paid work. They had lived in the community for between 2 and 72 years.

**Materials**

The same narrative format, as described in the narrative interview section above, was utilized with the focus group participants weaving their stories around one another.

**Procedure**



As a response to the noticeboard advertisement a number of participants expressed the desire to meet together to discuss their experiences of living in a bushfire community. These particular participants were part of a local reading group that meets at the Darlington library. Permission was obtained from the local library to conduct the focus group within the library premises. Prior to the commencement of the group, ground rules were established regarding the confidentiality and anonymity of what was expressed, and in regard to any statements being made. Instructions were provided about the narrative storyboard, similar to the narrative interview schedule contained in the previous section. Prompting was used where necessary. The focus group lasted approximately one and half hours.

#### **Data Collection and Analysis**

The focus group data was content analysed through the identification of themes elicited from the data. Initially the data, in the form of transcripts, from the focus group was read and re-read and sorted into different categories. The themes were derived from the participants' responses, the research question and theoretical frameworks. The data was separated by statements and physically sorted into the categories derived from the initial process. This transcript based method of analysis is identified as the most rigorous with regard to focus group analysis in terms of the quality and depth of the resulting information (Krueger, 1994). It was not important to glean quantitative information from the sorted data but to obtain themes that related to the domain of interest, the experience of living in a disaster community.

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This process was checked and re-checked with a peer to ensure dependability and credibility of the identified themes.

### **Findings and Interpretations**

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The aim of this stage was to explore what factors are important in understanding the experience of community members living with natural seasonal disasters in Western Australia. Factors important to the experience of living in a bushfire community were explored using resident's accounts of their experiences and perceptions of living in Darlington. Five main themes were identified in the responses from the participants. The following themes represent those that emerged from the interview analyses. All of these themes were confirmed through analysis of the focus group data.

#### **Sense Of Community (SoC)**

The first theme, which emerged consistently, was that of sense of community, or as referred to by many residents, 'community spirit'.

*There is a very big community spirit up here, huge actually and we live here because of that.*

The components of sense of community, as presented by McMillan and Chavis (1986), appear in the participant responses. First, *Membership*, where people feel they belong or relate to others. Residents indicated that they feel closer to people in the community, as they had similar experience of fires.

*I think the fires unite you in a sense, there is that sharing type feeling that you get because you've all gone through it. I personally feel closer to the people who've been through a fire rather than those who haven't.*

Or

*I would describe the community of Darlington as unique and insular, a community that is factionalised into smaller sub-groups which could be described as very "cliquey". The individual groups are very diverse and have very well defined boundaries overlaid with a large amount of elitism.*

There is a sense that people share events, like parties, picnics and fires (*shared emotional connection*). Needs of the individuals are met by living in Darlington (*fulfillment of needs*) and that this in turn produces *influence*. Sense of community is important to community members in relation to involvement in community activities and safety.

*The community spirit is fantastic up here and you can really see that when something really bad happens.*

Their sense of community is important to people remaining in the community after a disaster. The strong sense of neighboring may possibly be a factor that helped people survive economically, emotionally and spiritually.

*There is a lot of community spirit here and neighbours work to help one another with clearing and cleaning of their land.*

People who actively participate when there is a disaster have positive attitudes toward their community and remain in the community after the crisis has passed, finding a strengthened sense of belonging.

The appearance of this theme (SoC) supports earlier research by Bachrach and Zautra (1985), Bishop et al, (2000), and Paton (1994) indicating that sense of community is an important resource for people in times of stress. Additionally, the present study is qualitative, which adds support to other authors that have addressed the relevance of SoC quantitatively. This also indicates that SoC is relevant across a number of hazard contexts i.e., hazardous waste, salinity and bushfire. The connection point for sense of community may be the importance of social support networks.

#### Social Networks and Social Support

Residents identified different social networks operating in the community. Social networks include formal and informal structures/groups in the community.

*We have groups that have all manners of function (ratepayers, artists groups, the council....they all rally around the fires event to get things done.*

Residents were able to describe a wide variety of support ranging from, friends, family, neighbors, to community groups like the State Emergency Service, ratepayers association, the local council and the local volunteer fire brigade. This indicates that the residents of Darlington are aware of the different people within the community that they can call on for help or in times of need.

*We began to receive lots and lots of phone calls from people trying to find out what was happening.*

It also indicates that the community is fairly well connected and therefore has the structures available to allow members to communicate with each other.

*People are made aware where their neighbor's taps and hoses are in their yards, and they make plans with each about what they will do in the event of a fire. They also swap work and home phone numbers so that they can contact each other. They tell each other about the whereabouts of their kids and their pets.*

In concert with the social network literature this theme suggests that residents are accessing a number of other people, which relates to the size of the network people have and reporting access to different types of people, which refers to the structure of their network. This network is providing the bridge between the individuals and the community of Darlington.

*As I reached the main road, the volunteer fire brigade arrived, along with a friend who took the boys and my husband who had been alerted at work and had come immediately home.*

In terms of stress buffering, the Darlington residents are utilizing their support networks and then forming others when needed (Fleming et al., 1982; Kaniasty & Norris, 1993; Padgett, 2002). The existence and recognition of the

importance of community groups in Darlington may indicate that these social support networks were not necessarily disrupted in the aftermath of a bushfire, as they continue to be salient (Milne, 1977a).

The importance of the community-based groups/networks also related to coping in Darlington.

### Coping

Coping was an important aspect of living in the Darlington community.

*We now have a rule also that someone must always be on the property in case of fire.*

Coping included a number of coping strategies such as, emotional, problem-focused and avoidant. Many plans for managing bushfire threats have developed from problem-focused coping mechanisms.

*I was dreadfully concerned about how they would cope once the smoke started to affect them. As well as feeling concerned for my class, I was also trying to contact Dick and Dora, and finally located them.*

Coping strategies are evident at the individual and community level. For example, the Darlington community has put in place a fire system to deal with those residents that do not clear fire breaks etc, ready for the next summer season.

*As a direct consequence of this fire, we have fenced an area around our house and we now only garden in that area.*

The coping strategies identified are indicative of the types of coping behavior presented in the literature in relation to disaster events (Folkman & Lazarus, 1990).

### Self Efficacy

Related to coping is the way in which residents responded to situations, by doing things that they had planned to do, or made decisions about what to do in the face of little or no information emerged from the interviews and focus group. This is identified as self-efficacious behavior.

*I decided to do a reconnoitre and see what was happening, so I jumped into the van and drove part way down my property. From where I could see the smoke I thought that we didn't look too badly off but I decided to keep an eye on things in any case.*

The self perceived capability of residents to respond in situations is important in terms of their actual performance and response. Residents indicated that they felt helpless when they did not know what to do, but when they become aware of the things they need to do they start to engage in preventative behaviors, such as gutter cleaning etc.

*I felt particularly helpless because I didn't really know what I was supposed to be doing. Families that live here need to have that sort of knowledge and at least some sort of plan about what they will take from the house in the time of fire.*

These responses indicate that people will make judgments about their ability to carry out actions (Bandura, 1977;1986). In some cases they will act and in others they will not. The sense of control needed, in an event where there is no control, is regained when the Darlington residents behaved self-efficaciously. This inevitably enables them to cope (Bandura, 2002).

*Now that I know the correct things to do in the event of a fire, I feel that I would always stay at the house rather than leave. I know for example to shut the doors and windows and to watch for the outbreak of spot fires. We have also planted fire retardant trees on our land. We are also very conscious of fire prevention at the beginning of each summer season and do all the required clearing and cleaning of our land and around the house. For example, we move any chopped wood away from the house.*

For residents that felt helpless the recognition of a need for a plan of action indicated that with self-efficacy, stress reduction may follow (Millar et al., 1999).

### Community Competence

The final theme identified referred to the competence of the community. Community competence describes the processes and mechanisms in the



community that take place in order to carry out living in a bushfire threatened community.

*I feel that a direct result of the fire is that people are far more aware now of the fire risk, that they are far more cautious, and that they are far more pro-active about keeping their gardens clean of rubbish etc.*

In support of Sonn and Fisher's (1998) argument, the Darlington community indicates competence, as it negotiates what needs to occur to manage and resolve the effects of bushfires, in other words it copes with adversity.

*As well as the strategies used by the school, the local volunteer fire brigade plays a huge part in the community with the work they do all year round.*

*I was very involved in that one, liaising between schools, ensuring the safety of the children, contacting the police and the fire brigade and making sure that the phones continued to be manned in order for parents to reach us to find out about the safety of their children.*

Residents referred to the methods used by the community to plan for the future, and the processes that are employed in times of stress.

*Several public meetings were held to plan strategies and organize people for any future dramas of this kind. This was planned right down to little things like neighbours ringing one another to discover if they are at home. The volunteer bush fire brigade does a tremendous job*

*with its cleaning and clearing operations and the local residents who are unable to do this sort of work for themselves really rely on those volunteers to get the job done.*

*Since that fire, at considerable expense and using money that could have been spent elsewhere, the junior school has taken practical steps to create a safe haven for the children and members of the community in the event of future fires.*

These plans are in line with some of Cottrell's (1976) components of community competence, in particular the identification and collaboration aspects. Therefore, although the Darlington community does recognize the repertoire of skills it has, other areas (needs identification, working consensus) were not identified, which may be relevant to enhance the community's ability to cope with future disasters (Cottrell, 1976).

## **Discussion**

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The findings suggest a number of important issues. First, the themes that emerged from the present study support the themes that have been documented by other studies in the literature. For example Bachrach and Zautra (1985) and Bishop et al (2000) identified sense of community, self-efficacy and coping as important factors for community involvement in dealing with hazardous waste and salinity, respectively. Whereas Kulig (2000) concluded that the concepts of community competence and sense of community are important in understanding how landslide communities cope. The findings of the current study would therefore support the notion that these concepts are

as salient to a Western Australian semi rural bushfire threatened community as they are to a small United States hazardous waste threatened community, an Australian farming community (salinity) and a Canadian rural community (landslides).

Second, although previous studies have suggested that all of these factors may be important to disaster communities few studies have utilized the experience of the community members to determine the salient themes within a disaster community. For example, the studies carried out by Bachrach and Zutra (1985) and Bishop et al (2000) utilized quantitative scales to measure these concepts within a given community. The data collection methods utilized within the present study are arguably more contextually based as they were conducted with people living in the bushfire threatened community. The approaches used are therefore direct and inclusive. The present study sought to understand the experience of residents in a disaster threatened community, which may explain why *all* of the themes present in the literature, emerged in the current study.

In addition the use of the qualitative methodologies has provided a starting point to investigate factors that are directly relevant to individuals and to communities. The qualitative exploration of some of these factors in this disaster context adds to the empirical literature. The use of different data collection techniques (interviews and a focus group) strengthens the reliability of the findings through data triangulation (Searle, 1999).

Finally, the results of the present study suggest that there is no single factor that represents the experience of living in a disaster community. The themes that emerged suggest that it is a combination of factors that are relevant to a disaster experience at the individual level and the community level. It is the interplay of these factors that are important to the experience of a community facing a natural seasonal disaster. Importantly these factors are represented in the disaster literature in relation to different types of hazards; however there are few studies that look at them in combination with each other.

It must be noted that a majority of the participants involved in this study were women (16 female and 5 male) and therefore the issues raised may be more indicative of female views of a disaster community. However, Enarson (1998) argues that women have very important roles in our community; they transmit knowledge about family, community and the environment and are key players in community mobilization in pre disaster and in post disaster activities. Traditionally disaster research methods utilized have not been inclusive of women. Qualitative methods specifically narrative approaches have provided the opportunity to understand the disaster experience, especially from the perspective of women. The findings of the present study with regard to the combination of factors found may be a result/consequence of the methods used and the number of women in the sample.

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## **Summary and Conclusions**

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The overall aim of this stage of the present research was to explore factors that were important to understanding the experience of community members living in a disaster threatened community. Narrative interviews of 16 participants yielded five major factors at the individual and community levels, which were important to living in Darlington, a bushfire threatened community. The resulting factors were sense of community, self-efficacy, coping, community competence and social support and networks. Transferability of results is not generally an aim of qualitative research, Miles and Huberman (1994) argue that the potential for transferability is generated through providing rich descriptions of the research context that allow for common points of reference. Further to this Mitchell (1988) argues that sequential triangulation, where the results of one method are utilised in the planning of the next stage of research, ensures a more comprehensive approach to research and also provides greater accuracy of results. Therefore the following study (stage two) incorporated the identified factors from study one (Coping, self-efficacy, social networks, sense of community, and community competence) which is based on qualitative methodology and identified by the participants themselves and those identified in the disaster literature (posttraumatic stress and posttraumatic growth) to investigate their relevance within other Western Australian disaster communities.

## **CHAPTER 6**

### **Study 2 Methodology: Northwest Australian Cyclone Communities**

**"These questions are just pure nonsense no-one but a psychologist would ask them"**

**(Sent in by a 74 Year old Man who lived in the Kimberley for 52 years)**

#### **Aims of This Chapter**

First this chapter presents the sampling method utilised to select the participants for the second study. Second each of the communities is described to illustrate the research context for the present stage. Third the resident sampling process is described and includes detailed information about the participants in each community. Fourth the measures utilised in the community survey are presented with a description of how the data was subsequently collected.

This study examines in the salient individual and community variables identified in both study one and the literature in a quantitative study. It is argued that this second stage will provide confirmation of the importance of the variables identified, through the strategy of triangulation, for disaster communities in Northwest Australia. Sequential triangulation is achieved through the use of study one results in planning for the present study. Theoretical triangulation will be achieved through the testing of a number of different hypotheses and the use of different analyses techniques in order to increase confidence in the results obtained (Mitchell, 1986).

### **Study Two – Northwest Cyclone Communities**

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Participants living in identified disaster communities located in Northwest Australia were sampled. To undertake this stage of the research a two-stage process was utilized. The first stage was to identify communities, in which a 'disaster' had taken place; and the second stage was to identify residents within these communities to participate in the survey. Each sampling process is described below.

### **Stage One: Community Sample**

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#### **Inclusion Criteria**

The criteria for initial inclusion was the level of response required by a community from emergency management bodies to a disaster event. State or

Territory governments respond to events when local authority resources are insufficient or cannot respond effectively. When events are too large or specialized resources are needed, national/federal assistance is sought. First, communities that have had disasters that have required national/federal assistance were identified. The identification of the disasters is carried out through the use of EMAtack, which is a disaster database set up by Emergency Management Australia. A disaster is recorded on EMAtack when national/federal assistance is required or the disaster costs reach over A\$10 million. The second criterion for inclusion in this study was when the disaster took place. As the present study was interested in seasonal disasters it was important to obtain communities that were in various stages of preparation and recovery from seasonal threats. Given that the disaster literature indicates that it is not until at least the first anniversary after an event that communities start to recover (Ursano, 2000) it was decided that a period of three years would capture communities at various stages of recovery. Therefore communities identified were those that required national/federal assistance, for disaster recovery, between March 1999 and March 2002. In all there were 13 communities that fulfilled these criteria identified across Australia.

### Sample

Given the breadth of communities identified it was decided that the scope of the study would be localized to Western Australia, which resulted in four communities being included in the present study. The four communities (Carnarvon, Kununurra, Exmouth and Broome) were/are all subject to a seasonal



threat of cyclone. The following Table 6.1 indicates the frequency of cyclone incidents over the 36 month period.

Table 6. 1.

*History of Recent Natural Disaster (Cyclone) Events in Western Australia*

<b>Date/Yr</b>	<b>Event</b>	<b>Severity</b>	<b>Community</b>	<b>Time from data Collection</b>
March 1999	Cyclone Vance	Category 5	Exmouth	Thirty Six Months
March 2000	Cyclone Steve	Category 1	Kununurra, Carnarvon	Twenty Four Months
April 2000	Cyclone Paul	Category 5	Exmouth	Twenty Three Months
	Cyclone Rosita	Category 1	Broome	
December 2000	Cyclone Sam	Category 4	Broome	Fifteen Months
January 2001	Cyclone Terri	Category 2	Broome	Thirteen Months
February 2002	Cyclone Chris Flooding	Category 5	Kununurra	One Month

## **Research Context**

The communities included in the present study are all situated in the north of Western Australia. Western Australia's government was formed in 1889 when it publicly announced a new constitution. This saw the transferral of the then colony under British governance to the formation of a parliamentary system of self-government. This forged the way for an Australian Constitution to which Western

Australia (WA) agreed in July 1900, with the federation of Australia being formed in 1901 ([www.constitutioncentre.wa.gov/history/](http://www.constitutioncentre.wa.gov/history/)). At the time of federation WA's population was reported to be 18 860, the latest census (2001) data has WA's population at 1 851 252 people. Of the current population 3.2% identify as indigenous and 67.85% indicate they are Australian born. Of the 27% that identify as being born overseas, 11% indicate they are from the United Kingdom. For all Western Australians the three most common ancestries are English (40%), Australian (34%) and Irish (9.4%). In terms of population distribution WA's population resides mainly in the major city of Perth (69.7%) and the balance (30.3%) live in other areas throughout the state ([www.abs.gov.au/astats/census](http://www.abs.gov.au/astats/census) 2001).

Western Australia (WA) is the largest state in Australia (See Figure 6.1). It covers 250 million hectares with 12,500 kilometres of coastline. WA consists of 11 regions which encompasses various landscapes (rugged gorges, tropical reefs, towering forests, woodlands, white beaches) tourist attractions, and many small towns, regional centres and Perth, the capital city.

The communities chosen for the present study are located in two of these regions the Kimberley and the Gascoyne region, which are located in the north of WA. Both regions are classified as being in the remote and very remote areas of WA. In terms of population distribution these regions represent 6.7% of WA's population. Table 6.2 illustrate the distribution of the WA population across remoteness areas. What is interesting to note is that in the major city there are more dwellings than there are children (the median for WA is 2.6 children)

compared to very remote where the numbers of children are more than the number of dwellings (the median is 4.6 children).

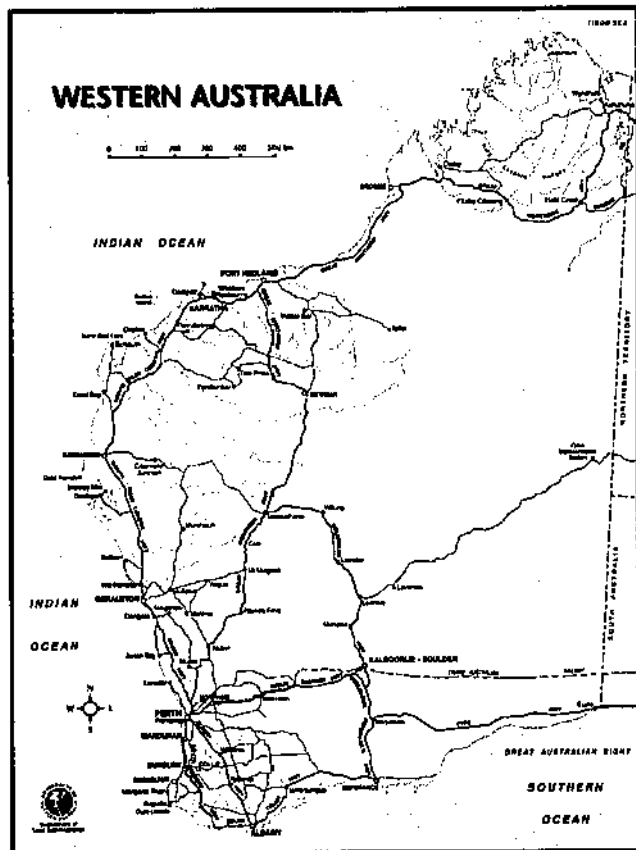


Figure 6.1 Map of Western Australia

Table 6.2

*Population Demographics of WA remoteness areas*

Area	Total	Males	Females	<18	Dwellings
WA	1851 252	922 288	928 984	692 553	695 649
Major City	1291 296	631 784	659 512	484 786	494 937
Inner regional	217 932	108 763	109 169	81 089	81 369
Outer Regional	177 541	90 542	86 999	66 096	66 262
Remote	98 040	52 295	45 745	35 912	34 859
Very Remote	64 527	37 268	27 279	23 544	18 216

**Profile of Research Communities**

The following section provides a profile of each community and its geographical location. Table 6.3 provides information on the median social statistics for each town site and Table 6.4 provides details of the population for each area.

**Township of Broome**

Broome, in the Kimberley region of WA, is predominately known as the pearling capital of the world. Broome is located 2250 km north east of Perth, has a remote classification and situated on Roebuck Bay. It boasts many natural

attractions such as the pristine white sandy beaches to the blue tropical water. It was founded on November 27, 1883 by Sir Frederick Napier Broome and within a few years became an important connection to the far north of Australia. Before WW1, 403 pearling vessels operated out of Broome however this was reduced to 50 by 1939 with a depressed world market. The Japanese attacked Broome in 1942 where reportedly 70 people were killed, and many boats and airplanes were destroyed. As Broome is situated on the coast in the tropical north it is threatened seasonally by tropical cyclones. The population of Broome is primarily Australian born 77% (including an indigenous population of 24.39%), 5% were born in the United Kingdom and the remainder in different countries (such as Spain and Asia). It is an extremely popular holiday destination for local and overseas tourists.

### **Township of Carnarvon**

Carnarvon, in the Gascoyne Region of WA, was named after the British secretary of State Lord Carnarvon (1866-74). Historically Carnarvon was founded in 1876 and was initially a supply port for the surrounding farming industry and became the centre of the wool industry. It is well known because it houses NASA's tracking station which relayed the words of Neil Armstrong on July 20 1969 "One small leap for man but a giant leap for mankind" to the world. Carnarvon is 904Kms north of Perth. The population is predominately Australian born (72.8%) which includes 15.73% from the indigenous community. Carnarvon's moderate tropical climate enables the growing of produce which is transported to the remainder of

WA and to other states. As the town is on the west coast of Australia, Carnarvon is continuously under a seasonal threat of cyclones.

### **Township of Exmouth**

Exmouth is 1272km north of Perth between a marine park (Ningaloo) and rugged ranges (Cape Range National Park). It has a tropical climate that features no wet season. Though not officially settled until 1963, early explorers were present through the 16-1800's. Originally when it was settled Exmouth was a military town but now survives on tourism based on its location and natural beauty. The population in Exmouth is predominately Australian born, 74.6% which includes 1.28% indigenous Australians. Exmouth is classified in the very remote area of the state.

### **Township of Kununurra**

Kununurra lies 3247km north of Perth. It was founded in 1958 as part of the Ord River Irrigation scheme and the name is Aboriginal for 'big water'. The Ord river irrigation scheme directed water to irrigate 75 000 hectares of farming land which is primarily used for cattle grazing. However water is also provided for local town sites to maintain an economy in the area and provide hydroelectricity to the surrounding area. The climate in Kununurra is described as arid-tropical (hot and humid). Kununurra is in the Kimberley region of WA and is classified as very remote. The population of Kununurra consists of 69.5% Australian born, which includes 18.93% indigenous Australians.

Table 6.3

*Median Social Statistics for each Community*

Community	Age	Monthly Loan Repay.	Weekly Rent	Weekly Ind. Income	Weekly Family Income	Household Size
Exmouth	44	800-899	100-149	300-399	800-899	3.1
Carnarvon	39	600-799	50-99	300-399	800-899	3.6
Kununurra	37	800-899	100-149	400-499	1000-1199	3.8
Broome	37	1000-1199	100-149	300-399	800-999	2.8
WA	34	800-999	100-149	300-399	800-899	2.6
Australia	35	800-999	150-199	300-399	800-999	2.6

Table 6.4

*Population Data (2001 Census)*

Community	Total Count %	M	F	< 18	18-30	31-40	41-50	51-60	61-70	71 >
Exmouth	3137	1618	1519	846	383	442	405	430	511	304
	100.00	51.58	48.42	26.97	12.21	14.09	12.91	13.71	16.29	9.69
Carnarvon	7273	3796	3477	1780	1056	931	785	923	899	713
	100.00	52.19	47.81	24.47	14.52	12.80	10.80	12.69	12.36	9.80
Kununurra	5485	2833	2652	1229	476	814	708	784	581	216
	100.00	51.65	48.35	22.41	8.71	14.84	12.91	14.47	10.59	3.93
Broome	13544	7081	6443	2887	2349	1958	1632	1895	1639	811
	100.00	52.18	47.87	21.39	17.34	14.67	12.05	13.98	12.10	4.51
TOTAL	29 439	15308	14091	6752	4268	4175	3530	4042	3630	1844
	100.00	51.9	47.86	22.93	14.49	14.18	11.99	13.73	12.33	6.26

## **Stage Two: Participant Sample**

After the identification of the communities, the total numbers of dwellings in each community were determined and then 50% of this total for each community was sampled. (See Table 6.5). The proportion (50%) was chosen for a number of reasons. Previous experience with collecting data from the public on issues of concern had yielded response rates between 9-11% (Pooley & O'Connor, 1997; McKillop, 2003), therefore the data analysis needed approximately 100 responses per community so a data target of 10% response was set. In addition economically, the cost the sending out additional surveys was prohibitive.

Table 6.5

### *Participants and Response Rates from each Community*

Community	Dwellings	Sampled 50 %	Number Returned	% Returned
Broome	4 466	2 200	175	7.9
Carnarvon	2 750	1 300	142	17.5
Exmouth	1 239	600	105	17.5
Kununurra	1 955	900	90	10.0
Total	10 400	5 000	512	10.24 (Average)

## **Participants**

There were 512 participants who responded to the survey. In the total sample there were 329 female respondents and 169 male respondents (see Table 6.6). The ages of the respondents ranged from 18-81 with an average age of 35.1



years. The participants have lived in their respective communities ranging from one month to 60 years and the average time spent in these communities is 3.8 years (See Table 6.7). In terms of home ownership most participants (51.17%) own their home (See Table 6.8). Data pertaining to each individual community is detailed in the Tables 6.6 – 6.8 below.

Table 6.6

*Gender and Age across all Communities*

Community	Total Count	Males %	Females %	18-30	31-40	41-50	51-60	61-70	71 >
Broome	175	52	122	39	63	36	28	7	1
	100.00	29.7	69.7	22.4	36.2	20.7	16.1	4.0	.8
Camarvon	142	48	90	35	33	29	26	10	6
	100.00	33.8	63.4	25.2	23.7	20.9	18.7	7.2	4.3
Exmouth	105	42	62	6	30	36	21	8	3
	100.00	40.4	59.6	5.8	28.8	34.6	20.2	7.7	2.9
Kununurra	90	27	55	21	21	24	12	1	3
	100.00	32.9	67.1	25.6	25.6	29.3	14.6	1.2	3.7
TOTAL	512	169	329	101	147	125	87	26	13
	100.00*	33.00	67.00	19.72	28.7	24.41	16.99	5.07	2.5

\* 3% (14) Unspecified gender

Table 6.7

*Length of Residence across Communities*

Community	<Yr	1-5	6-10	11-	16-	21-	26-	31-	36-	41-	46-	51-	56-
				15	20	25	30	35	40	45	50	55	60
	Count												
	%												
Broome	12	80	40	14	13	5	5	1		1	2		
	6.9	48.2	23.9	8.0	7.5	2.9	2.9	.6		.6	1.2		
Camaron	7	35	14	14	17	10	9	8	6	5	4	4	1
	5.1	25.5	10.2	10.2	12.4	7.3	6.6	5.8	4.4	3.6	2.9	2.9	.7
Exmouth		28	39	14	9	3	4	4	1	1			
		27.2	37.9	13.6	8.7	2.9	3.9	3.9	1.0	1.0			
Kununurra	4	42	19	9	1	6	1						
	4.9	51.2	23.2	11.0	1.2	7.3	1.2						
Total	23	185	112	51	40	24	19	13	7	7	6	4	1
	4.49	36.13	21.87	9.96	7.81	4.68	3.7	2.5	1.3	1.3	1.1	.78	.01

Table 6.8

*Home Ownership across Communities*

Community	Own Count %	Rent	Board	Supplied
Broome	92	65	8	7
	52.9	37.4	4.6	3.2
Carnarvon	79	47	7	4
	55.7	33.1	4.9	2.8
Exmouth	58	27	4	2
	60.9	29.3	4.3	2.2
Kununurra	35	40	1	5
	38.9	44.4	1.1	5.5
Total	262	179	20	18
	51.17	34.96	3.9	3.5

**Instrument****Community Survey**

A survey was developed using instruments to measure each of the issues elicited from study one which identified five factors relating to the experience of disaster communities. These were self-efficacy (SE), social networks (SN), coping styles (CS), sense of community (SoC), and community competence (CC). In addition measures of disaster stress (Impact of Events) and posttraumatic growth (Post Traumatic Growth Index) were included from the disaster literature as indicative of the disaster experience. In order to ascertain the mental health levels

of the participants a measure of anxiety and depression (Hospital Anxiety and Depression Scale) was also utilized. Therefore, the community survey consisted of eight scales that were utilized and presented in one survey consisting of nine sections and 154 items (See Appendix 3) which is described below.

#### Hospital Anxiety and Depression Scale (HADS)

This scale is a 'present state' scale that was designed for non-psychiatric clients to ascertain their level of anxiety and depression. Developed in 1983 by Zigmond and Snaith the 14-item scale has been used in various studies ranging from general hospital patients (Clarke, Smith and Herrman, 1993) to community-based samples (Dunbar, Ford, Hunt & Der, 2000). The HADS consists of two subscales; the A-Scale measures Anxiety (7 items) and has a reported Cronbach's Alpha of .93 and a concurrent validity correlation with a psychiatric anxiety scale of .54 (Snaith & Zigmond, 1994). Items included are:

Q1	I feel tense or 'wound up':	Most of the time	A lot of the time	From time to time	Not at all
Q3	I get sort of frightened feeling as if something awful is about to happen:	Very definitely and quite badly	Yes, but not too badly	A little, but it doesn't worry me	Not at all

In the D-Scale, which measures depression (7 items), the Cronbach's Alpha is .90 and the concurrent validation correlation is .79. Items that are included are:

Q2	I still enjoy the things I used to enjoy?	Definitely as much	Not quite so much	Only a little	Hardly at all
Q4	I can laugh and see the funny side of things:	As much as I always could	Not quite so much now	Definitely not so much now	Not at all

Individual Variables*Self Efficacy (SE)*

This 7-item scale was developed by Pearlin and Schooler (1978) as part of a larger study detailing which factors contribute to personal stress. The data used to develop this scale was gathered from 2300 people aged 8-65 years. The object of the scale is to ascertain whether individuals regard 'one's life's chances as being under one's own control' (p.5). The reported reliability score is .69 (Cronbach's Alpha). Included items are:

		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
37	I have little control over the things that happen to me.	1	2	3	4	5
38	There is little I can do to change many important things in my life.	1	2	3	4	5

*Coping Styles (CS)*

Coping style has been long associated with the area of trauma and disasters. The Coping Style Questionnaire (CSQ) (Carver, Schier, & Weintraub, 1989) utilised in the present study, contains 30 items that measures three broad coping dispositions: task focused (TC), emotion focus (EC) and avoidant coping (AC). The scale was developed theoretically through a series of three factor analytic studies consisting of 978 undergraduates. The CSQ was developed to specifically address self-regulatory functions in coping efforts. The Cronbach's alpha for each scale is .78 for the task-focused subscale, .76 for emotion focused, and .77 for the avoidant coping subscale. Included items are:

		I usually don't do this at all				I usually do this a lot
TC	I concentrate my efforts on doing something about it.	1	2	3	4	5
EC	I put my trust in god.	1	2	3	4	5
AC	I refuse to believe that it happened.	1	2	3	4	5

### *Social Networks (SN)*

The Social Embeddedness Scale utilized was originally an adaptation of the Phillips Social Participation Index (1967) and has been used by Kaniasty, Norris and Murrell (1990) with 222 adults and then was used by Kaniasty and Norris (1993) with 2931 respondents looking at structural aspects of social support in the context of natural disasters. The scale contains six items, which assess the size and closeness of a person's social network. The scale has a reported reliability of .62 (Cronbach's Alpha) and a test retest reliability of .68. An example of items is as follows.

- Q1 During the past few weeks, how many times did you get together with friends \_\_\_\_\_  
 - I mean things like going out together or visiting in each other's homes?
- Q2 About how many neighbours do you know well enough to visit with? \_\_\_\_\_

### Community Variables

#### *Psychological Sense of Community (PSOC)*

The Sense of Community Index SCI was first presented by Perkins et al., (1990) and developed by McMillan and Chavis (1986). It is based on the theory of psychological sense of community (SoC) developed by McMillan and Chavis (1986). The measure assesses the four aspects of SoC: Membership, Influence, Integration and Connections through a twelve-item scale measured on a five point Likert scale (Strongly Disagree to Strongly Agree). An example of items contained in the scale is as follows.

		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Q1	I think my neighbourhood is a good place for me to live.					
Q2	People in this neighbourhood do not share the same values.	1	2	3	4	5

**Community Competence (CC)**

This scale was developed by Eng and Parker (1994) and contains 32 items across eight broad areas (Cronbach's Alpha in brackets) of participation (.68), Commitment (.71), Self-other awareness and clarity of situational definitions (.58), Articulateness (.65), Conflict containment and accommodation (.81), Management of relations with wider society (.75), Machinery for facilitating participant interaction and decision-making (.79) and social support (.67). The items are measured on a four point Likert scale (never, rarely, occasionally, frequently). Examples of the items contained in the scale are as follows.

Q1	Do people in this community go elsewhere for fun?	Never	Rarely	Occasionally	Frequently
Q6	How often do people volunteer for community activities?	1	2	3	4

**Disaster Experience Variables*****Post traumatic Growth Inventory (PTGI)***

This concept of posttraumatic growth has developed from recognition of the positive impacts of negative events (Tedeschi & Calhoun, 1996). It is argued that posttraumatic growth is an outcome of the cognitive processes in coping with traumatic events (Tedeschi, Park & Calhoun, 1998). One of the original scales to measure posttraumatic growth was developed by Tedeschi and Calhoun (1996). This 21- item scale is based on five factors (new possibilities, relating to others, personal strength, spiritual change, and appreciation of life) that can be utilized to determine the ability of individuals to cope after traumatic events. This scale has been utilized with many studies about individual trauma situations i.e., cancer

survival, incest survival, heart attacks. The reported reliability (Cronbach's Alpha) is .80. An example of items contained in the scale is as follows.

		I did not experience this change as a result of the event	Very small degree	A small degree	A moderate degree	A great degree	I experienced this change as a result the event
Q1	My priorities about what is important in life.	1	2	3	4	5	6
Q2	An appreciation for the value of my own life						

#### *Impact of Events Scale – Revised (IES and IES-R)*

This scale was developed and utilised clinically and empirically to measure subjective stress to a single traumatic incident. The original scale (IES) was developed on 68 patients in an out-patient program who were diagnosed with a stress response syndrome. The 15-item scale produced two factors measuring intrusive thoughts and affects, and avoidance behaviours (Horowitz, Wilner & Alvarez, 1979). The scale was revised in 1996 by Weiss and Marmar to include an additional seven items (22-items in total), and a third factor Hyperarousal. The IES and IES-R have been utilised with many populations including earthquake survivors, emergency disaster workers, and women who have been sexually assaulted. The reliability (Cronbach's Alpha and test retest) are reported at .79 to .92 and .89 to .94, respectively. The reported validity (construct) ranges between .74 to .87. An example of the items included in the scale are as follows.

		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
1	Any reminder brought back feelings about it.					
2	I had trouble falling asleep or staying asleep because of pictures or thoughts that came into my mind	1	2	3	4	5



### *Section on Demographic Information*

The last section (section 9) within the survey addressed a number of demographic variables including: age, gender, homeownership, residential postcode, and length of residence.

The survey consisted of three parts:

Part One: About the participant, this contained The Impact of Events Scale, The Hospital Anxiety and Depression Scale, The Mastery Scale, The Coping Style Questionnaire and the Post-traumatic Growth Index.

Part Two: About the participant's Community, this contained the Sense of Community Index, the Community Competence Questionnaire, and the Social Embeddedness Scale.

Part Three: Background Information, this contained demographic information and a rating of the impact of the event on the individual, the family and the community.

### **Procedure**

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The first step was to determine which communities were to be included in this present study. As previously described using the EMATrack system four communities met the criteria for inclusion into the present stage. The participant sampling process was determined through identifying a proportion of the total

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number of residential dwellings contained in each community. As discussed 50% of every community would be targeted to participate in the community survey. A covering letter detailing a summary of the project, and indicating that participation was voluntary, anonymous and confidential, was included (see Appendix 4). Attached to the letter was the survey (see Appendix 3), and a reply-paid envelope all contained in a single envelope addressed to the householder. These were delivered to 50% of all residential dwellings of in Broome, Carnarvon, Exmouth and Kununurra via Australia Post. During March of 2002 participants were asked to complete the survey and return it using the reply-paid envelope. Participants were asked to return the survey within four weeks from the time of delivery.

The next chapter details the analysis and results of this study.

## **CHAPTER 7**

### **Study 2 Results and Discussion: Western Australian Cyclone Communities**

**"What can you possibly conclude from this? Involved/well knit communities cope better = Phd = I think not. Please show these comments to your supervisor. They need to lift their game."**

**(Comment from a 41-50 year old woman who has lived in Broome for 4 years)**

#### **Aims of This Chapter**

This chapter presents the results of study two and provides a discussion of the results of research questions two to six. Prior to the presentation of the results the data screening in the form of reliabilities across the scales utilised are presented. Further data screening processes are presented with the relevant analyses relating to the research questions. The results are then presented in research question order. Therefore initially the details of the relationships between the factors are presented then the best predictors of stress and growth as well as the significant factors, which discriminate between high and low, stress groups are presented. The next section details the use of path analysis, with data from each community, in order to understand the order of the variables important to disaster communities

### **Initial Data Screening**

Prior to analysis the data was screened to ascertain its suitability for each analysis. Each data screening process is described within the relevant results section. Initially reliability testing of each scale used in the community survey was performed. Cronbach's Alpha was produced for each scale within each community (see Table 7.1). The reliability scores ranged from .08 to .97.

Table 7. 1

*Reliability Statistics (Cronbach's Alpha) for each Scale from each Community*

Scale	Broome	Carnarvon	Exmouth	Kununurra
Impact of Events	.95	.97	.95	.96
Posttraumatic Growth	.96	.97	.97	.96
Self Efficacy	.81	.86	.86	.80
Task Coping	.86	.90	.83	.91
Emotion Coping	.79	.81	.78	.81
Avoid. Coping	.64	.79	.67	.72
Sense of Community	.81	.81	.81	.83
Social Network	.09	.67	.09	.26
Community Competence	.86	.82	.69	.79
HADS - Anxiety	.19	.41	.23	.13
HADS - Depression	.74	.65	.91	.43

There are a number of issues that arise from the reliability screening. In most cases the reliability results reflect those presented in the literature. The

reliability of three scales (HADS – Anxiety, HADS – Depression and Social Network) utilized need further consideration.

The HADS scales were originally included as a mental health screening tool. However it is apparent that based on the high incidence of anxiety and depression reported in rural and remote communities (Welfare, 2002) and variability in terms of reliability (see table 7.1) it was decided that neither scale (Depression or Anxiety) was useful as a criterion or predictor variable. Therefore the HADS variables were not utilized in any further analysis.

It is also noted that the social network scale has varying degrees of reliability scores across communities; in this study, however as Cortina (1993) argues low alphas and small numbers of items (in the social network scale there are six items) may be indicative of the dimensionality (that it may be multidimensional) of the scale and not representative of the scales reliability. Therefore the scale has been included in the analysis.

## **Study Two Results**

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The results of study two are presented in six sections which each related to a specific research question. The research questions are:

Research Question Two - What are the relationships between community, individual and disaster experience variables in each community?

Research Question Three - What is the best predictor of posttraumatic stress?

**Research Question Four** - What is the best predictor of posttraumatic growth?

**Research Question Five** - What variables differentiate high and low stress groups?

**Research Question Six** - What variables differentiate high and low growth groups?

**Research Question Seven** -What are the community and individual factors that mediate the disaster experience in different disaster communities in Western Australia?

**Research Question Two - What are the relationships between the individual, community, and disaster experience variables in each community?**

Pearson Correlation coefficients were computed for the scale scores in each community. The following Tables (7.2-7.5) indicate the correlations between all scaled scores in each community. Examination of scatter plots (see Appendix 5) did not suggest the violation of assumptions of normality, linearity and homoscedasticity for each significant correlation.

Broome

Table 7.2 presents correlations of all the variables for the Broome community. Significant correlations ranged from a low negative (-.296) to medium positive (.443) correlation.

Table 7.2

*Intercorrelations between subscales for Broome Community*

	Disaster Experience Variables		Community Resilience Variables			Individual Resilience Variables			
	PTGI	IES	CC	SoC	SN	SE	TC	AC	EC
PTGI	-	.443**	.083	.133	.052	-.106	.174*	.086	.341**
IES		-	.197	-.069	-.044	-.122	.089	.144	.222*
CC			-	.266*	.269**	-.068	.043	.117	.136
SoC				-	.205*	.222**	.013	.000	.079
SN					-	-.081	.156	.113	.239**
SE						-	.120	-.296**	.075
TC							-	.011	.433**
AC								-	.049
EC									-

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

PTGI Posttraumatic Growth Index; IES Impact of Events; CC Community Competence; SoC Sense of Community; SN Social Networks; SE Self-Efficacy; TC Task Focused Coping; AC Avoidant Coping; EC Emotion Focused Coping

Carnarvon

Table 7.3 presents correlations of all the variables for the Carnarvon community. Significant correlations ranged from a medium negative (-.379) to a medium positive (.634) correlation.

Table 7.3

*Intercorrelations between subscales for Carnarvon Community*

	Disaster Experience Variables			Community Resilience Variables			Individual Resilience Variables		
	PTGI	IES	CC	SoC	SN	SE	TC	AC	EC
PTGI	-	.541**	-.189	-.088	.084	-.205**	.189	.258**	.240*
IES		-	.129	.075	.163	-.355**	-.022	.147	.031
CC			-	.344**	-.158	.483**	.129	-.142	.011
SoC				-	.379**	.230**	-.030	-.173	-.115
SN					-	.136	-.141	-.231*	-.183
SE						-	.240*	-.232**	.058
TC							-	.285**	.634**
AC								-	.185*
EC									-

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

PTGI Posttraumatic Growth Index; IES Impact of Events; CC Community Competence; SoC Sense of Community; SN Social Networks; SE Self-Efficacy; TC Task Focused Coping; AC Avoidant Coping; EC Emotion Focused Coping



Exmouth

Table 7.4 presents correlations of all the variables for the Exmouth community. Significant correlations ranged from a low negative (-.395) to a medium positive (.493) correlation.

Table 7.4

*Intercorrelations between subscales for Exmouth Community*

	Disaster Experience Variables		Community Resilience Variables			Individual Resilience Variables			
	PTGI	IES	CC	SoC	SN	SE	TC	AC	EC
PTGI	-	.251*	.125	.157	.015	-.020	.072	.137	.197
IES		-	-.174	-.060	.000	-.321**	.095	.304**	.080
CC			-	.352**	.071	.186	.108	-.052	.224
SoC				-	.264*	.320**	-.036	-.114	.134
SN					-	.151	-.157	-.285**	-.201
SE						-	.092	-.395**	.051
TC							-	.086	.493**
AC								-	.218**
EC									-

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

PTGI Posttraumatic Growth Index; IES Impact of Events; CC Community Competence; SoC Sense of Community; SN Social Networks; SE Self-Efficacy; TC Task Focused Coping; AC Avoidant Coping; EC Emotion Focused Coping

Kununurra

Table 7.5 presents correlations of all the variables for the Kununurra community. Significant correlations ranged from a medium negative (-.365) to a medium positive (.704) correlation.

Table 7. 5

*Intercorrelations between subscales for Kununurra Community*

	Disaster Experience Variables		Community Resilience Variables		Individual Resilience Variables				
	PTGI	IES	CC	SoC	SN	SE	TC	AC	EC
PTGI	-	.518**	.121	.269*	.150	-.043	.289*	.162	.168
IES		-	-.069	.152	.241	-.365**	.048	.267*	.042
CC			-	.477**	.419**	.332*	.098	.197	.095
SoC				-	.303*	.260*	.103	.172	.163
SN					-	.323**	.120	-.105	.082
SE						-	.154	-.187	.111
TC							-	.370*	.704**
AC								-	.322**
EC									-

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

PTGI Posttraumatic Growth Index; IES Impact of Events; CC Community Competence; SoC Sense of Community; SN Social Networks; SE Self-Efficacy; TC Task Focused Coping; AC Avoidant Coping; EC Emotion Focused Coping

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**Research Question Three - What is the best predictor of posttraumatic stress?**

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Residual scatter plots (See Appendix 6) were examined for possible violations of assumptions of normality, linearity, homoscedasticity, and none were evident. Tabachnick and Fidell (2001) indicate that tolerance tests conducted by Statistical Package for the Social Sciences 11.0 (SPSS) protect against the violation of the assumption of multicollinearity.

Standard Multiple Regressions were then performed in order to determine which variables best predicts post traumatic stress (IES) for each community.

**Broome**

As shown in Table 7.6 emotion-focused coping significantly predicted posttraumatic stress (IES) for the Broome community. This model explained 32.7% of the variance in IES.

Table 7.6

*Predictors for Posttraumatic Stress in Broome (IES)*

Predictors	Beta	B	R	R <sup>2</sup>
Avoidant Coping	.163	.297		
Emotion Coping	.326	.657		
Task Coping	-.159	-.240		
Self-Efficacy	-.083	-.178		
Sense of Community	-.205	-.412		
Social Networks	.024	.003		
Community Competence	.139	.168		
Post Traumatic Growth	.237	.132		
Emotion Focused Coping	.326	.657*	.572	.327

[F(8,51)=3.096, p>.01]

N = 176. \*, p<.05

Carnarvon

As shown in Table 7.7 self efficacy, posttraumatic growth and social networks significantly predicted posttraumatic stress (IES) for the Carnarvon community. This model explained 58.7% of the variance in IES.

Table 7.7

*Predictors for Posttraumatic Stress in Carnarvon (IES)*

Predictors	Beta	B	R	R <sup>2</sup>
Avoidant Coping	-.89	-.330		
Emotion Coping	-.139	-.348		
Task Coping	.233	.513		
Sense of Community	.095	.306		
Community Competence	-.065	-.145		
Self Efficacy	-.261	-1.051*		
Posttraumatic Growth	.598	.470**		
Social Networks	.227	.428 *	.766	.587

[F(8,53)=9.414, p<.001]

N = 142. \*, p<.05, \*\* p<.01

Exmouth

There were no variables that were significant predictors of posttraumatic stress (IES) for the Exmouth community.

Kununurra

As shown in Table 7.8 self-efficacy, posttraumatic growth and community competence significantly predicted posttraumatic stress (IES) for the Kununurra community. This model explained 56.2% of the variance in IES.

Table 7. 8

**Predictors for Posttraumatic Stress in Kununurra (IES)**

Predictors	Beta	B	R	R <sup>2</sup>
Avoidant Coping	.275	.682		
Emotion Coping	.027	.047		
Task Coping	-.006	-.007		
Sense of Community	-.136	-.239		
Social Networks	.224	.305		
Self Efficacy	-.632	-2.248**		
Posttraumatic Growth	.452	.284**		
Community Competence	.598	.608*	.835	.562

[F(8,51)=5.166, p>.002]

N = 90. \*, p<.05, \*\*p<.01

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**Research Question Four - What is the best predictor of posttraumatic growth?**

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Residual scatter plots (see Appendix 6) were examined for possible violations of the assumptions of normality, linearity, homoscedasticity, and none were evident. Tabachnick and Fidell (2001) indicate that tolerance tests conducted by SPSS protect against the violation of the assumption of multicollinearity.

Standard Multiple Regressions were then performed in order to determine which variables best predicts posttraumatic growth (PTGI) in each community.

**Broome**

As shown in Table 7.9 emotion-focused coping significantly predicted posttraumatic growth (PTGI) in the Broome Community. This model explained 36.2% of the variance in PTGI.

Table 7.9

*Predictors for Posttraumatic Growth in the Broome Community (PTGI)*

Predictors	Beta	B	B	R <sup>2</sup>
Avoidant Coping	-.048		-.158	
Emotion Coping	.315		1.142	
Task Coping	.149		.404	
Self-Efficacy	-.137		-.698	
Sense of Community	-.187		-.676	
Social Networks	.159		.039	
Community Competence	-.021		-.045	
Impact of Events	.226		.405	
Emotion-focused coping	.315		1.142*	.601 .362
[F(8,51)=3.613, p>.01]				

N = 175. \*, p<.05



**Camraron**

As shown in Table 7.10 impact of events (stress) significantly predicted posttraumatic growth (PTGI) in the Camraron Community. This model explained 53.9% of the variance in PTGI.

Table 7. 10

*Predictors for Posttraumatic Growth in the Camraron Community (PTGI)*

<b>Predictors</b>	<b>Beta</b>	<b>B</b>	<b>R</b>	<b>R<sup>2</sup></b>
Avoldant Coping	.193	.812		
Emotion Coping	.208	.660		
Task Coping	-.156	-.436		
Self-Efficacy	-.031	-.160		
Sense of Community	.011	.047		
Social Networks	-.051	-.121		
Community Competence	.001	.002		
Impact of Events	.665	.844**	.734	.539
[F(8,53)=7.753, p<.01]				

N = 142. \*\*, p<.01

**Exmouth**

There were no variables identified that were significant predictors of posttraumatic growth (PTGI) for the Exmouth community.

### Kununurra

There were no variables identified that were significant predictors of posttraumatic growth (PTGI) for the Kununurra community.

### Research Question Five - What variables differentiate high and low stress groups?

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To determine which combinations of variables are predictive of those people that are highly stressed as opposed to those that are not stressed, discriminant function analyses (DFA) were performed for each community. The variables utilized to investigate which factors differentiated those that scored in the top 20% on the IES (High stress group) and those that scored in the bottom 20% of the IES (low stress group) were SE, CS, SN, CC, SOC, PTGI. Data was screened to test the assumptions underlying DFA. Multivariate outliers were assessed using Mahalanobis distance. Although moderate correlations between variables are evident in some communities, Tabachnick and Fidell (2001) argue that slight multicollinearity should not present a problem because most DFA programs test for this assumption and exclude variables if the assumption is violated to a great extent. Tabachnick and Fidell (2001) further argue that when sample sizes are equal, robustness of significance tests is expected. In each DFA performed it is important to note that only one function is needed as only two groups are in the analysis (Bishop & Drew, 1999). The variable Group was used as the dependent variable (i.e., high or low stress).

Broome

An examination of the Mahalanobis distance for the Broome data indicated that no cases exceeded the critical value. The correlations among the independent variables ranged from -.275 to .544. An examination of the canonical discriminant function indicates 1 function, which accounts for 100% variance and has a canonical correlation of  $r = 0.643$ . The high stress group was found to have lower self-efficacy, used more emotionally focused coping and had more post traumatic growth. The low stress group had higher self-efficacy, used less emotionally focused coping and had less posttraumatic growth (see Table 7.11). The overall correct classification of cases was 82.6%. The percentage of cases correctly classified in the high stress group was 81.5% and the low stress group was 85.2%.

Table 7. 11

*Discriminators for High and Low Impact of Events (IES) Groups in the Broome Community*

Discriminators	Function 1 Coeff.	p	Scale <i>M</i>	
			High	Low
Posttraumatic Growth (PTGI)	.696	.000	49.8	21.7
Self Efficacy (SE)	-.444	.001	26.0	29.6
Emotion Coping (EC)	.474	.004	32.6	26.5
[ $\chi^2(8)=45.965, p<.000$ ]				

N = 175.

**Camarvon**

An examination of the Mahalanobis distance for the Camarvon data indicates that no cases exceeded the critical value. The correlations among the independent variables ranged from -.390 to .481. An examination of the canonical discriminant function indicates 1 function, which accounts for 100% variance and has a canonical correlation of  $r = 0.887$ . The high stress group was found to have lower self-efficacy, lower scores on the community competence scale, higher scores on social network scale and more posttraumatic growth. The low stress group had higher scores of self-efficacy, higher scores on the community competence scale, lower scores on the social network scale (see Table 7.12). The overall correct classification of cases was 95.8%. The percentage of cases correctly classified in the high stress group was 93.8% and the low stress group was 100.0%.

Table 7. 12

*Discriminators for High and Low Impact of Events (IES) Groups in the Camarvon Community*

Discriminators	Function 1 Coeff	p	Scale M	
			High	Low
Self Efficacy (SE)	-.299	.013	22.8	27.5
Posttraumatic Growth (PTGI)	.600	.000	70.8	20.6
Community Comp. (CC)	-.321	.009	86.6	95.2
Social Networks (SN) [ $\chi^2(8)=27.820, p<.001$ ]	.388	.002	32.8	21.1

N = 142.

Exmouth

There were no variables identified that could discriminate between the high and low posttraumatic stress (IES) groups for the Exmouth community.

Kununurra

An examination of the Mahalanobis distance for the Carnarvon data indicates that no cases exceeded the critical value. The correlations among the independent variables ranged from -.660 to .760. An examination of the canonical discriminant function indicates 1 function, which accounts for 100% variance and has a canonical correlation of  $r = 0.980$ . The high stress group was found to have higher scores on the posttraumatic growth scale than the low stress group (see Table 7.13). The overall correct classification of cases was 100%. The percentage of cases correctly classified in the high stress group was 100% and the low stress group was 100%.

Table 7. 13

*Discriminators for High and Low Impact of Events (IES) Groups in the Kununurra Community*

Discriminators	Function Coeff	<i>p</i>	Scale M High	Low
Posttraumatic Growth (PTGI) [ $\chi^2(8)=22.510, p<.01$ ]	.244	.002	50.66	12.14

N = 90.

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**Research Question Six - What variables differentiate high and low growth groups?**

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Discriminant Function Analysis (DFA) was performed to Investigate which factors (SE, CS, SN, CC, SOC, IES) differentiated those that scored in the top 20% on the PTGI (High positive growth group) and those that scored in the bottom 20% of the PTGI (low positive growth group). Data was screened to test the assumptions underlying DFA. Multivariate outliers were assessed using Mahalanobis distance.

Although moderate correlations between variables are evident in some communities Tabachnick and Fidell (2001) argue that even slight multicollinearity should not present a problem because SPSS FOR WINDOWS DFA programs test for this assumption and exclude variables if the assumption is violated to a great extent. Tabachnick and Fidell (2001) further argue that when sample sizes are equal, robustness of significance tests is expected. The variable Group was used as the dependent variable (i.e., high or low positive growth).

Broome

An examination of the Mahalanobis distance indicates that no cases exceeded the critical value. The correlations among the independent variables ranged from -.178 to .562. An examination of the canonical discriminant function indicates 1 function which accounts for 100% variance and has a canonical correlation of  $r = 0.730$ . The high positive growth group was found to have high scores on the social network scale, emotion focused coping scale and posttraumatic stress, and a low score on the self efficacy scale. The low growth group had low scores on the social network scale, emotion focused coping scale and posttraumatic stress and a high score on the self efficacy scale (see Table 7.14). The overall correct classification of cases was 84.1%. The percentage of cases correctly classified in the high positive growth group was 90.9% and the low positive growth group was 76.7%.

Table 7. 14

*Discriminators for High and Low Posttraumatic Growth (PTGI) Groups in the Broome Community*

Discriminators	Function 1 Coeff.	$p$	Scale $M$	
			High	Low
Social Networks (SN)	.291	.018	116.9	45.1
Self Efficacy (SE)	-.275	.025	27.0	29.7
Emotion Coping (EC)	.326	.009	31.5	23.3
Impact of Events (IES) [ $\chi^2(8)=43.341, p<.000$ ]	.868	.000	26.1	4.7

N = 175.

Carnarvon

An examination of the Mahalanobis distance indicates that no cases exceeded the critical value. The correlations among the independent variables ranged from -.591 to .518. An examination of the canonical discriminant function indicates 1 function which accounts for 100% variance and has a canonical correlation of  $r = 0.807$ . The high growth group was found to have high scores on the social network scale and posttraumatic stress. The low growth group had lower scores on the social network scale and posttraumatic stress scale (see Table 7.15). The overall correct classification of cases was 91.7%. The percentage of cases correctly classified in the high positive growth group was 85.7% and the low positive growth group was 100.0%.

Table 7. 15

*Discriminators for High and Low Posttraumatic Growth (PTGI) Groups in the Carnarvon Community*

Discriminators	Function 1 Coeff.	p	Scale M	
			High	Low
Social Networks (SN)	.391	.020	31.8	23.9
Impact of Events (IES)	.801	.000	50.0	8.8
[ $\chi^2(8)=18.993, p<.05$ ]				
N = 142.				

Exmouth

There were no variables identified that could discriminate between the high and low posttraumatic growth (PTGI) groups for the Exmouth community.



**Kununurra**

An examination of the Mahalanobis distance indicates that no cases exceeded the critical value. The correlations among the independent variables ranged from  $-.778$  to  $.842$ . An examination of the canonical discriminant function indicates 1 function which accounts for 100% variance and has a canonical correlation of  $r = 0.990$ . The high growth group was found to have a high score posttraumatic stress and a low score on sense of community, where as the low growth group had a low score on posttraumatic stress and a high score on the sense of community scale (See Table 7.16). The overall correct classification of cases was 100%. The percentage of cases correctly classified in the high positive growth group was 100% and the low positive growth group was 100%.

Table 7. 16

*Discriminators for High and Low Posttraumatic Growth (PTG) Groups in the Kununurra Community*

Discriminators	Function 1 Coeff.	<i>p</i>	Scale <u>M</u> High	Low
S. of Community (SoC)	.108	.047	25.4	37.8
Impact of Events (IES) [ $\chi^2(8)=19.55, p<.05$ ]	.177	.005	24.6	1.0

N = 90

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## **Summary and Discussion of Results**

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The results from research questions two to six starts to examine the relationships between the factors utilized in the present study. This section of the present chapter will explore the results presented so far and discuss the results in relation to each community.

### **Broome**

Broome is the largest and one of the oldest communities utilized in the present study. Settled in 1883, Broome has over 13 000 residents of which a majority have lived in their own homes for 10 years or less. Broome residents are most like the Australian average, there are 2.8 people per household, the average age is 37, and they have a weekly family income of between \$800-999 a week. For the residents of Broome the wet season (November to April) brings the threat and reality of tropical cyclones. In the period preceding the present study Broome endured three cyclone events large enough to be recorded on EMATRACK. These events occurred in April and December 2000, and January 2001, cyclones Rosita, Sam and Terri, respectively. Within the present studies' catchment period (3 years) Broome registered the most events, and was possibly threatened by others.

The goal of the present study was to determine the relationships between the factors identified in study one and then determine how these factors impact on the stress and growth response from the disaster. In the case of Broome the correlation matrix (table 7.2) indicates that there are a number of significant relationships between the factors identified in study one. The strongest

relationship is that between posttraumatic stress and posttraumatic growth (.443), this indicates that for Broome residents those that experience high stress are likely to experience high growth. For the community variables there are relationships between community competence, sense of community (.266) and social networks (.269) both indicating that a more competent community means individuals have a higher sense of community and a larger social network. Self-efficacy relates to sense of community (.222), which indicates that those that are more self-efficacious are also more likely to feel attached to the Broome community. Alongside the role of coping; in Broome emotion focused coping is related to posttraumatic stress (.222), to posttraumatic growth (.341), to social networks (.433), and to task-focused coping (.239). These relationships suggest that Broome residents, who cope with disasters by focusing on their emotions, are also likely to have increased posttraumatic growth and posttraumatic stress, have larger social networks, and also use task-focused coping. This is also supported by task-focused 'copers' who are more likely to have higher levels of posttraumatic growth (.174). For Broome residents the use of avoidance as a coping mechanism is related to higher levels of task-focused coping.

Multiple regression determined which variables best predict posttraumatic stress and posttraumatic growth. In both cases the significant predictor was emotion-focused coping. For posttraumatic stress emotion focused coping accounted for approximately 33% of the variance indicating that two thirds of the variation is left unexplained. For posttraumatic growth there is only a slight increase in the variance explained by emotion focused coping (36%). In regard to

facilitating or alleviating stress or growth in the Broome community, emotion focused coping mechanisms would be the suggested target which is in contrast to previous research which indicated that task-focused coping mechanisms relate to reduced stress levels (Bishop et al., 2000). Critical incident stress debriefing programs have often been criticized for their reliance on emotion-focused mechanisms (Moran, 1998). Possibly Broome residents are used to this type of "debriefing" as they are regularly threatened by cyclones, and therefore emotion focused coping mechanisms may be more salient.

To further determine the variables that influence stress and growth in Broome a DFA was performed to highlight which variables differentiate those residents that obtained high stress scores and those that obtained low stress scores. The discriminating variables were posttraumatic growth, self-efficacy and emotion-focused coping. Therefore, those residents that have a high posttraumatic stress score, have more posttraumatic growth (49.8), use more emotion focused coping mechanisms (32.6) and are less self-efficacious (26.0). For those residents that have a low posttraumatic stress score, they experience less posttraumatic growth (21.7), use less emotion focused coping mechanisms (26.5) and are more self-efficacious (29.6).

The discriminating variables between those Broome residents with high and low posttraumatic growth scores were posttraumatic stress, emotion focused coping, self-efficacy and social networks. Residents that scored high on the growth scale also scored high on the stress scale (26.1), used more emotion focused coping mechanisms (31.5), had larger social networks (116.9) and were

less self-efficacious (27.0). Residents that scored low on the growth scale also scored low on the stress scale (4.7), used less emotion focused coping mechanisms (23.3), had smaller social networks (45.1) and were more self-efficacious (29.7). The DFA results support the idea that the service orientation of Broome may encourage less individual (self) action as self-efficacy is a discriminator for both high and low stress and growth groups indicating that those with low stress and low growth are more self-efficacious.

For the community of Broome the results of the correlations, regressions and DFA present a converging view of the relationships between the variables presented in the present study. There is strong evidence to support that posttraumatic stress and posttraumatic growth in Broome are clearly related to each other. Both the correlations and the DFA indicate the relationship and their role in distinguishing high and low stress and growth groups. Emotion focused coping mechanisms are also suggested as predictive of stress and growth and also as a discriminator between high and low stress and growth groups. For Broome the individual variables (self efficacy, coping and social networks) tend to feature more strongly in supporting stress and growth, as indicated by the regression and DFA. As Broome is a larger centre in northern Western Australia and the main gateway to other towns in the north of the state, it has an extensive tourist and service industry that is more akin to a 'well oiled machine' in regards to handling cyclone events. The Broome community has a history of coping with cyclone events and this may encourage the salience of individual factors like coping, self-efficacy and social networks for its residents. The community factors may have

become less salient and more latent because of the long establishment time since settlement (Bishop, Coakes & D'Rozario, 2002). Longer established communities exhibit a well-grained community spirit that underpins the functions of the community. This may be evidenced in the correlation matrix where the relative importance of the community variables is established through their significant relationships to different individual variables. On the other hand the salience of the individual variables may indicate the influence of the transient nature of a large proportion of the population as evidenced in the time period people live in Broome.

### **Carnarvon**

The community of Carnarvon is the oldest town site utilized in the present study. Settled in 1876 the majority of its population of 7300 has lived in their own homes for one to five years. Although the family weekly income is identical to the Australian median (\$800-999) there are more persons per household (3.6) and the median monthly mortgage repayments (600-799) are less than the Australian median. Carnarvon residents do not generally consider their town to be prone to cyclones. They do recognize that cyclones are a threat however there have been few events in the past two decades that many locals consider noteworthy. Carnarvon has been included in the present study as in March 2000 cyclone Steve caused sufficient damage to warrant federal assistance.

Correlations indicated a number of significant relationships (table 7.3). A moderate significant correlation was found between posttraumatic stress and posttraumatic growth indicating that for Carnarvon residents' disaster stress relates

to disaster growth. Disaster growth is also associated with self-efficacy (-.205) in that increase in growth residents report the less self-efficacious behavior they report. Coping in the form of avoidant behaviors (.258) and emotion-focused behaviors (.240) are also associated with higher reports of growth. For disaster stress there is a negative relationship with self-efficacy (-.355), which indicates that the more stress the less self-efficacious the residents are. Self-efficacy is also related to community competence (.483), sense of community (.230) and task-focused coping (.240), which indicates that the more self-efficacious the more attached to the community residents feel, the more self-efficacious the more competent the community, and the more self-efficacious the more task-focused coping mechanisms are used. The different coping styles are all significantly related to each other indicating that residents that cope emotionally are likely to also use more task-focused coping and avoidant coping mechanisms i.e., emotion-focused coping and avoidant coping (.185), emotion-focused coping and task-focused coping (.634), and task-focused coping and avoidant coping (.285). Finally for the individual factors social networks are negatively related to avoidant coping (-.231) indicating that the more people in the network the less avoidant coping mechanisms are used. With regard to the community variables sense of community relates to community competence (.344), indicating that the more competent the community the more attached the resident feels, and the larger the social networks (.379) indicating the larger the network the more attached the resident feels.

The correlation analysis highlighted the consistency with which self-efficacy and avoidant coping feature. Avoidant coping correlates with the individual variables (coping, efficacy, networks) and posttraumatic growth. These results support recent research, which find that complacency is a common theme for Carnarvon residents when it comes to cyclone preparedness behavior (Evans, Holmes & Pooley, 2004). The self-efficacy results may also be interpreted to mean that residents feel that they are capable of handling cyclone events, as they have not experienced many and are unaware of what the impact may really mean.

The results of the multiple regressions further define the relationships between stress and growth in that the significant predictor of growth is stress, which accounts for approximately 54% of the variance in growth scores. The significant predictors of stress, which account for approximately 59% of the variation in stress scores, are self-efficacy, posttraumatic growth and social networks. Self-efficacy is an important factor to disaster stress in Carnarvon as is indicated by the correlations and the regression. However more clearly is the link between disaster stress and growth being illuminated for Carnarvon residents.

The DFA further amplifies the relationship between disaster stress and growth for Carnarvon residents, as the factors that discriminate between high and low stress-scoring groups are self-efficacy, community competence, social networks and posttraumatic growth. This indicates that those with high stress scores are less self-efficacious (22.8), rate their community as less competent (86.8), have larger social networks (32.8) and more posttraumatic growth (70.8). For those that scored low on the stress scale they are more self-efficacious (27.5),



rate their community as more competent (95.2), have smaller social networks (21.1) and report less posttraumatic growth (20.6). For the high and low growth groups the discriminating factors are social networks, where the high growth group (31.8) have larger networks than the low growth group (23.9), and disaster stress, where the high growth group report higher rates of stress (50) than the low growth group (4.4).

### **Exmouth**

Exmouth is the youngest and smallest (population approx. 3200 residents) community in the present study. Although settled in 1963, of the four communities in the present study, Exmouth has the highest rate of home ownership (61%) and the oldest median age of 44 years (ten years older than the Australian median). With 3.1 members per household and with the Australian median weekly family income (\$800-999) the majority of residents live in Exmouth for a period of 10 years or less.

Exmouth has been included in the present study, as within the relevant study period the community has needed national assistance for cyclone Vance in March 1999 and cyclone Steve in March 2000. Cyclone Vance was particularly difficult for Exmouth as the town site was extremely damaged by what are the highest wind speeds recorded on Australian mainland and the storm surge that ensued ([www.bom.gov.au/announcements/media-releases/wa/waro-19990323.shtml](http://www.bom.gov.au/announcements/media-releases/wa/waro-19990323.shtml)).

The relationships between the factors in the correlation matrix indicate significance for posttraumatic stress and posttraumatic growth however the correlation is low positive (.251) indicating that the more posttraumatic stress the more posttraumatic growth. Stress is also negatively related to self-efficacy (-.321) which indicates that the more stress the less self-efficacious behaviors residents report, and positively related to avoidant coping (.304) which indicates that the more stress the more avoidant coping mechanisms are utilized. Emotion focused coping relates to both avoidant coping (.216) and task coping (.493) which indicates that more emotion coping is related to more avoidant coping, and more emotion coping is related to more task coping. Avoidant coping also negatively relates to self-efficacy (-.395) and social networks (-.288), which suggests that increased use of avoidant coping is coupled with less self-efficacy, and more avoidant coping is also associated with smaller social networks.

With regard to the community factors the link to the individual factors is through sense of community and social networks (.260) and sense of community and self-efficacy (.303). In Exmouth the more attached residents are to their community the more self-efficacious they are. The larger the social networks the more residents feel attached to Exmouth. Finally sense of community relates to how competent the Exmouth community is (.352) in that the more attached residents feel the more competent the community is perceived to be.

To further define these relationships multiple regression was used to determine what were significant predictors of stress and growth, however none of the factors in the analysis were found to be significant of either stress or growth.

DFA also failed to isolate factors which discriminate between high and low stress groups and high and low growth groups. An explanation of this may be that the variables utilized in the present study are not related to the stress and growth constructs in Exmouth. However as was indicated in the correlation analysis, stress and growth had a positive low correlation (.251). Further to this, few of the other variables did correlate with either stress or growth. In fact for growth there were no other significant correlating variables and for stress, self-efficacy and avoidant coping had significant low positive correlations.

### **Kununurra**

Kununurra is the most northern town site in Western Australia. With a small population of 5300 residents there are 3.8 people per household and the median age is 37. For this town established in 1958 a majority of the Kununurra sample remain in the community for less than five years in rental properties. This short-term rental market is also evident in the median weekly family income (\$1000-1199), which is the highest income for all the communities, in the present study, and higher than the Australian median income. For Kununurra residents the threat of a cyclone is somewhat different from the other three communities. Kununurra more often has to deal with the after effects of a cyclone i.e., flooding, rather than the cyclone itself. For inclusion in the present study Kununurra obtained federal assistance for cyclone Steve in March 2000 and flooding from cyclone Chris in February 2002.

With regard to the results of the analysis of the Kununurra data, a significant moderate positive relationship was evident between posttraumatic stress and posttraumatic growth (.541) indicating that for Kununurra residents the more stress associated with cyclone events the greater the posttraumatic growth. Correspondingly the greater use of avoidant coping (.258) and the greater use of emotion-focused coping (.240) were also independently correlated with posttraumatic growth. Both posttraumatic growth and posttraumatic stress independently correlated negatively with self-efficacy indicating that when stress or growth increases self-efficacy decreases.

The coping scales are correlated, emotion focused coping correlated with avoidant coping (.185), avoidant coping correlates with task-focused coping (.285) and task-focused coping correlated with emotion-focused coping (.634), all which indicate that increases in one type of coping increases the likelihood of the use of the other types of coping. Avoidant coping also correlates with self-efficacy (-.232) indicating that the more self-efficacious residents are the less they use avoidance mechanisms as a way of coping, and social networks (-.231) indicating that the smaller the network the greater the use of avoidant coping mechanisms. However the relationship between self-efficacy and task focused coping indicates that the higher ones self-efficacy the more they use task focused coping (.240).

The community variables correlate with each other and therefore a more competent community has residents that are more attached to it (.477). Sense of community also relates to social networks (.303) and self-efficacy (.260) indicating that the larger the social network the less attachment and the more self-efficacious

the more attachment to the Kununurra community. Finally community competence also relates to self-efficacy (.332) where the more competent the community the more self-efficacious residents are.

For the Kununurra residents one of the main variables to correlate with many of the other variables is self-efficacy. Further analysis reveals more about the importance of this variable. In terms of the significant predictors of posttraumatic stress, self-efficacy, posttraumatic growth and community competence account for 56% of the variation in stress responses. However through the DFA the variable that discriminates between the high and low stress group is posttraumatic growth. The high stress group has much higher rates of growth (50.6) than the low stress group (12.1). This would seem to suggest that self-efficacy is an important link for the community variable in understanding Kununurra residents' experience of stress.

In terms of predictors of posttraumatic growth the multiple regression indicates there are none, however in terms of discriminating between high and low growth groups, the high growth group scores higher on posttraumatic stress (24.6) and lower on sense of community (25.4) than the low growth group (Stress 1.0 and SoC 37.8).

These results indicate is that in each of the four different communities different factors are salient. What is less clear is what factors within the communities mediate the disaster experience. That is, what are the individual and community factors that mediate disaster stress and disaster growth? In order to start to understand how these factors mediate the disaster experience the next

section reports on the utility of path analysis to define the paths explicit in the data obtained from the four individual communities.

### **Path Analysis : Objectives and Model Overview**

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The research question addressed in this section is - What are the community and individual factors that mediate the disaster experience in different disaster communities?

In order to answer this question path analysis was chosen as it is one form of structural equation modeling that allows the testing of the causal ordering of a set of variables. In path analysis a general model with hypothesized relationships is presented and then the researcher is able to test whether the observed data is consistent with the generalized model. The hypothesized relationships are derived from a well articulated and evidenced argument based on the literature (Klem, 1995).

As path analysis is based on correlations and regression, many of the same assumptions apply. First, that the variables involved in the model are measured on an interval scale. Second, that all variables are accurately measured, to ensure no measurement error, and that the variables are specified correctly, to reduce specification error. Although every precaution needs to be taken to measure the variables correctly and to ensure that the model is based on sound theory, it is difficult to adhere to these assumptions (Klem, 1995).

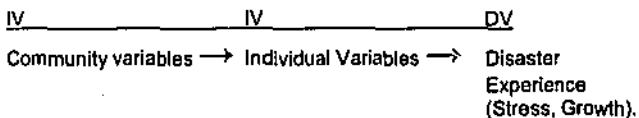
With regard to the assumptions underlying correlation and regression respectively, the issue of linearity and multicollinearity are also an issue for path

analysis. In the case of linearity it is important to inspect the scatterplots. In the case of multicollinearity, if the predictor variables are highly intercorrelated then there are problems with the estimates observed. Minimizing measurement and specification error, and inspecting the correlations between the variables utilized will reduce the issue of multicollinearity becoming a problem (Klem, 1995). However, as detailed earlier, Tabachnick and Fidell (2001) indicate that tolerance tests conducted by SPSS protect against the violation of the assumption of multicollinearity.

Another issue with regard to path analysis is sample size. Ideally Tabachnick and Fidell (2001) report that around 200 cases is suitable for a small to medium model, however it is considered reasonable to have 5-10 cases per estimated parameter (Klem, 1995). In the present study each community's data falls within these limits.

### **The Generalized Hypothetical Model**

The proposed sequence for the generalized model, in terms of the community and individual variables is as follows



This hypothesized model was established by treating community variables and individual variables as independent variables, and stress and growth as dependant variables. There were two independent community variables,

community competence and sense of community, and five individual variables, self efficacy, coping style, social networks, disaster stress and disaster growth. Table 7.17 summarizes these measures: their name; their abbreviations to be used in the path models, and how they were derived.

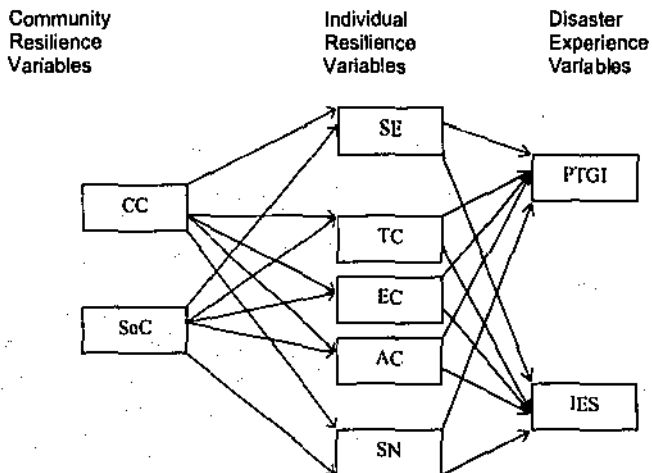
Table 7.17

**The Disaster Experience Model: Independent and Dependent Variables**

Independent Variables		Dependent Variables
Community	Individual	Disaster Experience
Community Competence CC Study One Literature	Self Efficacy SE Study One Literature	Disaster Stress DES Literature
Sense of Community SOC Study One Literature	Task Coping TC Literature Study One	Disaster Growth PTGI Literature
	Emotion Coping EC Literature Study One	
	Avoidant Coping AC Literature	
	Social Networks SN Study One Literature	



The model thus predicts significant pathways between the two community variables and the five individual variables as illustrated in Figure 7.1.



**Figure 7.1 Hypothesized Associations between Community Resilience Variables, Individual Resilience Variables and Disaster Experience Variables**

PTGI Posttraumatic Growth Index; IES Impact of Events; CC Community Competence; SoC Sense of Community; SN Social Networks; SE Self-Efficacy; TC Task Focused Coping; AC Avoidant Coping; EC Emotion Focused Coping

The associations between the community variables and individual variables have been established by many researchers interested in understanding the link between individuals and communities in stressful situations. Specifically the concepts of sense of community, self efficacy, coping, and social networks have all been studied in different contexts for example, environmental degradation

(Bishop et al, 2000), hazardous waste facilities (Bachrach & Zautra, 1985), and volcanic threats (Paton, 1999). Quite specifically these studies indicate that the community variables underpin the individual variables.

It is hypothesized that the individual variables will be enhanced by the community variables. Therefore individuals with more self-efficacy, larger social networks and those using a task focused coping style will be supported by a strong sense of attachment (sense of community) to a competent community.

In terms of the relationships between the individual variables and the disaster experience variables, chapter 2 discussed the research indicating specific individual factors (self-efficacy, coping styles and for social networks) and their relationship to posttraumatic stress. Further to this, posttraumatic growth, a more recently researched construct, has also been hypothesized as being associated with these individual variables and importantly the inclusion of posttraumatic stress is paramount in understanding the whole disaster experience (Tedeschi & Calhoun, 1998). Alongside this is the recognition that these variables need to be considered in context.

### **Path Analysis Method for Present Study**

In order to obtain the path coefficients for the disaster experience model a number of multiple regressions were performed. Table 7.18 details the variables used in the regression analyses in order to obtain the path coefficients. The results are presented graphically under each community heading. The model was trimmed according to Klem (1995) that is path co-efficients were re-estimated with the redundant paths excluded (also excluded in the diagram).

Table 7.18

*Variables Used in Regression Analyses*

<b>Model</b>	<b>Dependent Variable</b>	<b>Independent Variable</b>
Disaster Experience	Post Traumatic Growth	Self Efficacy
		Coping Style
		Social Network
	Impact of Events	Self Efficacy
		Coping Style
		Social Network
	Self Efficacy	Community Competence
		Sense of Community
	Social Network	Community Competence
		Sense of Community
	Coping Style	Community Competence
		Sense of Community

**Broome Community Path Model**

The path model (see figure 7.2) for Broome, observes that only one of the community variables (SoC), predicts two of the individual variables, self-efficacy (-.318) and social networks (-.206). For Broome residents this suggests that the more attached the residents are to the community the more self-efficacious they are and the larger the social networks they have.

In terms of the individual level variables that predict stress and growth. Emotion focused coping best predicts growth (.396) which indicates that the more emotion focused coping mechanisms are utilized the greater the resulting growth. EC also predict stress (.283) which suggests the same positive relationship as growth, the more stress results from a more emotion focused coping style. Stress

Is also predicted by the use of avoidant coping mechanisms (.253), the more these avoidant coping mechanisms are used the more stress results.

In the Broome model community variables do predict individual variables, however not the same individual variables predict the disaster experience variables.

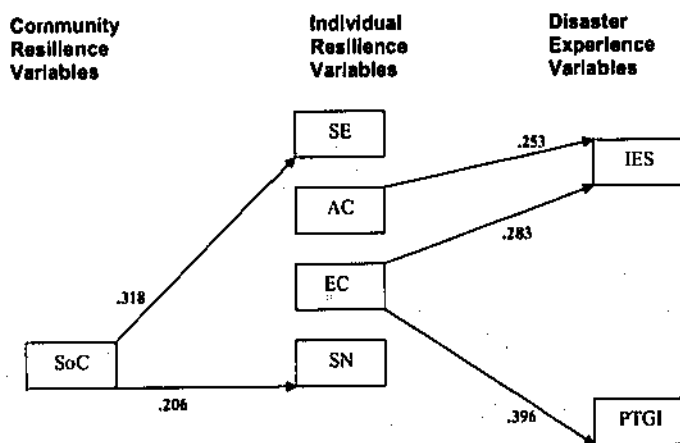


Figure 7.2 Observed Associations between the Community, Individual Variables, and Posttraumatic Stress and Growth In Broome

### Carnarvon Community Path Model

The path model for Carnarvon (see figure 7.3) supports the hypothesis that community variables act as antecedents to the individual variables with regard to

stress and growth. The model suggests two pathways for resident's disaster experience, where, both of these pathways result in a stress and growth outcome. For stress the best predictor is self-efficacy (-.369), which is also the best predictor of growth (-.267). The first pathway indicates that residents that perceive Camarvon to be a competent community are more likely to have higher levels of self-efficacy and thus experience less stress and less growth. The second path suggests that a resident that is attached to a smaller number of other residents experience greater stress (.362) and greater growth (.257).

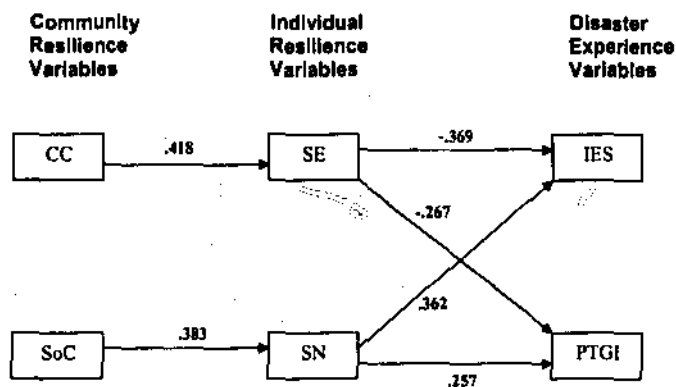


Figure 7.3 Observed Associations between the Community, Individual Variables, and Posttraumatic Stress and Growth in Camarvon

### Exmouth Community Path Model

The path model for Exmouth (see Figure 7.4) does not support the hypothesis that community variables act as antecedents to the individual variables

with regard to stress and growth. Stress and growth fail to be predicted in this model. In Exmouth a sense of community best predicts social networks (.380) indicating that a higher SoC indicates a larger SN, therefore suggesting that a resident that is more attached to the community is likely to know more people. A second pathway indicates that sense of community predicts self-efficacy (.365) which suggests that is more attached to the community will be more self-efficacious.

The failure of stress and growth to be a significant part of the model is supported by the results gained by the multiple regressions and DFA where stress and growth did not produce significant results. The reasons for this may be beyond the scope of the present study, as the variables utilized in the present study, are not significantly involved in the model for understanding Exmouth's experience of disasters.

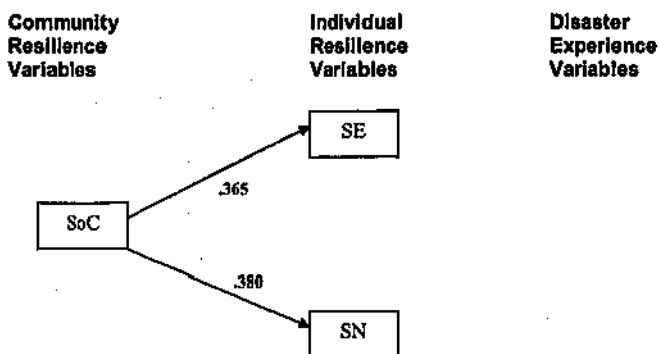


Figure 7.4 Observed Associations between the Community, Individual Variables, and Posttraumatic Stress and Growth In Exmouth

### **Kununurra Community Path Model**

The Kununurra model (see Figure 7.5) fails to provide any further understanding of the variables utilized in the present study. However a significant link is observed between CC and SN in that a competent community predicts social networks (.442). This pathway suggests that the more competent a community the larger the social network.

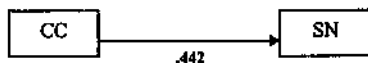
Again the failure of the other variables to be observed in Kununurra's model indicate that the variables are not relevant to this community at this time or that other variables may be important that are beyond what the scope of the current study investigated.

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**Community  
Resilience  
Variables**

**Individual  
Resilience  
Variables**

**Disaster  
Experience  
Variables**




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Figure 7.5 Observed Associations between the Community, Individual Variables, and Posttraumatic Stress and Growth In Exmouth

### **Combined Path Model**

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The general hypothetical model (see Figure 7.1) was obtained from the relationships evident in the literature, as indicated earlier. A table of the means and standard deviations for all variables and a correlation matrix is provided in Appendix H. In order to understand the relationships between each variable utilized in the general hypothetical model all four communities were combined into one data set. Although this may seem counter intuitive to the explication of the contextual argument presented in this current thesis, the analysis of the entire data set into a combined path model (see Figure 7.6) would illuminate the relationships between the variables, as in the literature, and would serve to highlight the impact of the contextual factors in each of the individual community models.



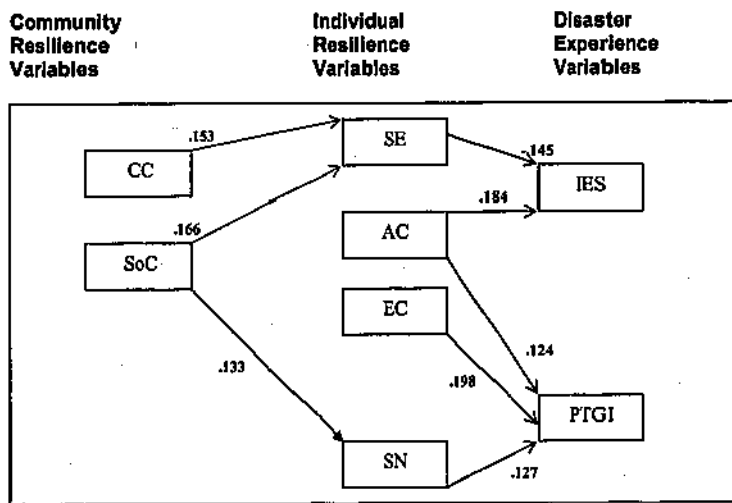


Figure 7.6 Observed Associations between the Community, Individual Variables, and Posttraumatic Stress and Growth In The Combined Communities of Broome, Carnarvon, Kununurra and Exmouth

This model indicates that the best predictor of stress is avoidant coping (.184). The more avoidant coping mechanisms are used the greater the stress outcome. The other predictor of stress is self-efficacy (-.145) which indicates that the higher the self efficacy the lower the stress outcome. For growth the best predictor is emotion focused coping (.198) which indicates the greater the use of emotions coping strategies the more posttraumatic growth is experienced. The other predictors of growth are social networks (.127) and avoidant coping (.124).

These indicate that the larger the social network, the more growth is experienced and the more avoidant coping strategies are used the higher the higher the growth.

In this model the community factors are mediated through two of the individual level variables, self-efficacy and social networks. Specifically the more competent the community, the more self-efficacious are residents (-.153). On the other hand the best predictor of self-efficacy is sense of community (.166) indicating that the more attached to the community the higher resident's self-efficacy. SoC also predicts SN (.133) indicating that the more attached to the community the larger the social network residents have.

### **Summary of Path Analysis Results**

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Overall, the results of the present study are consistent but somewhat different to the hypothesized predictions. In the combined model the community factors are mediated through two of the individual factors, self-efficacy and social networks. In terms of the individual variables predicting stress and growth self-efficacy, social networks and only two of the coping styles (emotion focused and avoidant) were significant.

In the individual community models, a community variable is a significant predictor of both or either self-efficacy and/or social networks in Broome, Carnarvon, Kununurra and Exmouth. However not all of the individual community models were able to observe significant relationships between the individual variables and stress and/or growth. In Exmouth and Kununurra stress and growth are not observed in the models at all, even though a pathway was observed

between a community variable and an Individual variable. In Broome two of the coping style variables predict stress and/or growth; however the individual variables that are predicted by the community variables are self-efficacy and social networks.

In terms of the path model results the combined model provides the best representation of the generalized hypothetical model. The next chapter will discuss this further taking into consideration all of the results obtained from the present study.

## **CHAPTER 8**

### **Final Discussion**

**"To develop a way forward needs some resources but more importantly diversity, awareness and education in the community to progress successfully..... We need to realise the potential, socially, environmentally and economically, build capacity."**

**(Comment from a 41-50 year old male who has lived in Kununurra for 5 years)**

#### **Aims of This Chapter**

The key aim of this research was to explore and understand the Western Australian disaster experience. This chapter presents an overview of research findings and also the contribution that this research has made to the disaster research area. In particular a discussion of the results of each of the community path models, presented in the previous chapter, is undertaken to provide an understanding for the importance of context for the present research. The results of the thesis are then discussed in relation to the accumulation of knowledge regarding the variables examined. The final discussion focuses on the connections, through contribution of the present study to theory, methodology and policy, and unresolved issues, through reflections, in an attempt to draw together the key threads underlying this research. Finally suggestions are made for future research and some personal thoughts of the researcher are shared.

## **Discussion**

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The current research sought to obtain from the literature, and from some a sample of a Western Australian disaster community salient variables relevant to the Western Australian disaster experience. In order to do this two studies were designed. Study one sought to explore the factors relevant to a Western Australian disaster community (Darlington). Study two sought to determine the relevance of these factors, highlighted in study one, and in addition relevant factors suggested by the literature, to other Western Australian disaster communities. Further to this, each study utilized different methodological approaches; qualitative and quantitative, to identify the variables and understand their relevance in context.

In study one (Chapter 5) a number of factors were identified as important to the experience of community members in a bushfire experienced and threatened community. The factors identified consisted of three individual factors; self-efficacy, social networks and coping styles. In the literature these factors are seen as central to the way in which individuals cope and survive across many different disaster scenarios. These variables were also central to the way in which the Darlington residents were able to deal with living in a community that is seasonally threatened by bushfires.

At the community level, two distinct factors emerged as being important to the Darlington community. In the literature these community variables have also been recognized as important to different disasters i.e., landslides, volcanic eruptions and hazardous waste facilities (Bachrach & Zautra, 1985; Bishop et al, 2000; Paton et al, 2001). For Darlington residents it was the attachment (sense of

community) that residents reported which determined their desire to remain in their community, and the way that Darlington, as a whole community, is able to facilitate and manage its processes of being a community and coming together when and where necessary that was seen as important to the experience of the individual members.

The factors identified (self-efficacy, coping style, social networks, sense of community and community competence) presented a more comprehensive picture of the possible variables that may mediate the disaster experience. In the literature reported in this thesis, no other study has examined all of these variables at one time when looking at a disaster community and the disaster experience.

Building on study one, study two included other variables identified in the literature. For example in relation to looking at the disaster experience the most common outcome presented in the literature is a stress response. However more recently the literature dealing with adverse events has identified the concept of posttraumatic growth as an important outcome of a traumatic experience (Tedeschi & Calhoun, 1998). As the study two was designed to investigate the Western Australian disaster experience it was necessary to include both the concepts of stress and posttraumatic growth in understanding Western Australian disaster communities. Therefore, study two (chapter 6) examines the community variables (sense of community, community competence), the individual variables (self-efficacy, coping style, social networks) and disaster stress and growth constructs in four different communities to determine the relevance of the variables to each other, the impact of the community variables and individual variables to the

disaster experience, and the relevance of the contextual factors in the interplay of these variables in disaster communities.

The research questions aimed to initially, identify the salient variables in the experience of an Australian disaster community, second to determine the underlying relationships between the identified variables, third, to highlight which community and individual variables were predictive of, or were able to differentiate the disaster experience and finally at the community level illuminate the underlying psychological structures that determined the community's disaster experience.

In order to build a picture, as comprehensive as possible, of the Western Australian disaster experience, a number of analyses were utilized. First, a qualitative study (study one) utilizing different data gathering techniques (interviews and a focus group) was undertaken to determine the salient factors to a Western Australian disaster community. These factors were then incorporated into a large survey (study two) aimed at looking at four different communities to determine how the identified variables related to each other. The community's chosen (Broome, Carnarvon, Exmouth and Kununurra) have varying disaster experiences and histories, and therefore the analysis chosen enabled the differences between the communities to be examined relative to their specific contexts.

It was important that each part of the analysis built on the next to provide a comprehensive view of the data. Correlations enabled an understanding of the relationships between the variables; multiple regression determined which variables could predict the disaster experience variables; DFA highlighted which variables differentiated those residents in each community that are highly stressed

or have experienced high growth and those residents that are at the other end of the spectrum; and finally path analysis was used to examine the underlying structures of the variables in the disaster experience of each of the four communities.

The next section will discuss the results presented in the previous chapter related to the path analytic models observed in each of the four communities. Further to this the importance of the context is discussed where an examination of the combined path model is also undertaken.

### **Discussion of the Community Path Models**

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#### **Broome**

The path model produced for the Broome community provides some evidence to support that community variables act as antecedents to the individual variables (see figure 7.2). First, the path model establishes the connection between the community variable SoC and the individual variables, SE (-.318) and SN (-.206). The path model also establishes connections between the two coping styles (AC and EC) and stress (.253 and .283 respectively) and EC and growth (.396). Therefore for Broome residents who are more attached to the community are likely to have larger social networks, and those more attached will be more self efficacious. On the other hand those residents that use avoidance to cope will be more stressed and those that use emotion coping mechanisms will be more stressed but experience more growth.

It would seem that there are two separate models being observed, however when you take into account the other analyses, there are other relationships that



are also apparent and important. There are relationships between the individual variables that the path model could not account for. For example SE correlates to AC (-.298) and SN correlates to EC (.239). These relationships suggest that some individual variables mediate others and warrant further investigation.

Broome is a much larger community that has been established for a long period of time (settled in 1883) although it has a large transient population; approximately 50% of the participants in the sample had resided in Broome for only 5 years and therefore would have varying degrees of experience with cyclonic events. This apparent split between new comers and locals may account for the two smaller models presented. One that represents the importance of connection to community and the other that represents coping related to stress and growth.

#### **Carnarvon**

The path model produced for Carnarvon indicates that the individual variables mediate the community variables in relation to the disaster experience (see Figure 7.3). Two pathways are indicated for the reduction of stress and growth for residents. The first is that residents perceive the Carnarvon community to be competent and are more likely to have higher levels of self-efficacy and thus experience less stress and less growth. The second pathway indicates that where a resident is attached (has a higher sense of community) to a larger network of other residents' they will experience less stress and less growth.

Further to these observed pathways in the path model, earlier analyses for Carnarvon indicate that there is a link between disaster stress and posttraumatic growth. Disaster stress and posttraumatic growth have one of the strongest

relationships (.541), each is a significant predictor of the other and each discriminates high and low scoring groups on each variable. This indicates again that the greater the stress the greater the growth. This link is also highlighted through a third factor, social networks, which is also a significant predictor of stress, and a discriminator of high and low stress and growth groups. What the social network results indicate in the DFA is that a larger social network is associated with groups that score high on stress and high on growth. The path model identifies the order of the relationships between these variables where for Carnarvon the larger the social network the more stress and growth result. What this indicates is that in a disaster event the more attached you feel to a larger network in the community the more stressed you will feel as a result of the disaster aftermath, however more growth will also result.

What is also interesting to note is the relative importance of self-efficacy in relation to disaster stress in Carnarvon. Self-efficacy has a significant relationship with stress (-.369), is a predictor of stress and a discriminator between high and low stress groups. What these results indicate is that the more self-efficacious Carnarvon residents are the less the impact of disaster stress and growth. Self-efficacy establishes connections to the community variables in Carnarvon. Self-efficacy is correlated to both sense of community (-.230) and community competence (.483), and is also discriminator of high and low stress groups. This indicates that it is not only individual variables (self-efficacy and social networks) that are important to understanding disaster stress in Carnarvon but also the

community variables as the difference between low and high stress scores is in part, due to how competent the Carnarvon community is.

For Carnarvon residents the two paths observed present a dilemma as those strongly attached, who have a large network of friends and family are likely to be stressed in the aftermath of an event, however those that draw upon their own repertoire of skills, and judge the community as competent will be less stressed as a result of an event. How these two paths are reconciled for residents is not apparent in this study, and is important in terms of the outcomes that would result.

#### **Exmouth**

For Exmouth the results of the earlier analyses are not necessarily made clearer by the path analysis (see Figure 7.4). The failure to predict stress and growth in this model may be suggestive of other variables being involved that are not measured in the present study. The results are interesting in that stress and growth are correlated with each other (.251), but fail to be predictive of each other or to discriminate high or low scores on either variable. Given the impact of cyclone Vance it could be reasonable to assume that the residents are still coping with the effects even three years after the event.

On the other hand there are clear pathways from sense of community to self-efficacy (-.365) and social networks (-.380) which indicate an important connection between community and individual level variables. Accordingly the greater the sense of attachment, the more self-efficacious residents are and the more attachment the larger the residents social network. This too may be

indicative of the salience of the cyclone Vance experience in that the connection between individuals and the community is the reference point for those still remaining in the community as a majority of the Exmouth participants (72%) lived their prior to the Vance event.

### **Kununurra**

The path analysis results for Kununurra also fail to predict stress and growth in the model. However the present result does highlight the connection (.442) between a community variable (CC) and an individual variable (SN). The regression and DFA results also establish a link between the individual variables and community variables to the disaster experience however the relationships may not be salient enough to be produced in the path model. One possible explanation for this may relate to the time at which the data was collected. With collecting data only one month after the event the relevance of all the variables is evident in the different analysis but in terms of structuring and ordering (path model) the salient variables may be only those observed (CC and SN).

Taking into consideration the other analyses performed a relationship was established between stress and growth through correlations (.519) and in their ability to be significant discriminators between high and low scoring groups on each variable. The next section of the discussion draws together the similarities and differences in the individual community results.

### **Context**

The results that emerge from this study stress the differences and similarities from each of the communities. By analyzing the data from each

community separately one can start to understand the variables in context and how the variables relate to each other where as the combined path model brings to the foreground the impact of the variables rather than context.

A main contextual difference among the communities relates to their size, settlement date of the community and the history of cyclone events. In terms of size, the largest is Broome, followed by Carnarvon, Kununurra and Exmouth (see Table 6.4). Even though Broome has twice the population as Carnarvon, and they are both classed as remote communities, they are both considered major regional centres in WA. They both retain many services that the smaller two communities do not have. For Broome there are differences in the population due to the tourist industry, the influx of many different people at different times, which make distinct the different parts of the community. For Carnarvon the community supports both towns' people and plantation owners, which like Broome, make distinct the different parts of the community. In a smaller community like Carnarvon it is conceptually easier to see a community that works together, that facilitates and manages itself. This is possibly what Peacock and Ragsdale (1997) identified in their study of Hurricane Andrew, where they thought of the community as a single bounded autonomous social system and not as an ecological network of interacting social systems. Broome is a larger community and therefore the networks of smaller interacting social systems may account for some of the contextual differences.

For Exmouth and Kununurra the differences in town size may not be that apparent however to the experience of Western Australians differences of town size between 13 000 - 3000 residents has a huge impact in rural and remote

communities. In the smaller towns it is possible to know a vast majority of the members of the community therefore bringing closer the community to the individuals, the sense of separation is more blurred. The number of services and activities within these two small communities is greatly reduced due to the size of the population.

Another difference between the four communities is the date of settlement. By comparison, Broome (settled in 1883) and Carnarvon (settled in 1876) were established much earlier and therefore have had a much greater time to establish community and a sense of community. For Exmouth (settled in 1963) and Kununurra (settled in 1958) the community establishment time has only been 40-50 years (see Coakes, 1995).

In regard to the history of cyclone events the four communities have different experiences. Broome has in the recent past been threatened by and has endured many cyclones. These events are considered to be 'part of the package' of living in Broome. For new residents there are cyclone packs that are given out as part of their welcoming by the local council. Carnarvon's biggest cyclone event, in the recent past, was in the 1970's. Even though they required federal assistance in March 2000 the cyclone was only a category one which many consider to be just a 'big blow'. A category one cyclone is the weakest in cyclone categorizations. Carnarvon is more often affected by flooding from cyclones that hit the coast further up in northern WA as the town is situated at the mouth of a river and a water catchment area.

For Exmouth the history of cyclone events is different again. The Exmouth community enjoys few threats; however the path that cyclone Vance (1999) took capitalized on the shape of the coastline around both Exmouth and Onslow and severely affected the whole population. The entire town centre had to be rebuilt which has devastated many businesses and families. Finally Kununurra traditionally is not in a cyclone area, as the town site is further inland than the other three communities. However, Kununurra often gets flooded from the effects of cyclones (storm surge) on the coast, similar to Carnarvon. Therefore in terms of experience with frequency of events Broome has had the most, then Carnarvon, followed by Exmouth and finally Kununurra. In terms of devastation Exmouth has experienced the most devastating cyclone in recent memory.

These contextual attributes contribute to the understanding of the variables in each individual community. In analyzing the community data sets separately the results can be interpreted in terms of a relative understanding of these communities. In combining the data support is given to these interpretations, the individual community model results may become clearer. It is interesting that the combined model more closely resembles the hypothesized model (see figures 7.7, 7.1 and 7.2). The hypothesized model represents a meta-analytic view of the disaster literature with regard to the ordering of variables across different contexts. The combined model is similar to a meta-analysis in that it combines four different sets of data and contexts. It could be argued that the hypothesized and combined models represent the 'pure' or 'ideal' state of the variables associated with the disaster experience. The hypothesized model disregards the context of individual

communities. The models produced for Broome, Carnarvon, Exmouth and Kununurra represent the real state of each of these communities. That is, the models illuminate the differential impact of the context (history, experience, size etc) in relation to the disaster experience of their communities. For example in Kununurra there were only two variables salient which may be a reflection of when the data collection for the present study had occurred, one-month after a disaster event (see table 6.1). With respect to the other analyses carried out on the Kununurra data, measurable and significant relationships were found between stress and growth, and between other individual and community variables. As the present study represents a snapshot of events the relationships between the identified factors may become more apparent as time, and the community, progresses and changes.

The difference in the contexts of these communities is complex. For researchers and practitioners working in this area the complexity of the factors involved and the contexts themselves may make it difficult to intervene and aid these communities. It is however imperative that we understand the importance of the role of community in these interventions as community is seen as paramount to mental health functioning (Hendryx & Ahern, 1997).

The utilization of an ecological framework in the present study has enabled the researcher to target specific levels of the ecological system, individual and community, for examination. This was carried out not with a view to compare the different disaster communities but with a view to understand the experiences and factors relevant to each community. By placing individuals at the centre of the



disaster experience and then looking outward toward the connections to the community, a greater appreciation of the contextual nature of the disaster experience can be had, and examined (see Lewin, 1951; Bronfenbrenner, 1979; and Strauss & Corbin, 1990). Therefore the use of ecological frameworks has allowed a multidimensional and multivariate picture to be obtained of these disaster communities.

At the community level there are also advantages of adopting a systemic approach. The benefit of this systemic and contextual approach is the recognition that there are people that are expert in these communities and in collaboration with these experts; interventions that are contextually based may be possible. For example van den Eynde and Veno (1999) argue that a competent community approach to intervention empowers the community to focus and direct its own intervention. This approach is based on notions of the community being the expert in its life and thus best able to determine its own healing approach; the community is oppressed by and struggling with the effects of the event but not broken or damaged; that agencies need to build on the strengths in the community and not focus on the deficits; that the community has control over the intervention and are viewed as competent, and finally; that the best corrective experience is to get on with life in a way that the community chooses and change will be promoted by experiencing this. This intervention is clearly ecological in nature and would require the facilitation of multiple factors and perspectives.

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The results of the present study may provide avenues for further research and disaster interventions. Central to this is an understanding what the present results indicate for the variables utilized in this thesis.

### **The Disaster Experience Model: A Discussion of the Independent and Dependent Variables**

#### *Dependent Variables - Stress and Growth*

A clear and valuable outcome current research is the relationship between posttraumatic stress and posttraumatic growth. In each of the four community's posttraumatic stress correlated with posttraumatic growth. In Carnarvon and Kununurra growth was a significant predictor of stress. In Broome, Carnarvon and Kununurra growth discriminated between high and low stress groups and in the same three communities stress discriminated between high and low growth groups. This study supports the argument that there are benefits from adverse events (Dunbar et al, 1998) and that stress and growth are related. The results conclude the greater the stress the greater the growth, as evidenced in each of the four communities'. This implies that any understanding of the effect of an adverse experience must take into account the whole experience, the stress and the growth. This is supported authors such as Curtis, Smith and Fisher (1997); McMillan (1999); Cordova, Cunningham, Carlson & Andryowski (2001); and, Frazier, Conlon, & Glaser (2001), who all report benefits and adversities from difficult events (i.e., sexual assault, tornados, mass killings, cancers and plane crashes).

In the past much effort has focused on reducing the stress associated with the disastrous event, the present results indicate that what accompanies the stress is growth. This provides an alternative way of looking at post disaster intervention for stress. At the individual level, disasters reportedly result in extreme emotional and psychological reactions, which can become dysfunctional, and can persist over a long period of time. This research indicates that with the relationship stress has to growth; growth could be a worthwhile focus for post-disaster interventions. An example of an intervention is that of McMillan's (1999) work with the process called REEP (Reflection, Encouragement, Exploration, Planning), which encourages social workers to follow a process by which growth can be encouraged and facilitated into clinical work with adverse event sufferers.

#### Posttraumatic Stress

The present study supports stress as a potential outcome for cyclone communities. Stress was correlated with self-efficacy in three communities and with different styles of coping. A number of variables are also significant predictors of stress; these are emotion focused coping, self-efficacy, growth, social network, and community competence. Growth features across three communities as a significant discriminator of stress along with self-efficacy, emotion focused coping, self-efficacy, social networks and community competence.

These results clearly indicate the importance of the relationship stress has with not only other individual variables but also with community variables. Stress from a disaster is not just an outcome for individuals it also impacts at the

community level. For example, the competence of the community, for Carnarvon residents, is a significant discriminator between high and low stress groups.

Therefore the present study would argue that to understand the impact of stress on an individual you need to understand its relationship to other variables like self-efficacy, coping styles, social networks and community competence as these may provide avenues to reducing post disaster stress.

### Posttraumatic Growth

As previously indicated the current research supports the notion that posttraumatic growth is an outcome of a cyclone event. It is as important to measure growth as it is to measure stress in the wake of an adverse event (Cordova, Cunningham, Carlson & Andryowski (2001). Posttraumatic growth also relates to other variables in understanding the disaster experience. In the present study growth correlates with self-efficacy, different coping styles and sense of community and growth is significantly predicted by emotion focused coping. Finally the variables that discriminate between high and low growth groups are social networks, self-efficacy, emotion-focused coping and sense of community. In the path models growth relates to self-efficacy, social networks and emotion-focused coping. These results indicate that growth relates to other individual variables like self-efficacy, coping and social networks. Growth also relates to community variables like sense of community. The combined path model and the model from Carnarvon support this.

The present study also establishes Tedeschi and Calhoun's (1996) instrument (PTGI) as valuable measure posttraumatic growth as an outcome of a community disaster, a cyclone. The posttraumatic growth index has previously been utilized to measure posttraumatic growth within the context of individual trauma events, i.e., heart attacks, cancers and incest. The present study has utilized the scale within the framework of a community event (cyclones) with great success. The scale has an excellent rate of reliability (see table 7.1). In addition to utilizing the PTGI, the measurement of posttraumatic growth in the present study indicates growth is being detected from as little as 4 weeks to 36 months after an event. This supports previous research that indicates positive changes can be reported, from adverse events, weeks to years after an event (Affleck, Tennen, Croog & Levine, 1987; Cohen, Hettler & Pans, 1998).

#### *Individual Variables (Independent Variables)*

##### Self-efficacy

As self-efficacy is seen as an important motivational construct (Gist & Mitchell, 1992), in the present study, self-efficacy holds a prominent role for reducing stress in the present study's communities. In Camarvon and Kununurra self-efficacy was a significant predictor of stress. Self-efficacy was also a significant discriminator for high and low stress groups in Broome and Camarvon and a significant discriminator for high and low growth groups in Broome, Camarvon and Kununurra. In each case the relationship of self-efficacy to stress and growth indicates that the greater the stress or growth the less self-efficacious

the residents are. This present result supports Millar et al, (1999) who found that residents under threat, of a volcanic eruption, had lower stress scores when their self-efficacy scores were higher. In addition the correlation results indicate that for all four communities higher self-efficacy scores are correlated to greater attachment (sense of community) to their respective community. This result concurs with that of Twigger-Ross and Uzzell (1996) who argue that individuals who are more attached to their community develop higher levels of self-efficacy.

### Coping Styles

One of the strongest patterns to emerge from the present study is the relatedness of the coping styles to each other. Although the correlations are not high they are significant, suggesting that residents are utilizing different styles of coping and often in conjunction with each other. This is indicative of the coping concept where the different styles (emotion, avoidant and task) share common ground. The use of the different coping mechanisms may be indicative of the consistency with which rural and remote residents face different adverse events.

In regard to the present studies results emotion focused coping featured more strongly than any other coping mechanism. Emotion focused coping was a predictor of stress and growth, and a discriminator for growth. Emotion coping featured both Broome's path model and in the combined model. Where related to stress and growth, the greater the use of emotion focused coping the greater the stress and growth.

Avoidant coping also featured in the Broome and combined path models. Often avoidant coping was associated with emotion focused coping and related to self-efficacy and stress. The final coping style, task focused coping was correlated to the other coping styles however does not appear relevant in any community model that is indicative of the disaster experience. However, coping and the disaster experience are linked. The present research supports this argument and in addition would propose that different coping strategies relate to different outcomes. For example, for residents in Broome who utilize an avoidant coping strategy the result was more stress without the subsequent growth. However if there were a greater use of emotion-focused techniques then the resulting stress would also see the same resulting growth. This would suggest that emotion focused coping is a more productive style of coping as the resultant stress also results in growth. This same relationship was observed in the combined path model.

### Social Networks

Social networks are another of the individual variables to consistently emerge across the communities and across analyses as an important and significant variable. For Carnarvon social networks were identified as a predictor of stress, as well as a discriminator between high and low stress groups. Within Broome and Carnarvon social networks discriminated between high and low growth groups. Social networks were also correlated to sense of community in each of the four communities indicating that social networks are important to

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resident's attachment to community. In all of the path models social networks has a prominent role in relation to the community variables. The present results therefore establish a link between the individual and the community where social networks could be the important vehicles to facilitate opportunities for attachment. Orford (1992) argues that social networks are critical in providing the link between individual and community well being. In the present study this critical links is in each model but plays out differently, i.e. as related to sense of community for Broome, Kununurra, Carnarvon and the combined model. However is related to community competence for Exmouth.

One of the difficulties with the social network results is that the reliability scores for the social network scale differed greatly (see Table 7.1) for each community. The reliability score was the highest for the Carnarvon community where social networks seem to play a bigger role.

#### *Community Variables (Independent Variables)*

##### Sense of Community

Sense of community has been highlighted in the literature as important to communities facing adversities (Bachrach & Zautra, 1985 and Bishop, et al, 2000). The present research supports sense of community as important to understanding the disaster experience in WA cyclone communities. Specifically, sense of community is significantly correlated in each community with self-efficacy, social networks and community competence and is a significant discriminator of high and low growth groups for Kununurra. In the three community path models and the



combined path model sense of community was related to both/ or either social networks and self-efficacy. These results suggest that the relationship of sense of community to the disaster experience is indirect, and it is mediated through the individual variables of self-efficacy and/or social networks.

The remoteness of communities that endure cyclones is an important issue for the residents within that particular community. Sense of community is about the attachment a resident has for their community. For cyclone community residents the more attached they are to their community the more self-efficacious they are and the less stress that results. Therefore sense of community is more important than just about being involved in these communities it is about reducing post disaster stress. Programs to aid attachment to the community would then seem to benefit communities and individuals to reduce stress, increase self-efficacy and strengthen social networks.

#### Community Competence

The final community level variable measured in the present study was community competence. Community competence is a variable that relates to the broad community context, which is vital to understanding the disasters (Smith et al. 1990; Wandersman & Maury, 1998). The present study supports this notion and further to this has found that community competence correlates with sense of community, social networks and self-efficacy. This supports others authors such as Sonn and Fisher (1998) who established a links between community competence and sense of community in oppressed communities and Kulig (2000)

who argued for link between these variables in Canadian rural communities. The link is now also established in Western Australian disaster communities.

In regard to the relationship of community competence to the other individual level variables (self-efficacy and social networks) this supports the view that community level variables do underpin the individual level variables. Community competence has also been identified as a predictor of stress and a discriminator of high and low stress groups there by directly linking the construct to the disaster experience.

Finally, in two of the individual community path models and in the combined path model community competence is a precursor to self-efficacy. In two of the models (Carnarvon and the combined) this relationship is a positive one indicating that the more competent the community the more self-efficacious the resident which results in a reduced stress outcome. This result provides avenues for thinking about interventions at the community level, as the flow on effect could be reduced post-disaster stress.

### **Overall Summary and Conclusions**

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The present study sought to explore and understand the variables important to Western Australian disaster communities. In recognition that previous literature in the area of disasters has relied heavily on the results from individuals to inform programs and interventions for individuals and communities, regardless of the disaster event, the present study sought to utilize an ecological framework which

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allowed for the examination of individual and community factors relevant to Western Australian disaster communities.

In utilizing multiple factors, across multiple levels, in different communities, that / which have experienced disaster events at different times, it is important not to oversimplify the results and interpretations from the present study. It is however noteworthy that few studies have tried a similar task in relation to understanding the disaster experience of individuals and communities. The results and interpretations of the current study combine to support emerging themes in the literature. A finding from the present study supports the relationship between posttraumatic stress and posttraumatic growth. In the disaster literature there are an abundance of studies reporting stress as an outcome of disaster events. Only recently has growth appeared in the empirical literature. This study argues that outcomes of stress are associated with outcomes of growth. In terms of the disaster interventions this finding suggests that working from a growth perspective will capitalize on the natural relationship of stress and growth and promote a salutogenic/strength based (Antonovsky, 1993) approach, which contrasts with the deficit based models currently used.

While it may on the face of it seem self evident, a second important finding is the recognition that communities are different especially in the way they deal with disaster events. They are different because of the individuals within each community chooses to cope and act in different ways before and after an event. In addition it is important to note that when communities are coping differently that they are surviving and possibly thriving. Another key finding is that the present

study clearly indicates that the community factors underpin the individuals within it. The results support the notion that community factors are linked to, related to and in some communities are mediated by individual factors in relation to the disaster experience.

One of the most prominent variables to emerge was that of self-efficacy. This individual factor is important in the reduction of disaster stress and would therefore be an important focus for disaster stress reduction programs. It is important to note that the precursors to self-efficacy in most of the communities in the present study are a competent community and/or sense of community. This highlights the importance of the connectedness of the individual to the community and provides many avenues for community intervention programs.

Further to this are the relationship between, and the combination of, community competence and sense of community. Kulig (2000) refers to the combination of these variables as community resilience. Therefore the conclusion drawn from the present study's results is that by increasing the competence of the community and the attachment residents have for the community (increasing community resilience) will lead to more self-efficacious residents, which in turn can lead to reducing the resulting stress from a disaster event. This not only supports the notion that intervention programs aimed at increasing community competence and attachment to the community will lead to greater self-efficacy, thus reducing stress, it also suggests that this pathway of community variables to self-efficacy may be an avenue for the prevention of disaster stress.

## **Contributions Of Present Study**

One of the main tasks of the study was to contribute to an understanding of the disaster experience of individuals and communities in Western Australia. This understanding is important in terms of the contribution to theory and to policy and practice.

### **Contribution to Theory**

First, this thesis drew upon the experience of a disaster community to determine what the salient factors were for individuals and communities who face natural seasonal disasters. This is important to the development of disaster research in Australia as previous studies incorporate factors that have been identified in international research, which may not be relevant to the Australian context. Generally factors researched in disaster studies have been determined by researchers, there are few studies that utilize the community in determining the factors.

Second, the present study took a systemic view of the disaster experience to incorporate both individual and community level variables. In other words this study utilized an ecological framework that included multiple levels (individual and community) and multiple factors (self-efficacy, social networks, coping styles, sense of community and community competence). In addition to this the context was taken into consideration through examining the disaster experience in five different disaster communities utilizing both qualitative and quantitative methodology.

Third, the thesis attempts to use a number of variables simultaneously in order to include a number of different variables to enhance the ability to understand the concept of resilience. This may allow future research to develop comprehensive ecological models to assist research within the resilience area and the development of intervention programs. The inclusion of community competence is a unique approach not documented previously in the literature. This assists in researchers and emergency management professionals to understand the capacity of individuals in disaster communities and the way in which they react during a natural disaster.

The present study includes the variable posttraumatic growth which allows the research to understand the role of positive and negative results for people that live in disaster prone areas. The inclusion of this variable also enables the researcher and emergency management professionals to appreciate that in the face of adversity post traumatic growth may assist individuals to undergo beneficial changes rather than the detrimental effects of the disaster.

A strength of the current approach is the inclusion of qualitative and quantitative methodologies. This allowed understanding of the context prior to investigating the variables within the different communities.

Finally, few psychological studies have been undertaken of Western Australian disaster communities and therefore there is relatively little information available to others that are interested in rural and regional WA or to those interested in disaster research in WA.

**Contribution to Policy and Practice**

This research builds on the practice of community psychology that advocates for policies and practices to take into account local needs and conditions (Buckle, 1999; Boughton, 1998). This study supports the notion that one size does not fit all and that needs and assets are different. Policy intervention programs for post disaster recovery would be better targeted if the needs and assets were better identified.

This study has used different approaches and methods to understand the experience of people who have made the decision to live and work in areas which are prone to natural disasters. This provided participants with the opportunity to understand their role within the community and the ways in which they may contribute to the wellbeing of that community during a disaster.

This research has practical implications in each community for intervention and prevention programs for individuals and communities. Programs aimed at increasing community competence and increasing the attachment of individuals to their communities creates resilient communities. Programs aimed at increasing individuals self-efficacy will result in less stressed individuals after a disaster event.

With regard to the professional bodies that administer emergency management to the northern WA communities this study indicates the value of understanding local communities at the social or psychological level, when trying to aid communities in prevention and intervention in disaster events.

## **Limitations**

The focus of the present study was to examine the disaster experience in Western Australian communities. Central to this focus was to examine variables in context, and in doing difficulties emerged in choosing to analyze the data as separate communities. For each individual community there was a reduction in the total numbers included in each community analysis. Although no assumptions were violated, and the ratio of parameters to respondents was deemed acceptable, the inclusion of more residents from each community would strengthen the results obtained.

Importantly, it must be noted that this sample did not set out to include or identify Indigenous Australians. The present study did not set out to specifically address the disaster experience of Indigenous Australia and therefore did not use methods appropriate to obtain information from this population. Indigenous Australians in the northern WA region were being researched at the time and therefore it was decided that to include that population would over burden it. Hence the sample is limited given the proportion of Indigenous Australians in the communities utilized in the present study.

Clearly there was an issue with response rate (12%); however there are a number of points that need to be made concerning this. First, the exclusion of methods used to access Indigenous Australians reduced the actual population being targeted. Second, there are issues to do with lower levels of literacy in rural and regional areas of northern WA. Third, other emergency management researchers have indicated that research carried out in areas north of the 23<sup>rd</sup>



parallel often delivers reduced response rates however there has not been any published material that indicates the reasons for this. Finally, there may be issues to do with the length of the survey and the types of questions asked. The survey contained 154 questions, which would require at least a year 10 reading level. Although pilot testing was carried out the above issues were not mentioned.

The cross-sectional nature of the present study makes it difficult to draw definitive conclusions from one community to another. The conclusions drawn in the current study are based more on the information in the literature because of a lack of knowledge about the communities investigated. The current research utilized multiple variables to examine the disaster experiences however it must be noted that in particular path analysis builds a model on the bases of the variables measured. It may be the case that not all of the variables relevant to the actual disaster experience were being measured and may account for results obtained for Exmouth and Kununurra.

This research sought to understand the experiences of individuals and the community experience within a defined context. The researchers was aware that the provision of programs and response to emergencies is the responsibility of a number of state and federal authorities (e.g. EMA, FESA) however this research did not attempt to investigate the role of these organizations and their areas of responsibility. It is hoped that professional from these organizations will view these results positively.

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## **Future Research**

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The present study provides a starting point for future disaster research in Western Australia. In utilizing an ecological approach to understanding the disaster experience the benefit to the community is an understanding of the real state of their community disaster experience.

There are a number of methodological additions refinements that would benefit future studies of this type. The examination of these communities longitudinally would provide an opportunity to develop an understanding as to how these communities change and adapt after and before the cyclone impact. This would also build up the knowledge base about northern WA communities, as at the present time there is very little research to draw upon. Second, the inclusion of more qualitative data would allow for further exploration of the variables studied in the current research, the identification of other variables and the inclusion of other parts of the population for example Indigenous Australia would also be beneficial in building up a more comprehensive picture of these disaster communities.

The ecological approach taken by this study was limited to the levels of the individual and community. Analysis that involves the level of policy would be beneficial to the rural and remote areas of WA as the impact that state and federal health and welfare policies has on the provision of services for disaster communities is a big issue for these communities.

Although the current study included residents from the local communities another group of stakeholders is the emergency management professionals involved in pre and post disaster impact and planning. This group has a vested

Interest in these communities and therefore it would be beneficial to include this group in future research.

Finally research carried out in different contexts, other parts of Australia, or with technological disaster communities would benefit from the approach taken in the current study.

### **So Finally**

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The view that I have for psychology is that it is useful for the human race, that it is connected to the real world. That it invests time and effort into understanding how we as people can make our lives better. Psychology has not been a very good advocate for itself; it has not marketed itself well to many of the people and communities that would benefit from the psychological knowledge we have produced.

During 1996 I became fascinated by a number of disaster events, Port Arthur where 35 people were killed in a gun massacre, the death of Princess Diana and the flooding devastation at Moora, a small town in the wheat belt region of Western Australia. All of these events were so vastly different however the commentaries coming forth from communities, from around world were about the strength and resilient spirit that people and communities possess. So I had a thesis topic I wanted to know what are these processes that make communities and people resilient. I saw this as a legitimate area for psychology to be able to add to the lives of individuals and communities. If we understand what is taking

place in communities that are not coping then as a psychologist I can help communities survive better, even thrive after an adverse event.

I soon began to realize that, when visiting these communities, they already survive, possibly not in the way in which the literature defines it, but the communities exist and will continue to do so in some form or another. So what is it that I have done?

I have become an even stronger advocate of community. I have learnt that community can nurture individuals and vice a versa. That a community is the expert in its own life and if we as professionals want to know something about a community you need to ask the community. Do not assume what is best, do not do things to or for communities, work in partnership. In all that progresses from this research I hope I never lose sight of this.

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## APPENDIX A

Thank you for agreeing to Participate.

**Information on this Study**

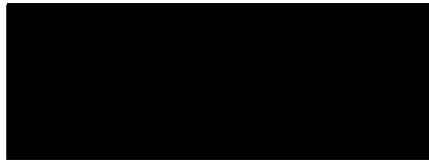
My name is Julie Ann Pooley and I am currently researching, as part of my Phd what your experience of living in a bushfire threatened community is like. In undertaking this research we hope to better understand what factors (ie how individuals cope and how the community copes, how attached to the community you feel) affect different communities ability to deal with different seasonal threats. This information will enable us to be better prepared for and help in the recovery of future seasonal threats.

Please let me assure you that your participation is totally voluntary, confidential and anonymous. I am not collecting any information that will enable me to identify you personally. I would **greatly appreciate your participation** in this Western Australian study and would encourage you to contact me if you have any queries at all.

Alternatively you may also contact my supervisor Dr Moira O'Connor on [REDACTED] or email [REDACTED]

I wish to thank you, in advance, for your time and participation.

Julie Ann Pooley  
School of Psychology  
Edith Cowan University  
Perth, Western Australia.



## APPENDIX B

## RESEARCH INTERVIEW CONSENT FORM

Having Read the information sheet please read the following questions and provide a response to them (Please Circle)

I have read the information sheet	Yes	No
I am satisfied that I am aware of what is required of me	Yes	No
I am aware that I may withdraw from this study at any time	Yes	No
I agree to participate in this research	Yes	No

Please initial and date this form

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## APPENDIX C



## Community Responses to Seasonal Natural Disasters

In the survey I will be referring to the seasonal cyclones or floods as "the event". There are three parts to this survey. The first part asks about you, the way you cope, and how you feel and think about the event and in general. Part one contains five sections. The second part asks about your community, how you feel about the community and what happens in it. The second part contains three sections. The final part contains one section of background information. Please be aware that each section has a different way of answering, instructions are given for each section.

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### PART ONE : About Yourself

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#### Section One

The following is a list of difficulties people sometimes have after stressful life events. Please read each item and then indicate how distressing each difficulty has been for you during the past 7 days with respect to the event. How much were you distressed or bothered by these difficulties?

Please use this scale on the following statements (Please Circle your response)		Not at All 1	2	3	4	Extremely 5
1	Any reminder brought back feelings about it.	1	2	3	4	5
2	I had trouble falling asleep or staying asleep because of pictures or thoughts that came into my mind	1	2	3	4	5
3	Other things kept making me think about it.	1	2	3	4	5
4	I felt irritable and angry	1	2	3	4	5
5	I avoided letting myself get upset when I thought about it or was reminded of it	1	2	3	4	5
6	I thought about it when I didn't mean to.	1	2	3	4	5
7	I felt as if it hadn't happened or wasn't real.	1	2	3	4	5
8	I stayed away from reminders of it.	1	2	3	4	5
9	Pictures about it popped into my mind.	1	2	3	4	5
10	I was jumpy and easily startled.	1	2	3	4	5
11	I tried not to think about it.	1	2	3	4	5
12	I was aware that I still had a lot of feelings about it but I didn't deal with them.	1	2	3	4	5

4	My feelings about it were kind of numb.	1	2	3	4	5
5	I found myself acting or feeling like I was back at that time.	1	2	3	4	5
6	I had trouble falling asleep.	1	2	3	4	5
7	I had waves of strong feelings about it.	1	2	3	4	5
8	I tried to remove it from memory.	1	2	3	4	5
9	I had trouble concentrating.	1	2	3	4	5
10	Reminders of it caused me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart.	1	2	3	4	5
11	I had dreams about it.	1	2	3	4	5
12	I felt watchful and on guard.	1	2	3	4	5
13	I tried not to talk about it.	1	2	3	4	5

## Section Two

This section is designed to help to know how you feel. Read each item and indicate the reply that comes closest to how you have been feeling in the past week. Don't take too long over your replies; your immediate reaction to each item will probably be more accurate than a long thought out response.

Please circle the answer to each item that best describes your recent self

23	I feel tense or 'wound up':	Most of the time	A lot of the time	From time to time	Not at all
24	I still enjoy the things I used to enjoy?	Definitely as much	Not quite so much	Only a little	Hardly at all
25	I get sort of frightened feeling as if something awful is about to happen:	Very definitely and quite badly	Yes, but not too badly	A little, but it doesn't worry me	Not at all
26	I can laugh and see the funny side of things:	As much as I always could	Not quite so much now	Definitely not so much now	Not at all
27	Worrying thoughts go through my head:	A great deal of the time	A lot of the time	From time to time but not too often	Only occasionally
28	I feel cheerful:	Not at all	Not often	Sometimes	Most of the time
29	I can sit at ease and feel relaxed:	Definitely	Usually	Not Often	Not at all
30	I feel as if I am slowed down:	Nearly all of the time	Very often	Sometimes	Not at all

31	I get a sort of butterflies feeling in the stomach:	Not at all	Occasionally	Quite often	Very often
32	I have lost interest in my appearance:	Definitely	I don't take as much care as I should	I may not take quite as much care	I take just as much care as ever
33	I feel restless as if I have to be on the move:	Very much indeed	Quite a lot	Not very much	Not at all
34	I look forward with enjoyment to things:	As much as I ever did	Rather less than I used to	Definitely less than I used to	Hardly at all
35	I get sudden feelings of panic:	Very often indeed	Quite often	Not very often	Not at all
36	I can enjoy a good book or radio or TV program:	Often	Sometimes	Not Often	Very seldom

### Section Three

**How strongly do you agree or disagree that ....**

Please use this scale on the following statements  
(Please Circle your response)

		Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
37	I have little control over the things that happen to me.	1	2	3	4	5
38	There is little I can do to change many important things in my life.	1	2	3	4	5
39	There is really no way I can solve some of the problems I have.	1	2	3	4	5
40	I often feel helpless in dealing with the problems of life.	1	2	3	4	5
41	Sometimes I feel that I am being pushed around in life.	1	2	3	4	5
42	What happens to me in the future mostly depends on me	1	2	3	4	5
43	I can do just about anything I really set my mind to do.	1	2	3	4	5

### Section Four

**How have you coped with the event?**

Please use this scale on the following statements  
(Please Circle your response)

		I usually don't do this at all				I usually do this alot
44	I concentrate my efforts on doing something about it.	1	2	3	4	5

5	I take additional action to try to get rid of the problem.	1	2	3	4	5
6	I make a plan of action.	1	2	3	4	5
7	I try to come up with a strategy about what to do.	1	2	3	4	5
8	I focus on dealing with this problem and if necessary, let other things slide a little.	1	2	3	4	5
9	I put aside other activities in order to concentrate on this.	1	2	3	4	5
10	I hold off doing anything about it until the situation permits.	1	2	3	4	5
11	I force myself to wait for the right time to do something.	1	2	3	4	5
12	I try to get advice from someone about what to do.	1	2	3	4	5
13	I ask people who have had similar experiences what they did.	1	2	3	4	5
14	I put my trust in god.	1	2	3	4	5
15	I seek god's help.	1	2	3	4	5
16	I get upset and let my emotions out.	1	2	3	4	5
17	I let my feelings out.	1	2	3	4	5
18	I make jokes about it.	1	2	3	4	5
19	I try to get emotional support from friends and relatives.	1	2	3	4	5
20	I talk to someone about how I feel.	1	2	3	4	5
21	I try to see it in a different light, to make it seem more positive.	1	2	3	4	5
22	I look for something good in what is happening.	1	2	3	4	5
23	I learn to live with it.	1	2	3	4	5
24	I refuse to believe that it happened.	1	2	3	4	5
25	I pretend that it hasn't really happened.	1	2	3	4	5
26	I use alcohol or drugs to make myself feel better.	1	2	3	4	5
27	I try to lose myself for a while by drinking alcohol or taking drugs.	1	2	3	4	5
28	I keep others from knowing how bad things are.	1	2	3	4	5
29	I wish that the situation would go away or somehow be over with.	1	2	3	4	5

I make light of the situation, I refuse to get too serious about it.	1	2	3	4	5
I go on as if nothing happened.	1	2	3	4	5
I turn to work or other substitute activities to take my mind off things.	1	2	3	4	5
I try to keep my feelings to myself.	1	2	3	4	5

## Section Five

Indicate for each statement below the degree to which this change occurred in your life as a result of the event.

Please use this scale for the following statements  
(Please Circle your response)

	I did not experience this change as a result of the event	Very small degree	A small degree	A moderate degree	A great degree	I experienced this change as a result the event
4 My priorities about what is important in life.	1	2	3	4	5	6
5 An appreciation for the value of my own life	1	2	3	4	5	6
6 I developed new interests	1	2	3	4	5	6
7 A feeling of self-reliance.	1	2	3	4	5	6
8 A better understanding of spiritual matters	1	2	3	4	5	6
9 Knowing that I can count on people in times of trouble	1	2	3	4	5	6
10 I established a new path for my life	1	2	3	4	5	6
11 A sense of closeness with others	1	2	3	4	5	6
12 A willingness to express my emotions	1	2	3	4	5	6
13 Knowing I can handle difficulties	1	2	3	4	5	6
14 I'm able to do better things in my life	1	2	3	4	5	6
15 Being able to accept the way things work out.	1	2	3	4	5	6
16 Appreciating each day	1	2	3	4	5	6
17 New opportunities are available which wouldn't have been otherwise	1	2	3	4	5	6
18 Having compassion for others	1	2	3	4	5	6
19 Putting effort into my relationships	1	2	3	4	5	6
20 I'm more likely to try to change things which need changing	1	2	3	4	5	6
21 I have stronger religious faith	1	2	3	4	5	6

92	I have discovered that I am stronger than I thought I was	1	2	3	4	5	6
93	I learned a great deal about how wonderful people are	1	2	3	4	5	6
94	I accept needing others	1	2	3	4	5	6

---

## PART TWO: Your Community

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The following sections pertain to how you relate to your community?

### Section Six

Strongly agree    Agree    Neutral    Disagree    Strongly Disagree

Please use this scale on the following statements  
(Please Circle your response)

95	I think my neighbourhood is a good place for me to live.	1	2	3	4	5
96	People in this neighbourhood do not share the same values.	1	2	3	4	5
97	My neighbours and I want the same things from the neighbourhood.	1	2	3	4	5
98	I can recognise most of the people who live in my neighbourhood.	1	2	3	4	5
99	I feel at home in this neighbourhood.	1	2	3	4	5
100	Very few of my neighbours know me.	1	2	3	4	5
101	I care about what my neighbours think of my actions.	1	2	3	4	5
102	I have almost no influence over what this neighbourhood is like.	1	2	3	4	5
103	If there is a problem in this neighbourhood people who live here can solve it.	1	2	3	4	5
104	It is very important to me to live in this particular neighbourhood.	1	2	3	4	5
105	People in this neighbourhood generally don't get along with each other.	1	2	3	4	5
106	I expect to live in this neighbourhood for a long time.	1	2	3	4	5

**Section Seven**

Never                  Rarely                  Occasionally                  Frequently

Please use this scale on the following statements  
(Please Circle your response)

107	Do people in this community go elsewhere for fun?	1	2	3	4
108	Are there any private and government, or service organisations that people in your community belong to?	1	2	3	4
109	Would you say that more than half of the people in your community belongs to one or more of these organisations?	1	2	3	4
110	In the past year has this community ever had a neighbourhood activity either for fun or because there was a problem?	1	2	3	4
111	At present, are there neighbourhood activities underway in your neighbourhood?	1	2	3	4
112	Are there future plans for neighbourhood activities?	1	2	3	4
113	When it comes to getting things done in this community, how often do the same few people end up doing all the work?	1	2	3	4
114	How often do people volunteer for community activities?	1	2	3	4
115	How often do people around here feel that they see positive results when they participate in community activities?	1	2	3	4
116	How often do people here feel that they have an active part in keeping this community going?	1	2	3	4
117	How often do people around here come to care about how the community looks?	1	2	3	4
118	How often do people around here feel that what this community does and what happens to this community can affect their own lives?	1	2	3	4
119	We have strong opinions about the way things are done by local government.	1	2	3	4
120	Local Government seriously considers our opinions.	1	2	3	4
121	How often does the local government try to influence what goes on in your community?	1	2	3	4

122	Will people around express an opinion even though they know it will be unpopular?	1	2	3	4
123	Here are some different ways that people can use to work out their differences. Are these used in your community?	Never	Rarely	Occasionally	Frequently
A	• One side is forced to give in?	1	2	3	4
B	• One side volunteers to give in?	1	2	3	4
C	• Both sides give in?	1	2	3	4
D	• Something else happens?	1	2	3	4
124	In general, how often do you feel that people living in this community try to influence what goes on in their shire?	1	2	3	4
125	Compared with other communities in the shire, how well does yours do in having most citizens participate in making decisions?	1	2	3	4
126	How often do people in your community lend time, money, things or an extra hand to one another?	1	2	3	4
127	How often do people around here offer a shoulder to cry on or a sympathetic ear to one another?	1	2	3	4
126	How often do people around here give advice or information to one another?	1	2	3	4
129	For each of the following things that people can do to have a say in this community please tell me if people are	Very Willing	Some what Willing	Not Very Willing	Not At All Willing
A	• Phone calls to local councilors?	1	2	3	4
B	• Personal conversations about community issues with local councilors?	1	2	3	4
C	• Write a letter to the editor about what he/she thinks should be done around here?	1	2	3	4
D	• Encourage someone he/she knows to personally run for local government or run him/herself?	1	2	3	4
E	• Help work during a political campaign?	1	2	3	4
F	• Write a letter to a member of local government to express his/her views?	1	2	3	4
G	• Serve on a local committee or board?	1	2	3	4
H	• Start a service he/she feels this community needed?	1	2	3	4



**Section Eight**

130 In terms of the people living in this community would you say that \_\_\_\_\_  
have their friends living here? (Please circle one of these) **most  
some  
just a few  
none**

131 During the past few weeks, how many times did you get  
together with friends – I mean things like going out together or  
visiting in each other’s homes? \_\_\_\_\_

132 About how many neighbours do you know well enough to visit with? \_\_\_\_\_

133 What are the organisations such as church and school groups,  
social groups that you take an active part in?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

134 How often do you visit with family and relatives who live outside the home? \_\_\_\_\_

135 In an average day, how many people would you say hello  
to, either on the phone or in person? \_\_\_\_\_

136 Thinking of your best friend you now have, how close  
are you to that friend in being able to share your innermost  
thoughts, worries and feelings? (Please circle your response)

Share Nothing Share everything  
1 2 3 4 5 6 7 8 9 10

**PART THREE: Background  
Information**

This section is looking at background information

**Section Nine**

137 What would you rate the impact the crisis has had on you personally?  
(Please Circle your response)

Not at All Extremely High  
1 2 3 4 5



## APPENDIX D

Dear Resident

My name is Julie Ann Pooley and I am currently researching, as part of my Phd, how you and your community respond to seasonal threats like cyclones and floods. In undertaking this research we hope to better understand what factors (ie how individuals cope and how the community copes, how attached to the community you feel) affect different communities ability to deal with different seasonal threats. This information will enable us to be better prepared for and help in the recovery of, future seasonal threats.

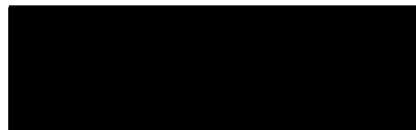
I would be very pleased if you were able to participate in this study. If you are willing to participate then please fill in the following survey , it will take about 10-15 minutes, and return it to me via the reply-paid envelope. The return date for this survey is **by 15 March 2000**.

Please let me assure you that your participation is totally voluntary, confidential and anonymous. I am not collecting any information that will enable me to identify you personally. Your community is one of six that has been approached to be part of the study.

I would **greatly appreciate your participation** in this Western Australian study and would encourage you to contact me if you have any queries at all. Alternatively you may also contact my supervisor Dr Moira O'Connor on [REDACTED] or email [REDACTED]

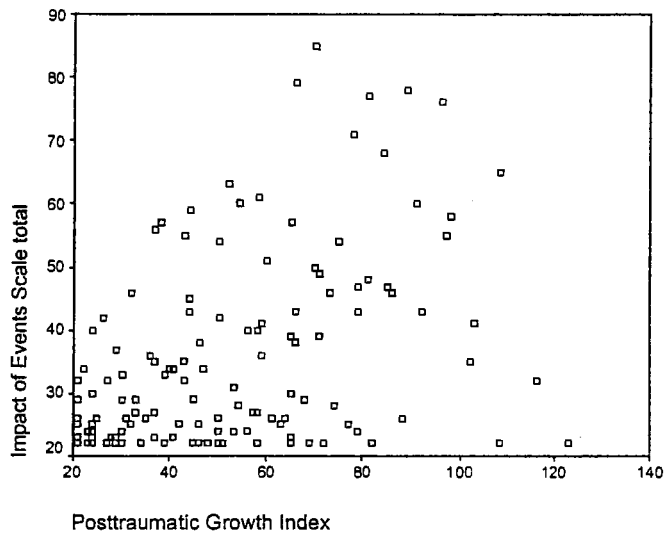
I wish to thank you, in advance, for your time and participation.

Julie Ann Pooley  
School of Psychology  
Edith Cowan University  
Perth, Western Australia.

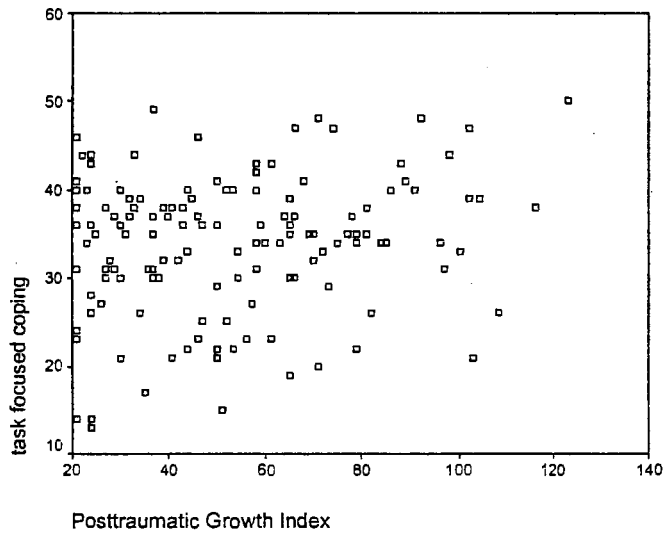


## APPENDIX E

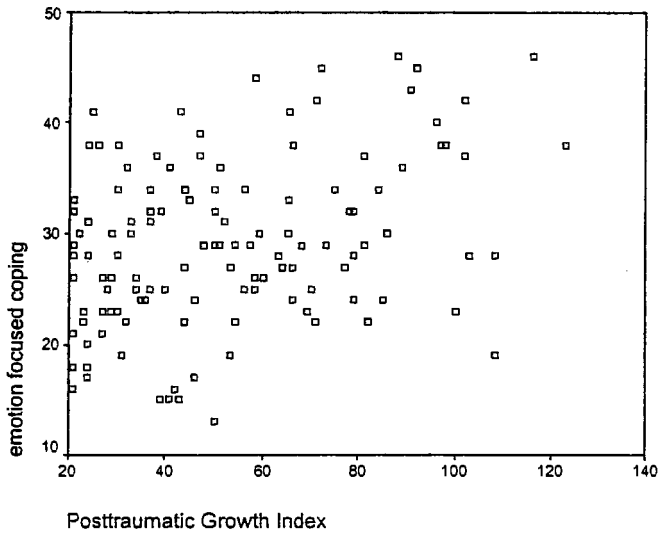
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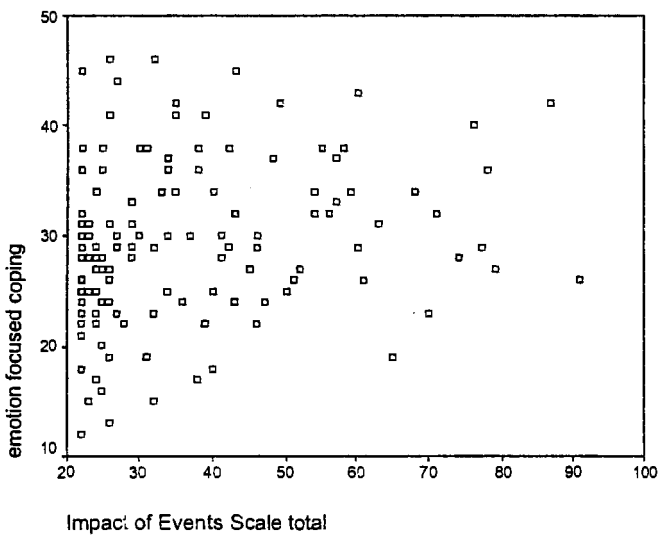
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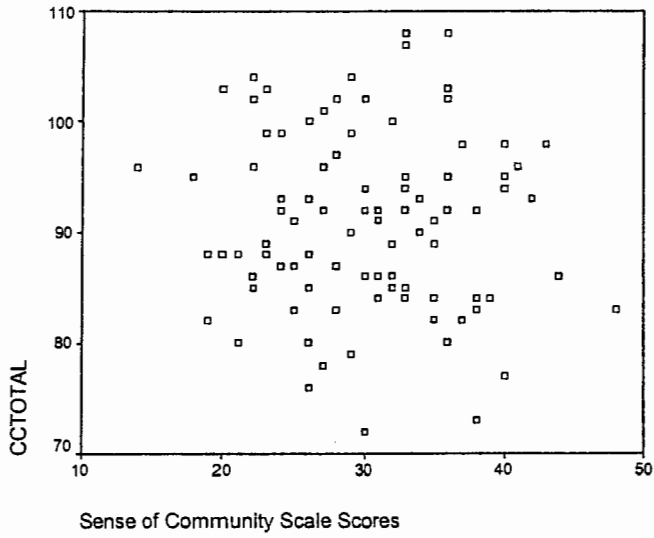
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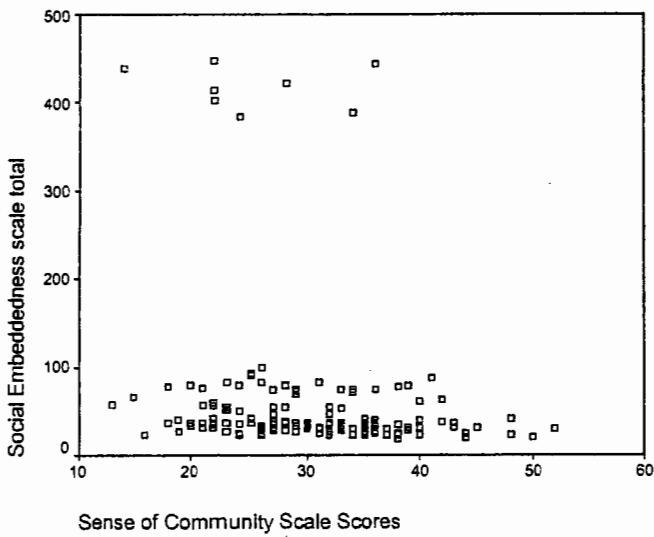
## Broome Scatter Plot



### Broome Scatter Plot

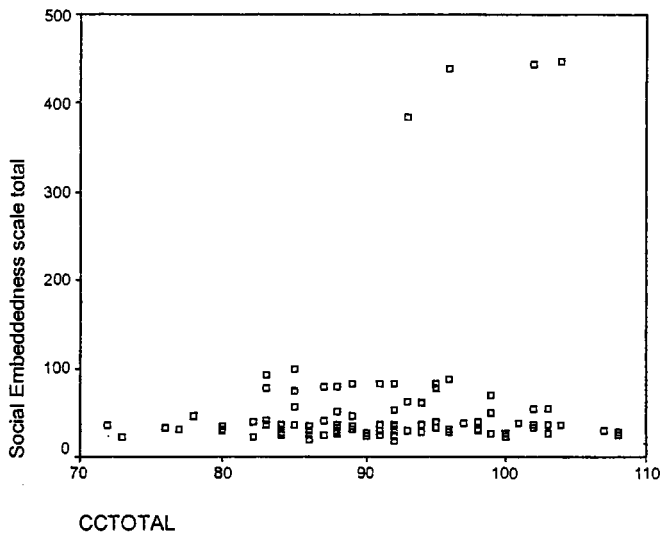


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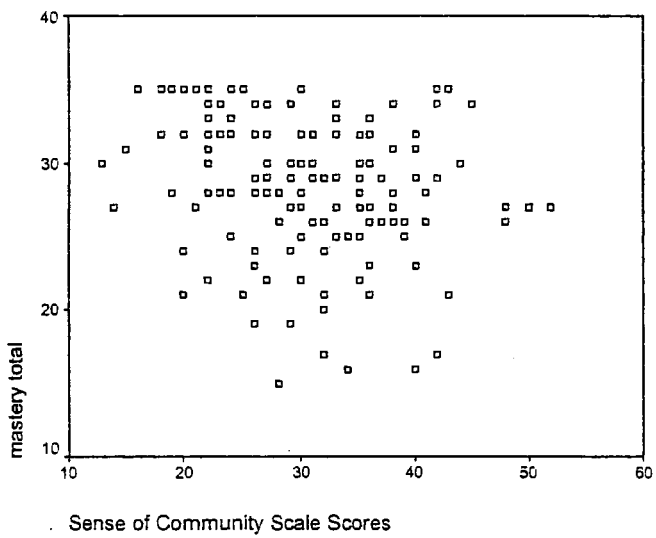




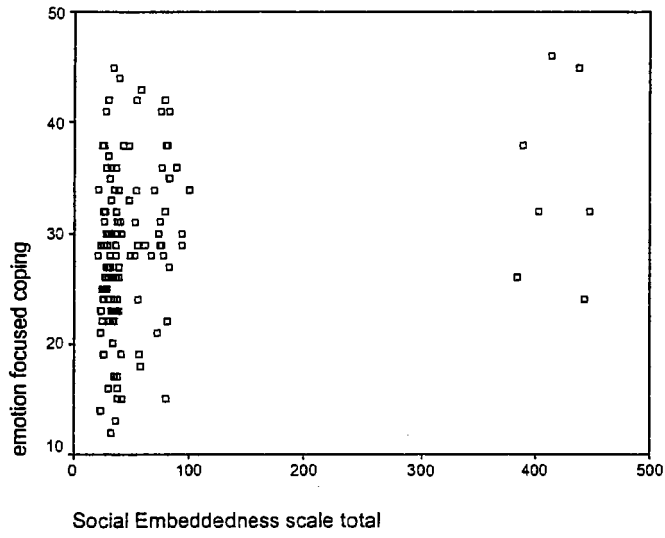
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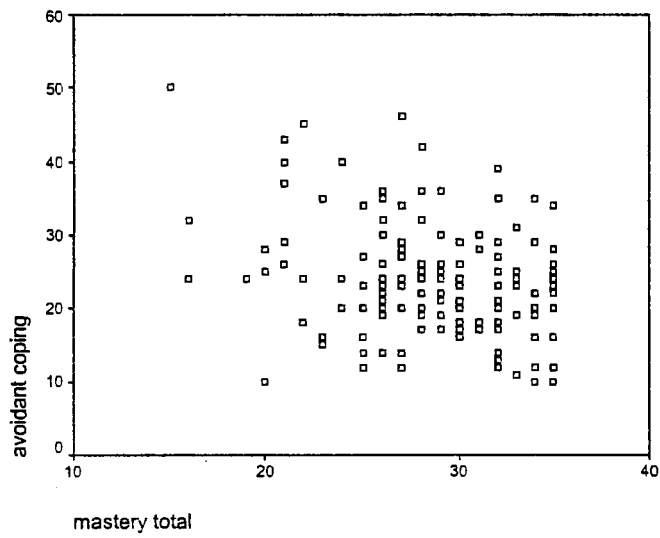
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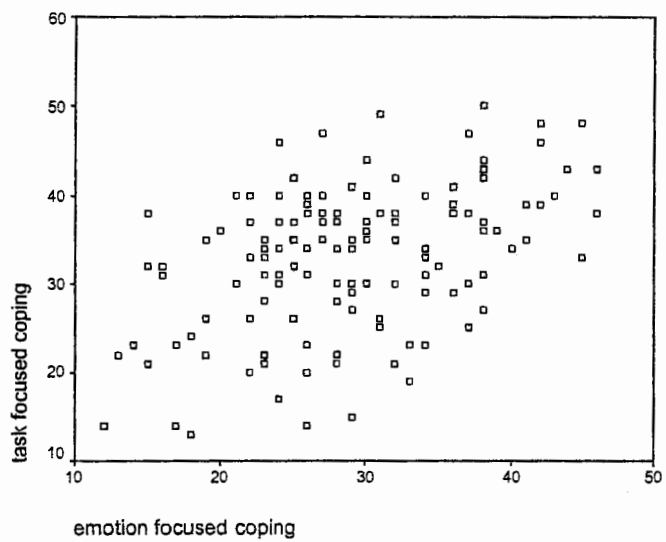
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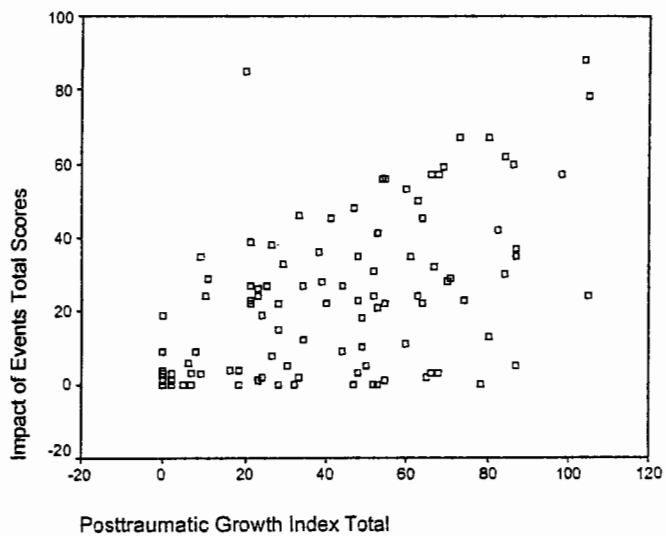
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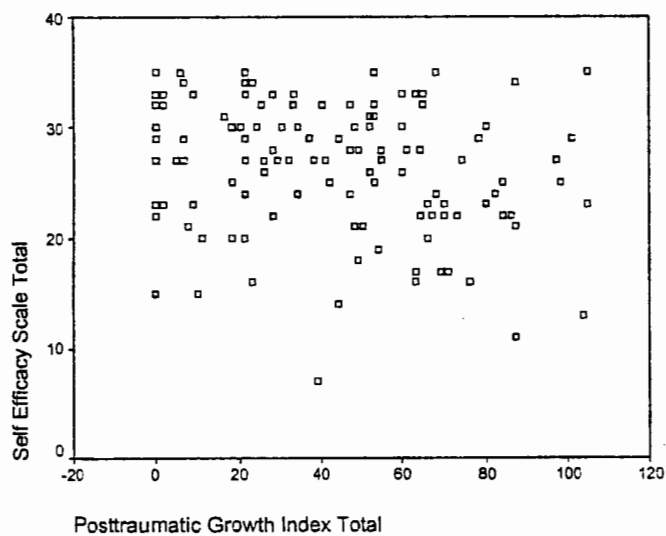
# Broome Scatter Plot



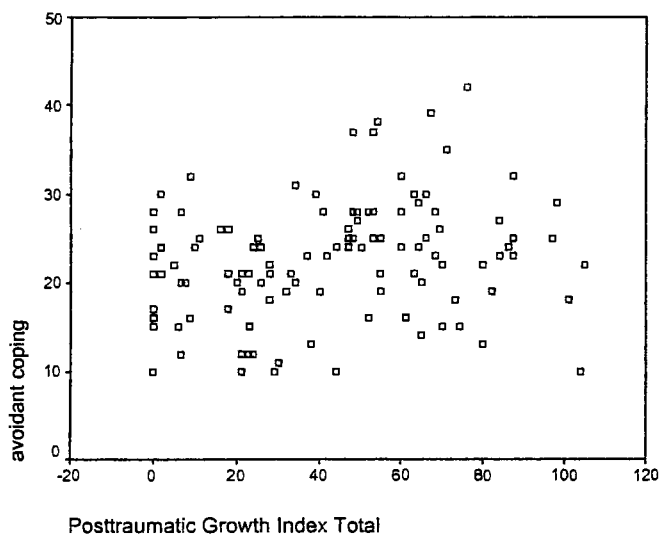
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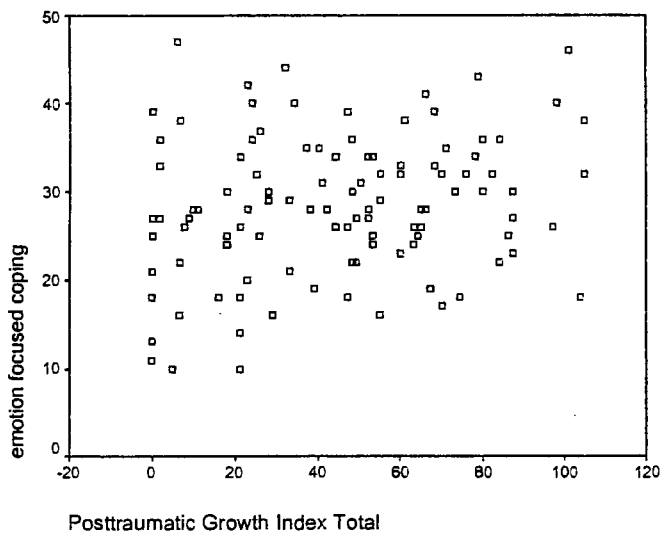
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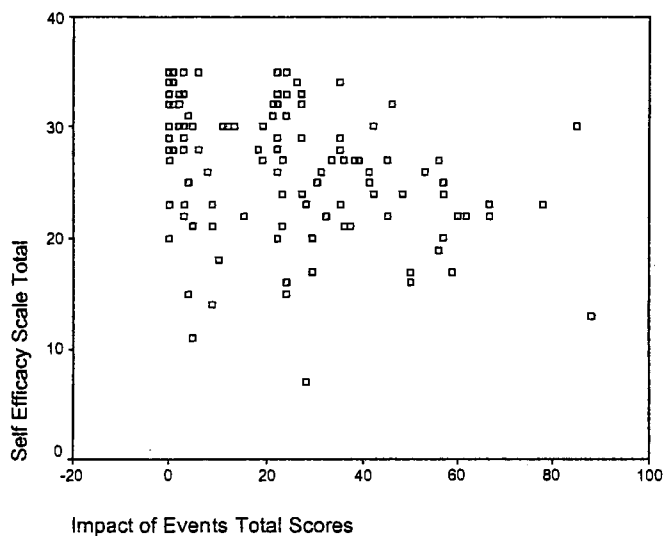
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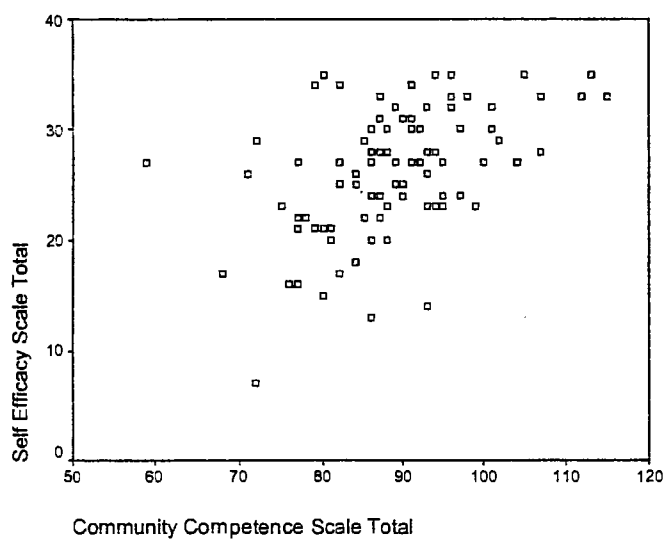
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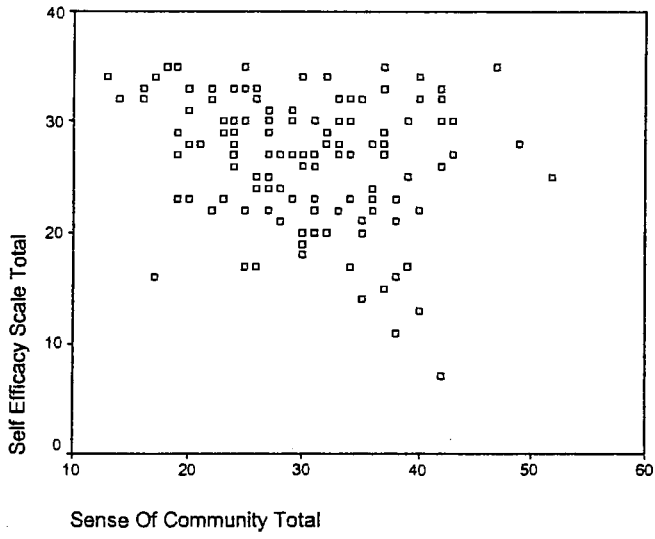
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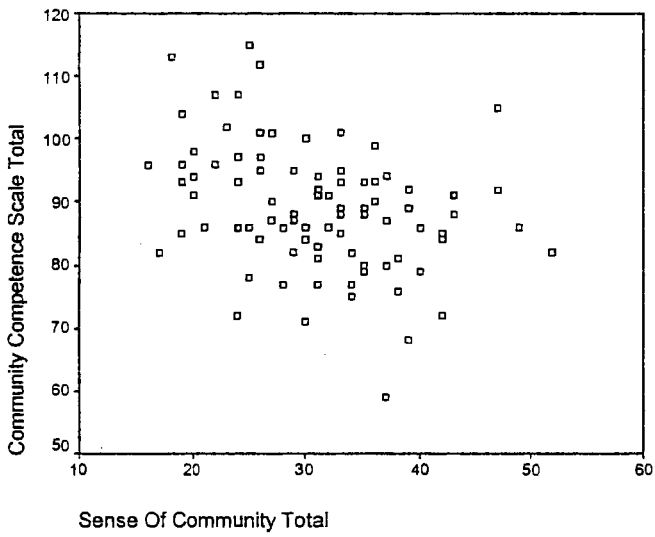
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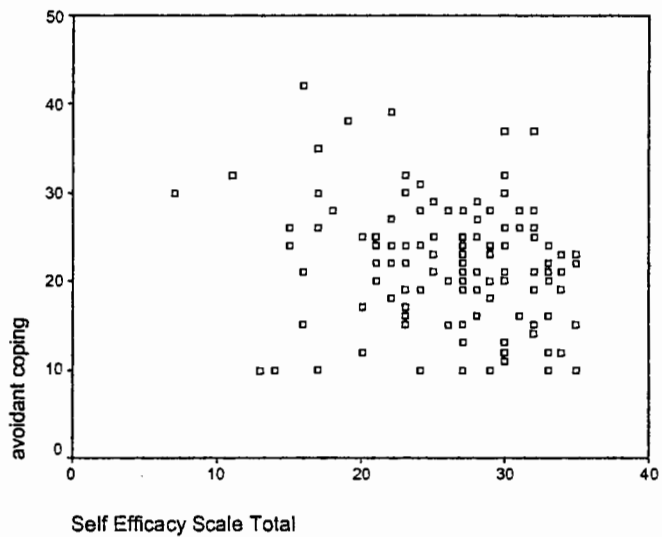
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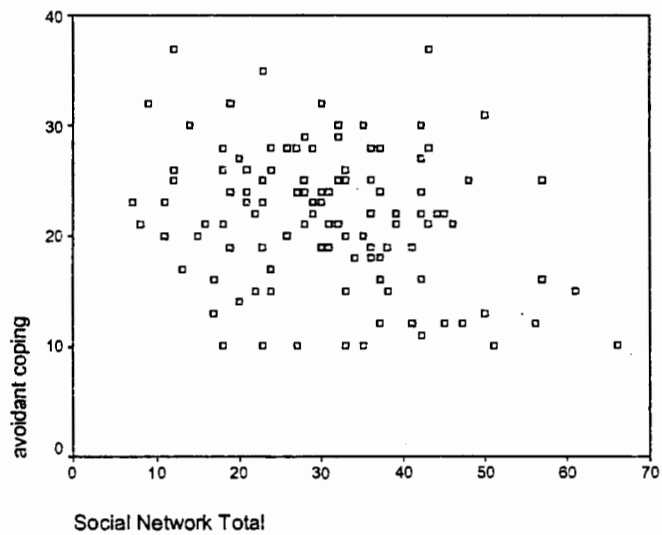
## Carnarvon Scatterplot



## Carnarvon Scatterplot

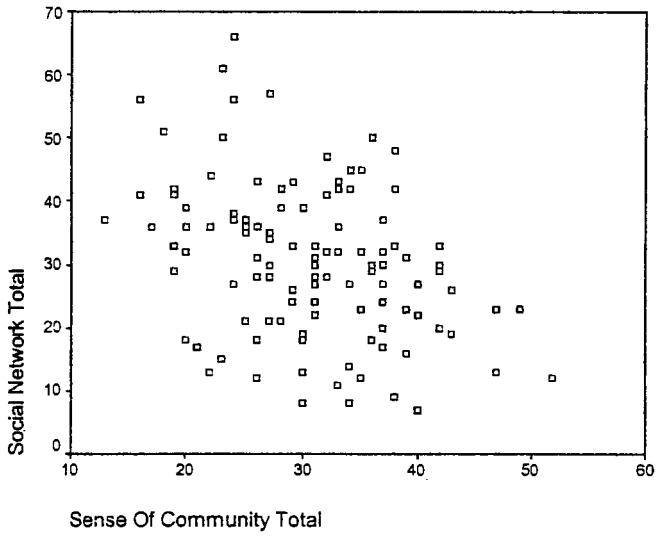


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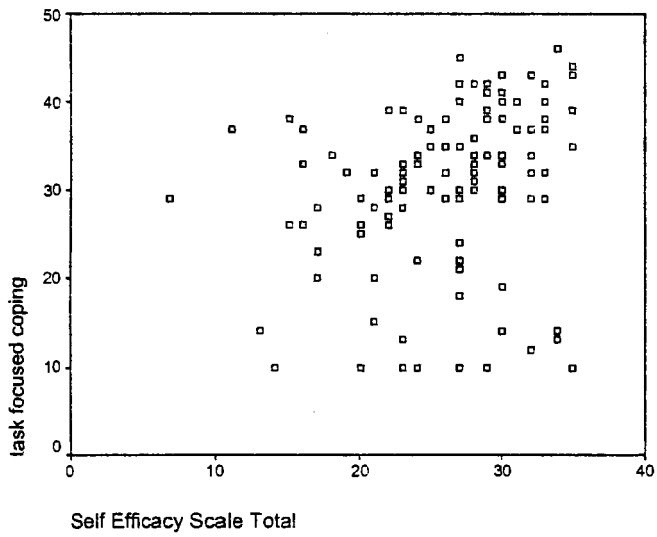




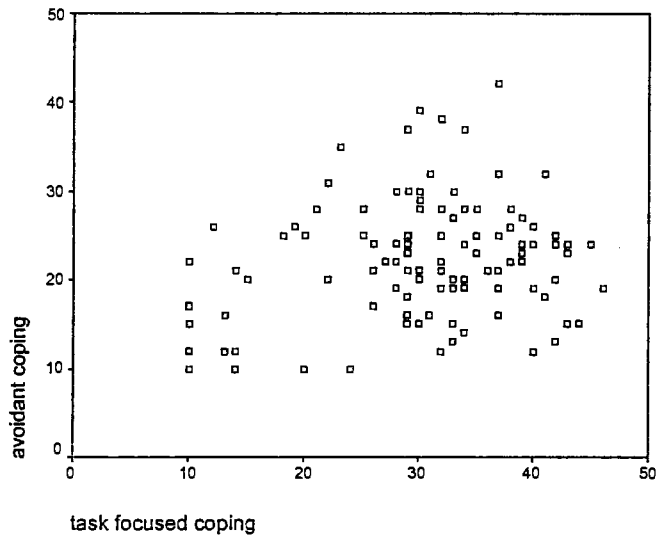
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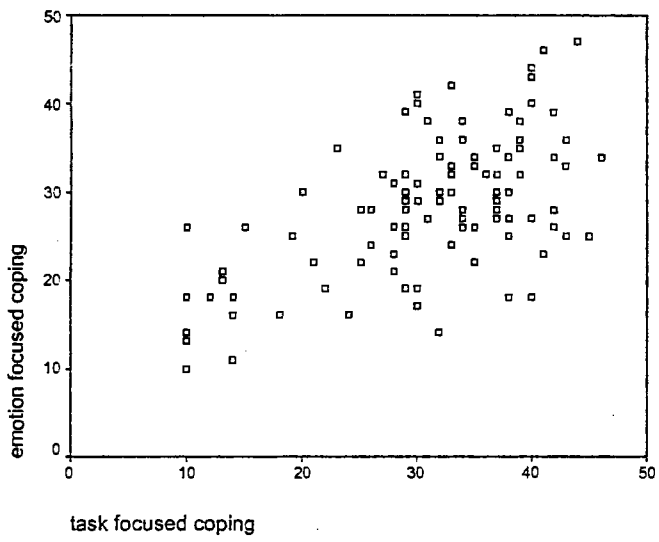
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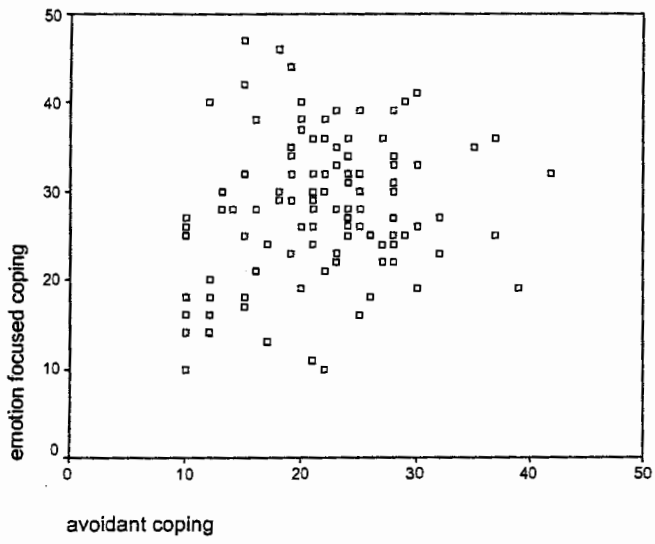
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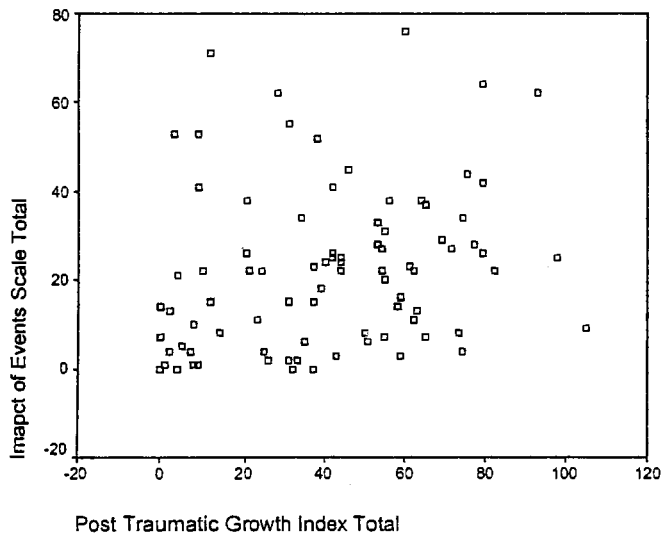
## Carnarvon Scatterplot



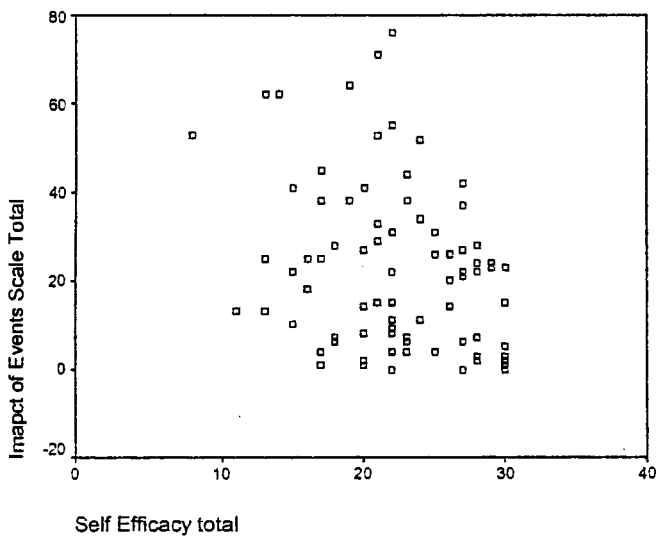
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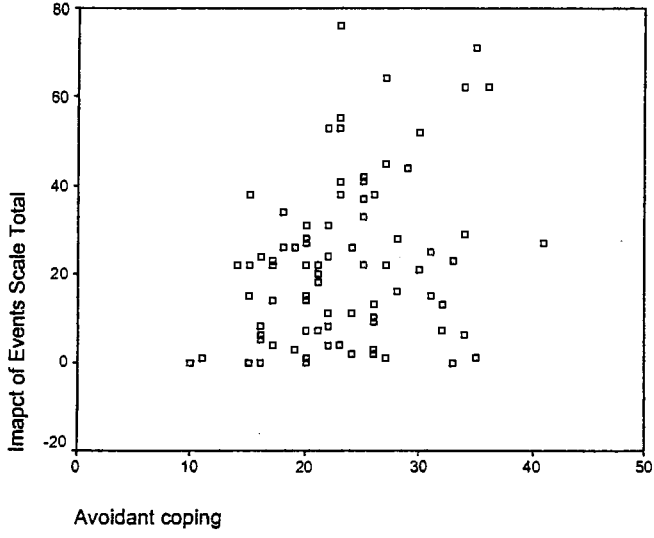
## Exmouth Scatterplot



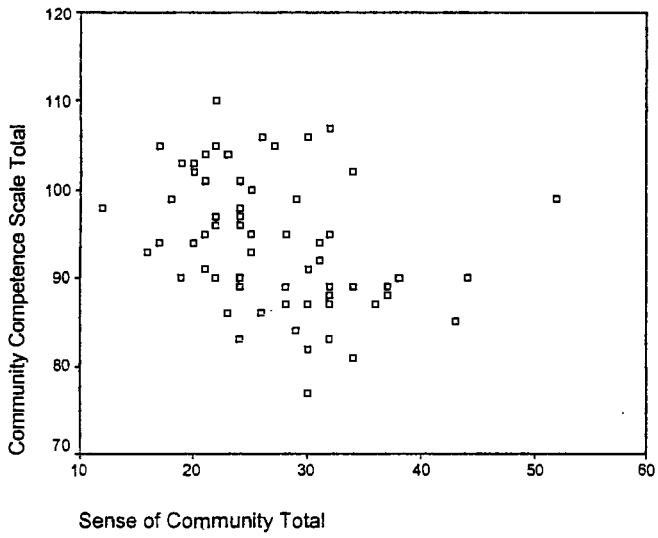
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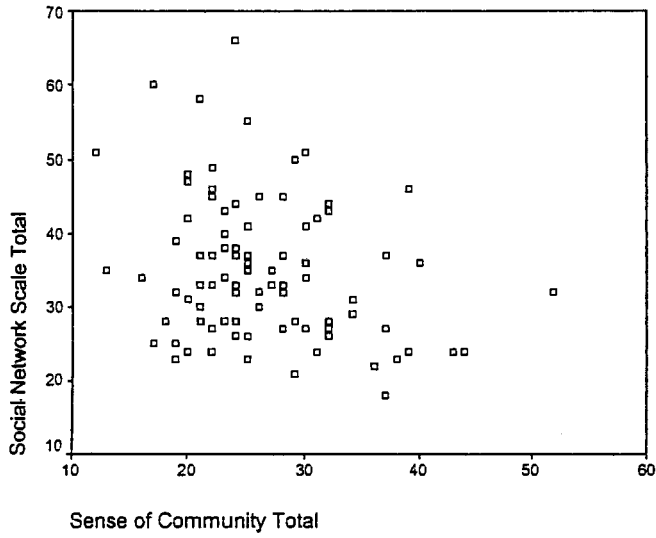
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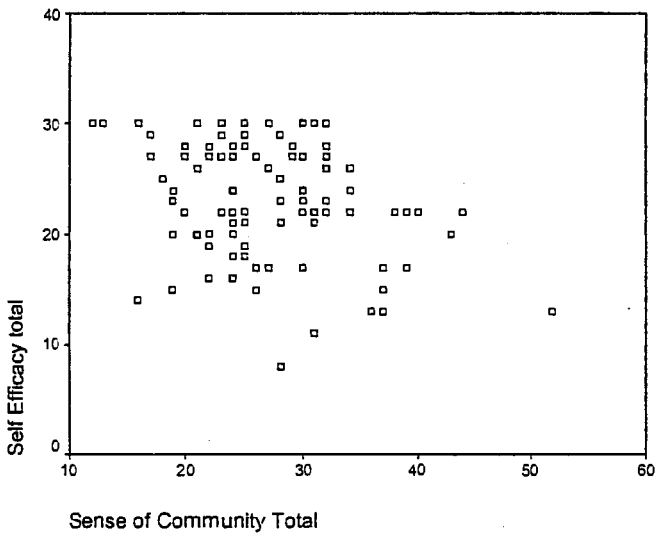
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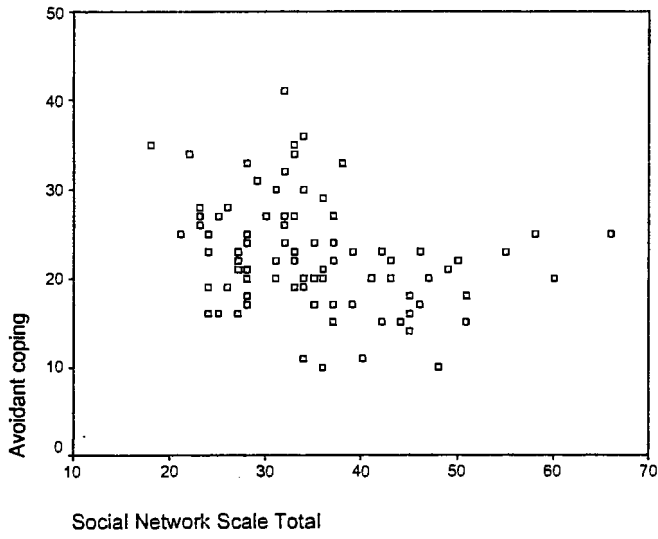
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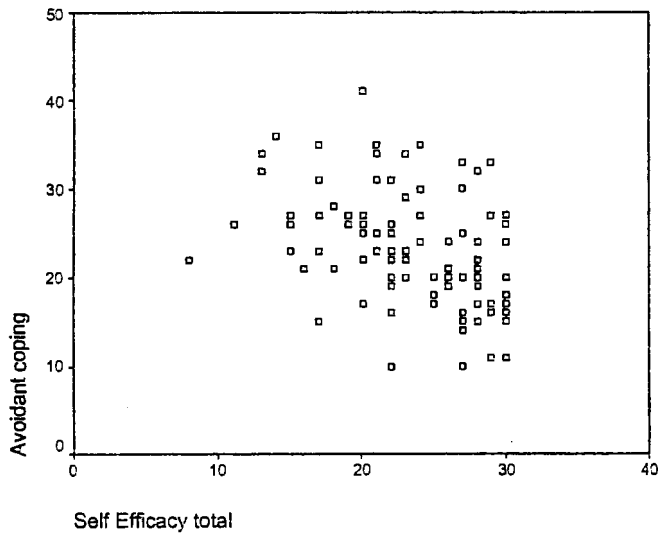
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## Exmouth Scatterplot



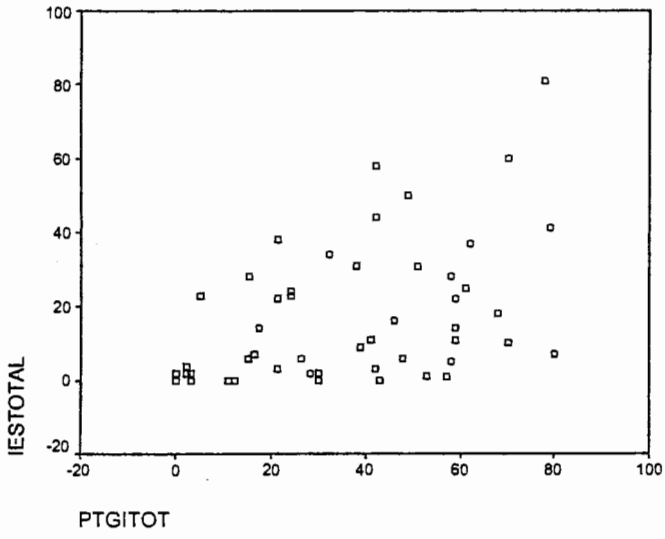
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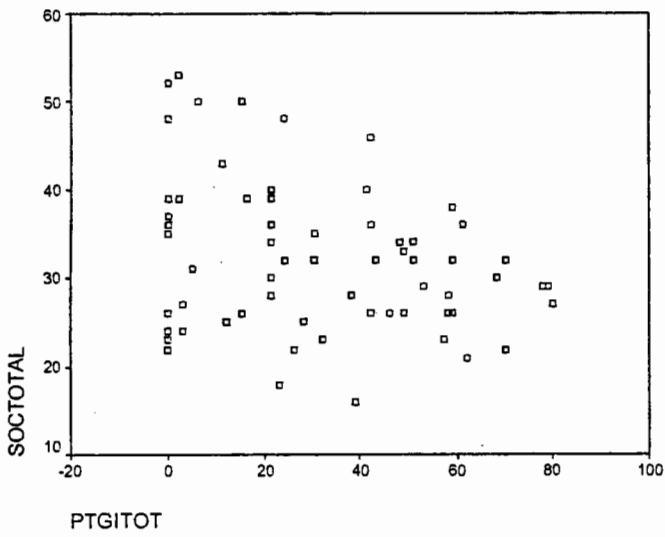




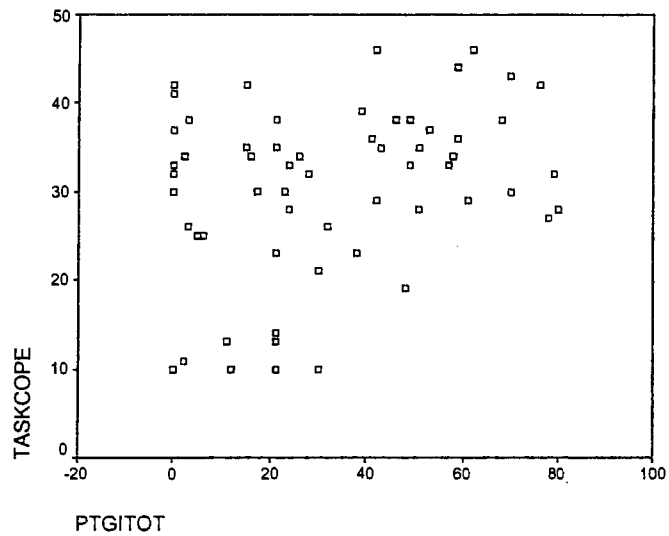
### Kununurra Scatterplot



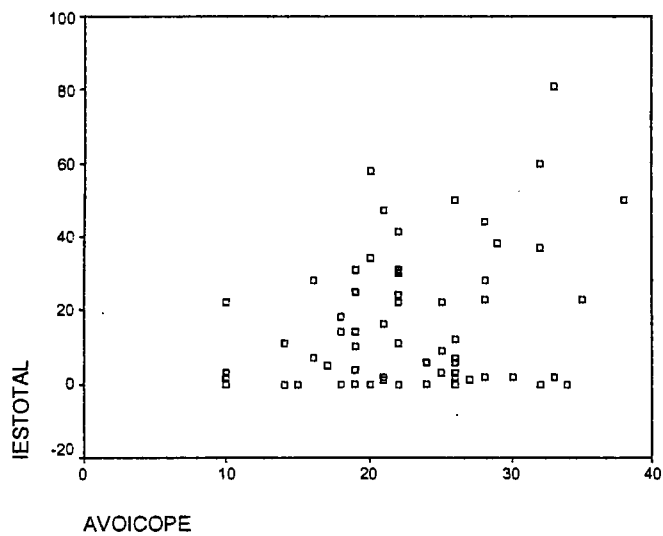
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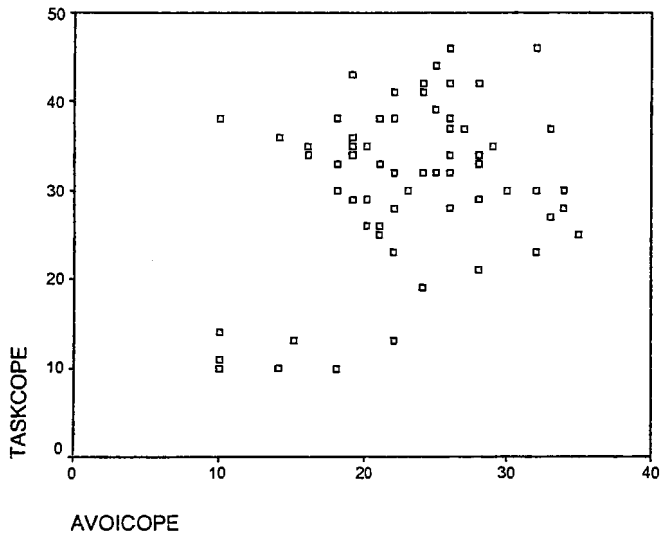
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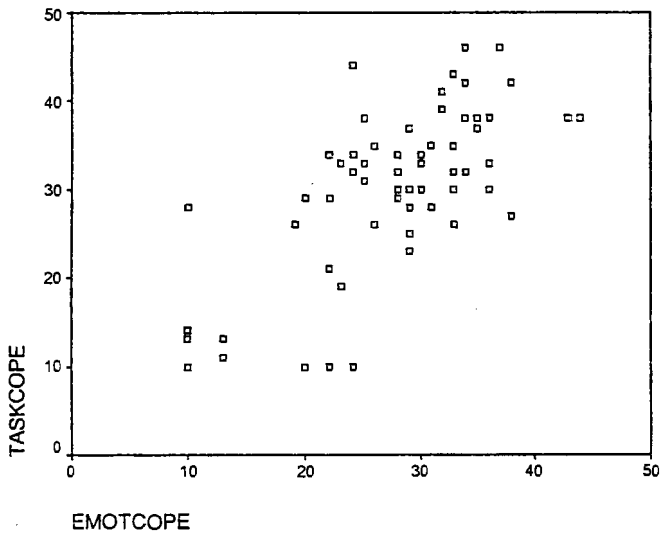
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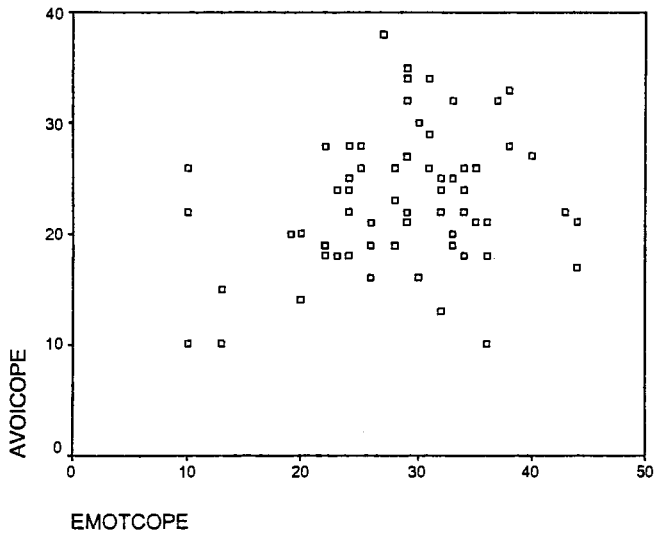
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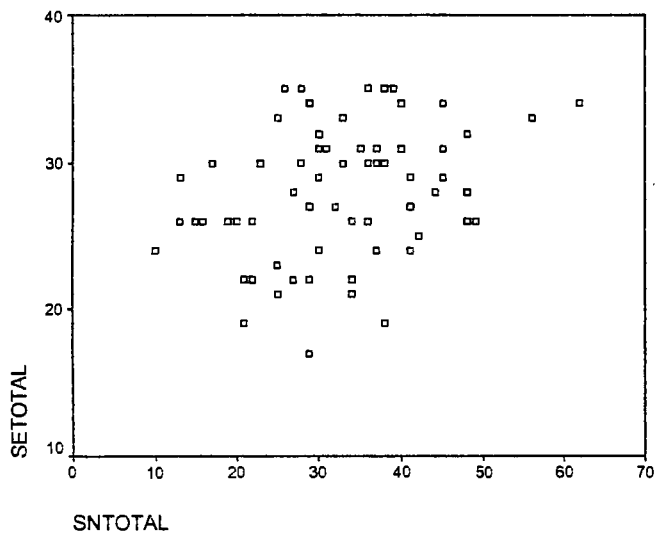
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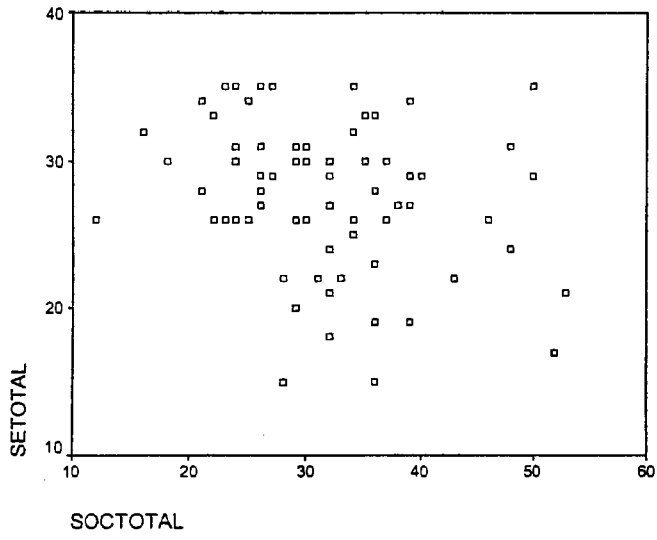
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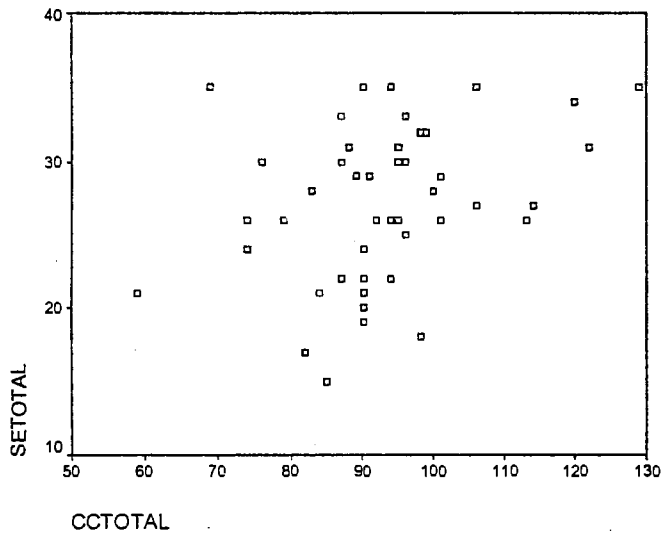
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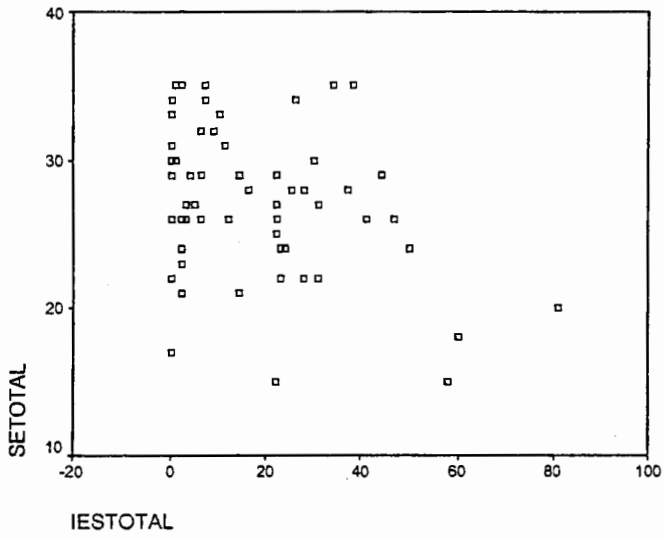
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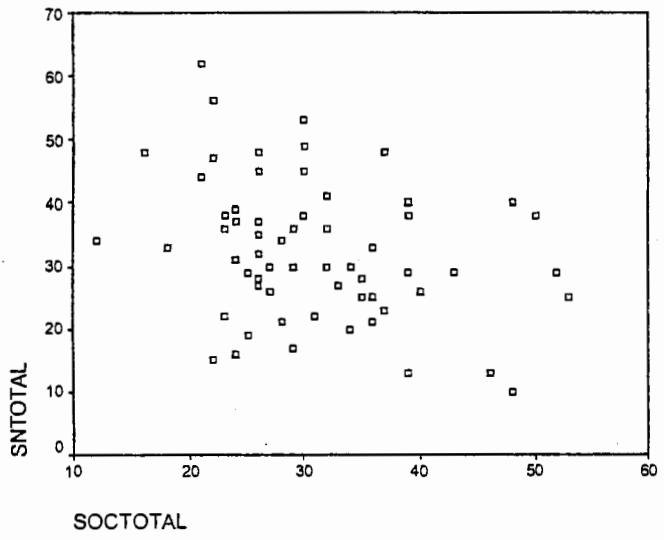
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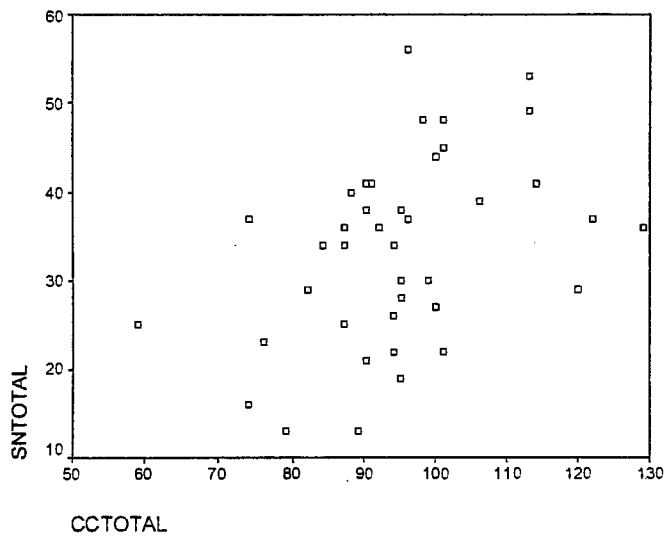
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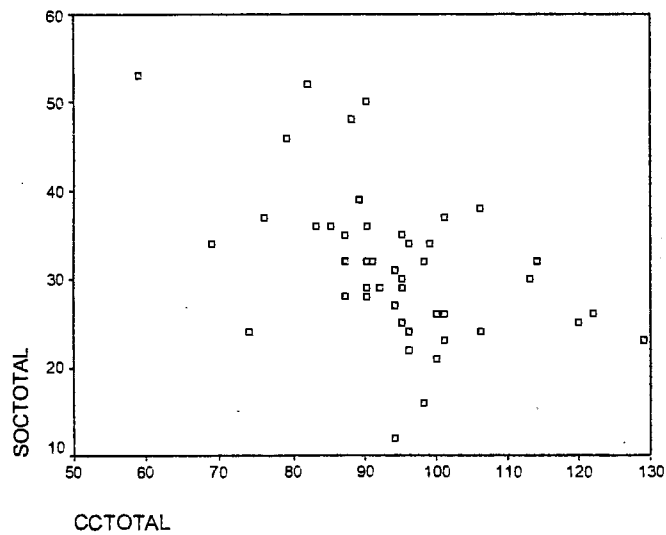
### Kununurra Scatterplot



### Kununurra Scatterplot



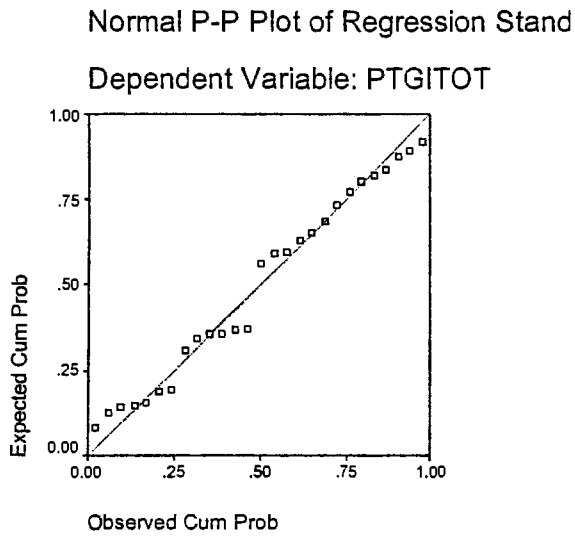
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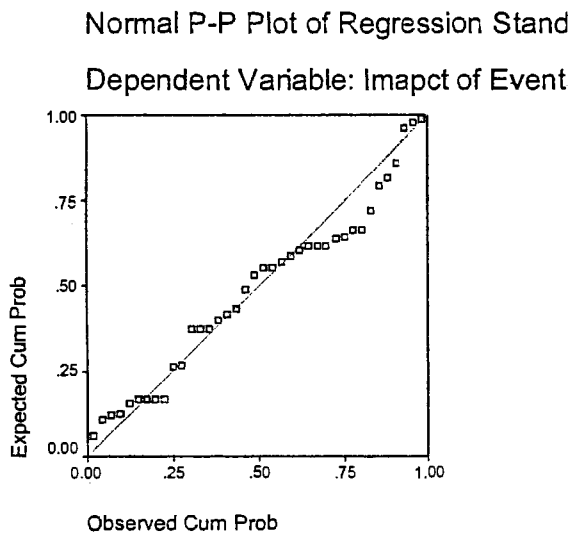
## **APPENDIX F**



## Kununurra Residual Plot for Posttraumatic Stress



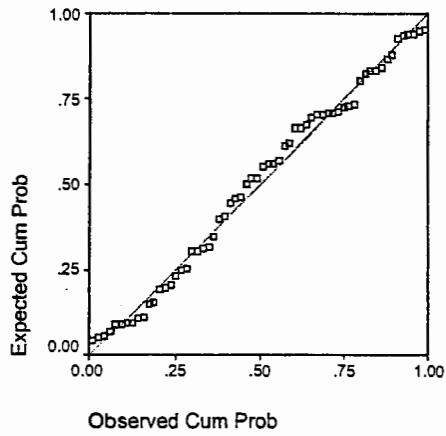
## Exmouth Residual Plot for Posttraumatic Stress



## Carnarvon Residual Plot for Posttraumatic Stress

Normal P-P Plot of Regression Stand

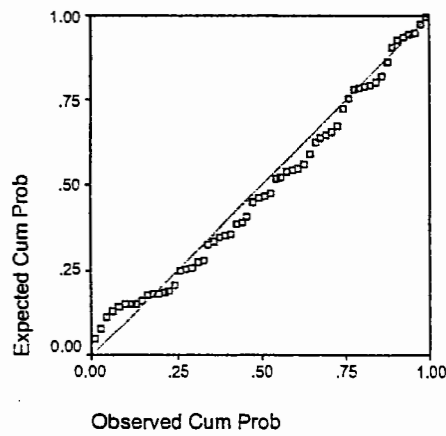
Dependent Variable: Impact of Event



## Broome Residual Plot for Posttraumatic Stress

Normal P-P Plot of Regression Stand

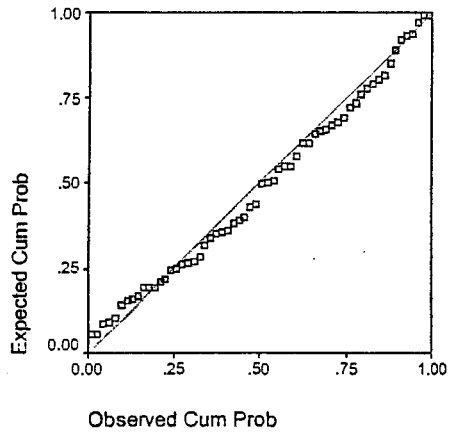
Dependent Variable: Impact of Event



## Broome Residual Plot for Posttraumatic Growth

Normal P-P Plot of Regression Stand

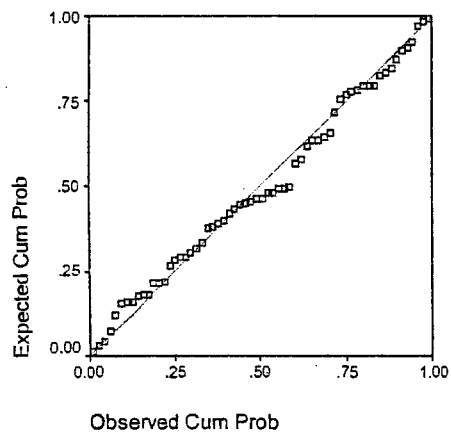
Dependent Variable: Posttraumatic G



## Carnarvon Residual Plot for Posttraumatic Growth

Normal P-P Plot of Regression Stand

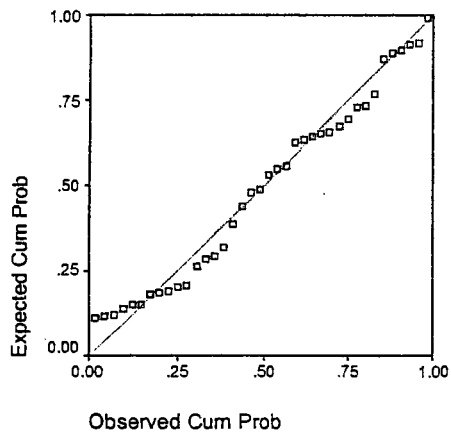
Dependent Variable: Posttraumatic G



## Exmouth Residual Plot for Posttraumatic Growth

Normal P-P Plot of Regression Stand

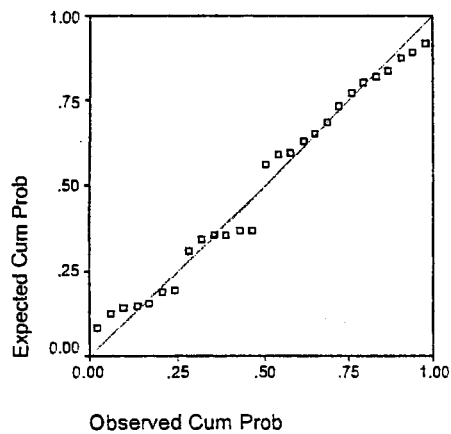
Dependent Variable: Post Traumatic



## Kununurra Residual Plot for Posttraumatic Growth

Normal P-P Plot of Regression Stand

Dependent Variable: PTGITOT



## APPENDIX G



## APPENDIX H

*Correlation Matrix between subscales for Combined Model*

	Disaster Experience Variables		Community Resilience Variables		Individual Resilience Variables					
	PTGI	IES	CC	SoC	SN	SE	TC	AC	EC	
PTGI	-	<b>.377**</b>	.063	.083	.020	-.103	<b>.199**</b>	<b>.115*</b>	<b>.278**</b>	
IES		-	-.019	.044	.028	<b>-.228**</b>	.087	<b>.186*</b>	<b>.123*</b>	
CC			-	<b>.363**</b>	.071	<b>.209**</b>	.058	-.070	.114	
SoC				-	<b>.132*</b>	<b>.214**</b>	.045	-.004	.090	
SN					-	-.017	-.037	-.030	-.022	
SE						-	<b>.146*</b>	<b>-.280**</b>	.086	
TC							-	<b>.132*</b>	<b>.515**</b>	
AC								-	.070	
EC									-	

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

PTGI Posttraumatic Growth Index; IES Impact of Events; CC Community Competence; SoC Sense of Community ; SN Social Networks; SE Self-Efficacy; TC Task Focused Coping; AC Avoidant Coping; EC Emotion Focused Coping