After the Tornado

An Exploration of Capacity and Vulnerability on Community Engagement in Goderich

by

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Guelph, Ontario, Canada

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ABSTRACT

AFTER THE TORNADO: AN EXPLORATION
OF CAPACITY AND VULNERABILITY
ON COMMUNITY ENGAGEMENT IN GODERICH

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This thesis is an investigation of the multi-dimensional impact of disaster on community engagement with respect to capacity and vulnerability factors. The historic community of Goderich, Ontario, ravaged by an F3 tornado August 21, 2011, was the study population. A mixed-methods approach utilizing surveys, semi-structured interviews, and key informant interviews was employed in an effort to yield a more confident set of data and help facilitate understanding. Testing results revealed that the community was very aware of its capacities and vulnerabilities and utilized the disaster situation to affect positive change in these conditions. However, disaster itself was only found to stimulate engagement patterns in its immediate aftermath. Therefore, while disaster does not adversely affect community engagement, it also does not encourage sustained engagement activity. It does, however, stimulate extended associations of connection to the community, which may hold the key to long-term engagement motivation.

Keywords: Adaptive resilience, capacity, capacity and vulnerability analysis, communication, community awareness, community engagement, life cycles, mitigation, natural disasters, social capital, social networks, sustainability, tornadoes, vulnerability.
ACKNOWLEDGEMENTS

This research has been a pleasurable and informative experience that would not have been possible without the assistance of and support from many individuals.

The most significant person to thank is my mum, Susan—my editor, sounding board, and motivator. This endeavour would have been unattainable without her support, effort, and some very late nights. Her dedication, patience, and impeccable eye for detail were essential during every step of this process. Thank you to my sister, Michelle, who used vacation time to support me in Goderich during my initial visit there and who also helped format my tables and paper during her reading week. She was a great asset and influence in the completion of this thesis.

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dinner. The entire community was absolutely supportive and made my first experience with field research one that I will long remember. Thank you all so much for your cooperation and for making this a truly amazing experience.

Katherine E. Laycock
Guelph, Ontario
March 2013
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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ANOVA</td>
<td>Analysis of Variance</td>
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<tr>
<td>BR + E</td>
<td>Business Retention and Expansion</td>
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<td>CVA</td>
<td>Capacity and Vulnerability Analysis</td>
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<td>DROP</td>
<td>Disaster Resilience of Place Model</td>
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<tr>
<td>EF-scale</td>
<td>Enhanced Fujita Scale</td>
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<tr>
<td>F-scale</td>
<td>Fujita Scale or Fujita Person Tornado Intensity Scale</td>
</tr>
<tr>
<td>HRC</td>
<td>Heritage Resources Centre</td>
</tr>
<tr>
<td>IRD</td>
<td>Integrated Rural Development</td>
</tr>
<tr>
<td>IDNDR</td>
<td>International Decade for Natural Disaster Reduction</td>
</tr>
<tr>
<td>MEMO</td>
<td>Manitoba Emergency Management Organization</td>
</tr>
<tr>
<td>NVivo</td>
<td>QRS NVivo 10</td>
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<tr>
<td>NWS</td>
<td>National Weather Service (United States)</td>
</tr>
<tr>
<td>PAR</td>
<td>Pressure and Release model</td>
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<td>SPSS</td>
<td>IBM Statistical Package for Social Science Statistics 21</td>
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<tr>
<td>SRL</td>
<td>Sustainable Rural Livelihood model</td>
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<tr>
<td>USB</td>
<td>Universal Serial Bus</td>
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CHAPTER ONE: RESEARCH INTENT

1.1 PURPOSE

Interpreting community engagement can be quite subjective. For purposes of this research, community engagement concerns the range of personal participation in social activities that enhance a community without contributing directly to an individual’s career or livelihood. These activities may be undertaken independently or collectively. Engagement also implies a sense of trust. Studies reveal there is a correlation between societal trust and engagement for “the greater the density of associational membership in a society, the more trusting its citizens” (Putnam, 1995, p.73). Putnam (1995) also notes the plethora of research that supports how successful community capacities directly relate to the social connectedness or civic engagement of a community.

It is found that engaged communities are those that, through the collaborative input and actions of its members, are in a better position to influence and control a range of decisions important to its social structure, sense of collective cohesion, and communal benefit (Abraham et al., n.d.). But, are engaged communities more effective in managing disaster when it occurs? Conversely, can it be assumed that vulnerable communities are less engaged; less likely to deal with disaster? A consideration of how capacity and vulnerability are intrinsically linked to community engagement and disaster management is needed to answer such questions.

Frequently, a community’s capacities and vulnerabilities are often more evident after a natural disaster occurs since it is the disaster that triggers or amplifies many of the societal factors that demand attention post-disaster (Weichselgartner, 2001). The perceptive observation by Weichselgartner (2001) that “disaster itself occurs within society and not within nature” (p. 86) gives even more credence to the imperative to establish strong social networks that not only reflect a community’s capacities but also effectively utilize these in the face of disaster.

By properly understanding the nuances of community engagement as well as the effects both capacity and vulnerability have on this social activity, this study’s purpose is to determine the impact of disaster on civic engagement. The 2011 tornado that ravaged the community of Goderich, Ontario will be the focus of this research.
Although each community is unique and requires individual attention, the findings and recommendations from such a study may be transferrable to other rural communities, which is of the upmost importance as natural disasters continue to rise.

1.2 INTRODUCTION TO STUDY POPULATION

The picturesque and historic community of Goderich, which dubs itself Canada’s prettiest town, lies on the eastern shores of Lake Huron, in the south-western ridge of Ontario’s Huron County. In 2011, the town’s population was 7,521 (Statistics Canada, Census Subdivision, 2012, para. 1). While this represents a less than 1% decrease from 2006 census figures for Goderich, it is notably below the Canadian national average of 5.9% growth (Statistics Canada, Census Subdivision, 2012, para. 1). There is a fairly even distribution between male and female populations, with only approximately 500 more females (Statistics Canada, Age and Sex, 2011, chart). Another important population consideration for this research is median age. At 45.6 years (Statistics Canada, Age and Sex, 2011, chart) Goderich’s population age is slightly higher than the Canadian average of 39.9 years (Statistics Canada, Canada’s Population Estimates, 2011, para. 1). This variance is indicative of a slightly older community that may embrace different needs and contributions.

Goderich’s land use has reasonably evolved since its founding in 1822 by Captain Wolsey Bayfield and its original inception as a Canada Company trading post (Heritage Resources Centre [HRC], 2010, p. 4). Within three decades, the port community was incorporated into a town and, by 1859, had expanded to accommodate a railway to increase accessibility (HRC, 2010, p. 5). However, as Goderich’s transportation needs changed over the next 100 years, a decline in the use of the port was mirrored by the deterioration of rail use. The gradual cancellation of passenger services ultimately led to the removal of the entire railway system by 1988 (HRC, 2010, p. 7). Today, limited in-community and inter-community public transportation services may influence the ability of the town to connect with its citizens and with greater Ontario.

Natural salt deposits along Lake Huron led Samuel Platt in 1866 (HRC, 2010, p. 8) to begin salt processing in Goderich. By the 1880s, large-scale salt production began as brine water was pumped, heated, and evaporated into coarse salt (Sifto Canada Corp., Sifto’s Goderich Mine, 2011, para. 1). The actual mining of salt did not
begin until late in the 1950s (Sifto Canada Corp., Sifto’s Goderich Mine, 2011, para. 2) and continues to present day as mining remains an integral industrial employer for the community. The town’s Sifto mine also has the distinction of being the largest salt mine in the world (Sifto Canada Corp., Salt in Canada, 2011, para. 3).

Goderich’s harbour area provided much of the economic stimulus for the town’s commercial and industrial heritage, supporting fishing and shipping of products such as oil, flour, and lumber. The harbour was also a shipbuilding site where one hundred craft were built under the Marlton Yard name (HRC, 2010, pp. 6, 9). An act of parliament back in the 1870s, declaring Goderich a Harbour of Refuge, presented the community with the early opportunity to conserve its harbour front by several means including the dredging of a man-made channel connecting to the Maitland River (HRC, 2010, p. 28). Over time, four artesian wells were dropped in the harbour area in an effort to increase tourism to a spa district originally created there in 1866 (HRC, 2010, p.13). As years passed, numerous hotels and business ventures sprang up attempting to capitalize on the springs that, recently, have declined to only the remaining Menesetung Spring (HRC, 2010). Harbour ownership changed hands multiple times over the years and, by 1999, was eventually sold to the Town of Goderich (HRC, 2010, p.13). Today, the harbour stands as a main attraction for the community, supporting tourism and continuing to serve as a vital shipping port.

The historic charm of Goderich’s iconic octagonal landmark, known as the Courthouse Square, draws many tourists to the downtown area and is the heart of its commercial district. A 2007 report¹, compiled by the municipality’s Business Retention and Expansion (BR+E) group, specifically noted that “Courthouse Square is the single most visible and important economic sector of our community” (Town of Goderich, 2007, p. 20). The BR+E report (2007) also underscored the value of tourism to the entire area, noting tourisms’ essential significance in Huron County as its “3rd largest industry” and “one of the main employers of small business in Goderich” (Town of Goderich, 2007, p. 23).

1.2.1 Disaster in Goderich

Goderich was battered by a tornado on Sunday, August 21, 2011 at 3:55 p.m. (Environment Canada, Tornado Goderich, 2011, para. 2). Within two short minutes,

¹ See also Millierdickinsonblais Inc. (2010), for an “Economic Development Marketing Strategy” for Goderich.
ensuing devastation resulted in death and injury; hundreds of displaced people; the loss of hydro, telephone, and natural gas for 10 days; and over $100 million worth of damage to historic buildings, residences, and businesses (Environment Canada, Tornado Goderich, 2011, para. 3). Unlike some other Canadian communities, the town was not equipped with a tornado siren; residents who were tuned in to local radio or television stations were warned at 3:45, only 10 minutes before the tornado strike, of impending tornado activity by Environment Canada (Environment Canada, Tornado Goderich, 2011, para. 2). Motivated by winds between 250-300 km/hr, the tornado sustained a 20 km long erratic ground trail that ranged between 200 – 1,500 metres in width (Environment Canada, Tornado Goderich, 2011, para. 2). The path of destruction from this natural disaster was vast; it forged a direct line through the town from the water on the west side straight eastward through the centre of town. The devastation was so extensive that the historic, octagonal square in the downtown core was likened to a war zone (Stockton, 2011). Homes were shattered; 10 homes on Cambria Road alone were completely destroyed (CTV Kitchener, 2012, para. 5). During its brief duration, one individual was killed and almost 40 others injured (Environment Canada, Tornado Goderich, 2011, para. 2).

By 10 p.m., natural gas was turned off to over 3,300 customers in the community as a state of emergency was issued by the mayor's office (Stockton, 2011, para. 4; 211 Central East Ontario, 2011, p. 2). Many individuals whose homes sustained damage were relocated to the Knights of Columbus Community Hall, which was transformed into a quick response, emergency shelter (211 Central East Ontario, 2011; Lynn, 2012, Video Series Part One). Individuals instinctively took up impromptu initiatives throughout town to help clean up, aid neighbours in need, and bolster community moral. As emergency measures gave way to coping and rebuilding strategies, the capacities and vulnerabilities of this small community to deal with this tragedy would soon become apparent.

1.3 Analysis Models

Various models examine vulnerability and all possess validity for use in specific case studies. Capacity and Vulnerability Analysis (CVA), Sustainable Rural Livelihoods (SRL), and the Pressure and Release (PAR)/Access models will be assessed here to fully appreciate the selection of the CVA model for this research.
SRL primarily focuses on gender relations, specifically those dealing with employment issues and has its roots in integrated rural development (IRD), farming systems analysis, and participatory rural appraisal (Filson, 2010). In addition, this model has a very structured and elaborate framework that begins by categorizing the source of vulnerability as emanating from shocks, trends, or seasonal challenges (Filson, 2010; Twigg, 2001). It continues on to assess existing social capital including human, natural, financial, social, and physical levels (Filson, 2010; Twigg, 2001), which could be useful for the Goderich context. In addition, SRL reviews policies and institutional processes that contribute to particular livelihood outcomes and potential solutions (Filson, 2010; Twigg, 2001) and this also has relevance for this research. SRL holds a great deal of merit and its focus on sustainability as a preventative and mitigating instrument for disaster management (Filson, 2010) makes it an extremely useful tool for instances involving multiple situations. However, since this research predominately focuses on only one circumstance of community engagement, that is, as it relates to disaster management, the additional perspectives SRL communicates is unnecessary for this study. As well, due to the strong overlying gender relations and economic focus of this model, it has been ruled out for this specific research.

The PAR model is complementarily linked to the Access model in order to gain optimum value. Both models are clear and easy to follow. However, they assign higher significance to the hazard of the natural disaster rather than on individual importance (Twigg, 2001). The PAR model explains disaster as the convergence of the two opposing forces of vulnerability and the actual hazard while additionally dividing vulnerability into three elemental categories of root cause, dynamic pressure, and unsafe conditions (Twigg, 2001). The Access model complements this model’s broad categorization of disaster by further exploring exactly how individuals cope with disasters, including an examination of their personal access to resources (Twigg, 2001). The comprehensive aspects of this dual matrix would appear conducive to this research. However, the stronger PAR/Access focus on the hazard itself rather than the human factors contributing to a disaster situation makes it a less ideal fit for this community engagement study.

The primary reason why this research employs the CVA model is due to its strong focus on the complexities of human connections pertaining to disasters rather than on the actual hazards of the disaster itself (Twigg, 2001). In so doing, CVA redirects more attention to individuals’ overall security of livelihood rather than
concentrating principally on immediate relief following a disaster (Twigg, 2001). This makes it an ideal tool for exploring the Goderich disaster situation.

The CVA model was initially used in association with humanitarian aid (Filson, 2010). The broader, human capital aspects of this matrix allows for comprehensive independent and distinct observations while utilizing the basic categorical framework that is incorporated into the model. This framework is broken down into three categories that outline the central aspects of vulnerabilities and capacities: physical/material, social/organizational, and motivational/attitudinal (Twigg, 2001). Within this structured classification system, CVA provides optimum investigative flexibility depending on the requirements of the community in question. Since quite often vulnerability studies focus largely on poverty (Twigg, 2001), such flexibility is essential to properly evaluate Goderich, an area which does not suffer extensively from poverty-related issues.

Although CVA offers greater exploratory flexibility, it remains vital to recognize the relevance of CVA’s foundational framework categories to Goderich’s case. As physical or material vulnerabilities and capacities address issues directly caused by disaster (Twigg, 2001), in the Goderich experience this concerns wages lost from employment interruptions, specifically those associated with businesses in the downtown which was particularly hard hit. It also considers additional expenditures for repairs not covered by insurance. While the social or organizational aspects of vulnerability and capacity deal predominantly with internalized conflicts between groups (Twigg, 2001) it also considers issues surrounding group cohesion before and after disaster. With regard to this study, group cohesion is apparent in measures of community engagement. Lastly, motivational or attitudinal vulnerabilities and capacities explore personal perceptions surfacing from disaster (Twigg, 2001). In the case of Goderich, these are readily observed through the personal and community management strategies following the effects of the tornado.

1.4 RESEARCH STATEMENT

Focusing on the CVA model, this research explores community engagement of key stakeholders with respect to the August 21, 2011 tornado that struck Goderich, Ontario.
1.5 RESEARCH GOALS
The goal of this research is to explore how capacity and vulnerability factors affect community engagement in the face of natural disaster.

1.6 RESEARCH OBJECTIVES
The following three objectives assist the fulfillment of this goal:
- a) Understanding risks by exploring stakeholders’ physical capacity and vulnerability;
- b) Understanding perceptions by exploring stakeholders’ social connectedness;
- c) Understanding involvement by exploring stakeholders’ motivation.

1.7 RESEARCH HYPOTHESES
Assumptions that this research will attempt to confirm or negate through testing are presented by the following hypotheses:
- Community engagement is associated with community connection.
- Community engagement is associated with mid-age adults.
- Community connection is associated with older adults.
- Within the context of gender, there is an association with community engagement and community connection.
- Within the context of employment, there is an association with community engagement and community connection.
- Within the context of extended residency, there is an association with community engagement and community connection.
- Within the context of higher levels of education, there is an association with community engagement and community connection.
- Satisfaction is associated with community engagement and community connection.
- Satisfaction with disaster reconstruction efforts is associated with community engagement and community connection.
- Satisfaction with disaster reconstruction efforts is associated with mid-age adults.
- Participation in disaster relief efforts is associated with mid-age adults.
- Disaster does not provide long term impetus to engagement.
CHAPTER TWO: REVIEW OF RELATED LITERATURE

PART ONE: ENGAGEMENT, CAPACITY, VULNERABILITY

2.1 COMMUNITY ENGAGEMENT

Community engagement frequently takes the form of participatory commitment through groups or sponsorships, also known as community networks. Understanding community engagement, therefore, is best accomplished by first exploring how community networks are achieved. This involves uncovering the motivation behind civic participation, determining the types of organizations and causes that attract supporters, and most specifically, ascertaining the reasons why individual participation varies so markedly at different stages of life. Once these personal issues are scrutinized, it becomes easier to understand a community’s particular collective capacities and vulnerabilities and how these, in turn, affect community engagement in times of extreme duress. Here the idea of tangible interdependency, referred to by Smithers, Johnson, and Joseph (2004) is taken into account for this concept deals with a community’s need for connection and how this can establish the foundation upon which a progression of future events unfolds. Acknowledging the role of tangible interdependency is especially important when studying community engagement in times of extreme disturbance, such as one finds in post-natural disaster periods.

2.1.1 Community networks and social capital

The significance of community networks or connections is revealed through the motivations behind their creation and sustainability and by the realization of how changes in the life cycle correlate with changes in the network. Community networks are vital since these arrangements strengthen a community’s cohesion and are the defining systems that keep that unity present when unexpected disaster occurs. Therefore, durable networks ultimately bolster a community’s overall resilience to future duress and disasters. This point is clearly demonstrated throughout Mathbor’s (2007) research, which also underscores the necessity for community networks to properly employ social capital. An appreciation of what constitutes social capital is consequently needed as an initial step to understanding community networks and, in due course, community engagement.
Putnam (1995) considers social capital the “features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit” (p. 67). This relational dependency implies then, that something may be gained from nurturing strong social capital and encouraging favourable civic participation, two elements intrinsically linked to social organization. Buckland and Rahman (1999) and Hawkins and Maurer (2010) characterize social capital even further by aptly relating it to the values, characteristics, and contexts through which social relationships are formed and, eventually, community networks are developed and sustained.

For instance, people appear more willing to help when they can sympathize with victims and even particularly more so if a relationship exists where victims are viewed as helpless in the face of uncontrollable circumstances (Marjanovic et al., 2009). These social relationships depend upon the perceived valuation of strong and vulnerable members and the characteristic of social empathy. Social context also plays a significant role in social capital. Marjanovic et al. (2009) discuss some of the situational attributes social psychologists find stimulates cooperation among individuals: “the presence of bystanders; relationships between helper and recipient; and size of the community in which helping occurs” (p. 2605). Trust is another social value that can, potentially, be nurtured or accentuated through the action of effective social capital (Becchetti et al., 2012). As well, causal context influences the quality of response by social capital to stressors (Kouzmin et al., 1995) as people appear more moved to action in the face of natural than artificial disasters (Marjanovic et al., 2009). Ultimately, social capital should be viewed through the lens of sustainable and equitable interactions, as suggested by Buckland and Rahman (1999). This stance promotes the “co-operation and problem-solving” necessary for social capital to establish viable networks capable of withstanding and managing duress (Buckland & Rahman, 1999, p. 188).

Of course, social capital can be problematic at times. It can mirror socio-political sentiments that can be potentially damaging to non-aligned community engagement (Hawkins & Maurer, 2010). An example of this was clearly evident following the 2003 Bam, Iran earthquake and the 2004 Indian Ocean tsunami when it was noted that significantly fewer financial contributions were made to the Iranian earthquake victims than to the south Asian populations adversely affected by the tsunami (Marjanovic et al., 2009, p. 2605). While numerous motives may explain this
variance, the one suggested by Marjanovic et al. (2009) that “natural-disaster victims would be judged more harshly if they were perceived to be a unified group than a more heterogeneous one” (p. 2608) clearly supports the idea of socio-political impetus to engagement.

Social capital may also be ineffective or harmful when stress is increased, time management is inefficient, or volunteerism interferes with labour potential or retention (Hawkins & Maurer, 2010). These points demonstrates that there can be a risk associated with inappropriately timed or too much volunteering and that this form of social capital should be monitored according to individual needs, particularly in reference to life cycle stimuli to participate. Moreover, Buckland and Rahman (1999) draw attention to the divergence of actions social capital may elicit during emergencies: “it can effectively mobilise people through pre-existing associations to assist one another, but it can also block or delay urgent decisions” (p. 188). Frequently, it can be difficult to balance social capital properly or utilize the most appropriate organizations in order to make effective and efficient decisions in times of duress.

2.1.2 Network motivation and sustainability: Bonding, bridging, and linking

A very assessable method to appreciate how community networks attract and sustain social capital is illustrated by Mathbor’s (2007) three stages: bonding within community, bridging between and among communities, and linking communities with financial and other institutions. These three categories involve unique paths yet are interconnected by their goals of motivating and developing strong social capital (Hawkins & Maurer, 2010).

Bonding occurs as community members are moved to participate in groups due to similar interests, goals, or beliefs (Hawkins & Maurer, 2010). Mathbor (2007) observes that individuals often become attracted and connected to groups through “recreational activities, religious and spiritual gatherings, political and institutional affiliations, economic and business activities, the physical infrastructure and buildings, and psychological and social supports” (p. 361). Mutual commonalities reinforce bonds within the community allowing groups to grow into viable and cohesive networks of individuals who have come together to support, share, and expand upon their common pursuits. Once community networks take shape through the bonding process, bridging and linking these networks can begin. These next two stages of
network building are “characterised by exposure to and development of new ideas, values and perspectives” (Hawkins & Maurer, 2010, p. 1780), which is a significant diversion from the similar characteristics that appear to initially bind networks together.

One of the root motivations for bridging existing community groups is to strengthen the network foundations that were built during the bonding phase. Bridging, however, relies more heavily on dissimilarities than similarities among individual networks (Hawkins & Maurer, 2010). Merging groups with distinct strengths and diversities allows bridged networks the opportunity to augment their effectiveness and overall social capital within a community. This type of mutually beneficial collaboration can reduce weaknesses or gaps that may be apparent in the original networks (Mathbor, 2007).

The final stage, associating or linking these connected networks with something tangible such as finances, public institutions, or causes, forges deeper connections within and among networks that can more effectively withstand the test of various stressors (Mathbor, 2007). Additionally, linking networks with more powerful individuals or groups often reinforces and strengthens the original, individual network bonds (Hawkins & Maurer, 2010). This develops because linking establishes relations with something more substantial than the original, homogeneous motivation for network conception—linking brings together diversified interests and talents.

2.2 Volunteering: Motivational and Life Cycle Themes

Evident throughout multiple studies as well as in the data collected for this study, the impetus for volunteer community involvement varies a great deal depending on personal motivations and life cycle phases. Personal motivations mainly involve the wants and needs of community members and can be generally categorized based on the motives of obligation, consumption, and health. Life cycle phases are primarily driven by the extenuating factor of time and are, primarily, divided into early, middle, and later year periods of volunteerism.

2.2.1 Motivational themes

According to Smithers et al. (2004), many individuals maintain a high level of community involvement while their children are young and then again later in life due,
predominantly, to a need to associate with others. These periods of engagement can be easily explained as periods of obligation. When children are involved in activities, this frequently obliges parents or caregivers to also become involved (Li & Ferraro, 2006). Later on, a decrease in parental obligation correlates with reduced volunteerism (Li & Ferraro, 2006). During the later year life cycles, stemming largely from a desire for increased interaction with others that has been, perhaps, abandoned or lost amid the fulfillment of other life duties, social obligation manifests itself through volunteer community engagement (Li & Ferraro, 2006; Becchetti et al., 2012).

Individuals also have desires that motivate them to consume and, in some situations, fulfilling their drive for consumption can only be achieved through participation with others in an organizational setting. This type of consumption is referred to as relational goods and is largely dependent on the integrity and earnest motivation of consumers (Becchetti et al., 2012). In effect, individuals motivated to participate because of relational goods consumption could have their volunteer experience diminished should they find themselves involved with a group of individuals less genuinely motivated by relational goods consumption.

While consumption is a reality of social systems, a barrier to consumption is the initial effort that it requires since the satisfaction derived from relational goods is in direct proportion to the effort put forward by the consumer. Furthermore, just as effort increases satisfaction so too does satisfaction increase consumption (Becchetti et al., 2012). In the extreme, this can negatively overextend an individual. The sentimental or nostalgic atmosphere that often surrounds relational goods can also cause individuals to over-consume (Becchetti et al., 2012). In acute cases over consumption can manifest itself as negative health issues, such as stress.

Health is a critical motivator or inhibitor to volunteerism. While studies have shown that the socializing that results from volunteering can potentially increase psychological well-being (Becchetti et al., 2012; Li & Ferraro, 2006), good physical and mental health is essential at the onset of community service and in order to continue volunteering (Li & Ferraro, 2006). Li and Ferraro (2006) point out individuals with health issues, like depression, may volunteer less although exceptions to this observation also exist. As a general observance, the psychological benefits of volunteerism are positive and numerous: increased confidence, happiness, socialization, and a sense of belonging (Li & Ferraro, 2006). Moderate levels of volunteerism are best for overall good health as is being selective about the quantity of
volunteer work undertaken, for overwhelming one’s self can deteriorate optimum physical or psychological health (Li & Ferraro, 2006).

### 2.2.2 Life cycle themes

One’s selection of community involvement generally mirrors the main life cycle phase—early, middle, or later years—one currently is in. Additionally, life cycles reflect changes in the intensity of individual volunteerism since it has been determined that volunteerism is greatest during the middle years (Li & Ferraro, 2006). Generally, community involvement focuses on commitments to religious, athletic, educational, or social organizations (Smithers et al., 2004). It is also apparent that individuals who are socially established, educated, confident, and faith-oriented appear to volunteer more across all life cycle groups (Li & Ferraro, 2006). Among the three main social influences—marital, parental, and employment—that encourage volunteer activity, interestingly Li and Ferraro (2006) remark that “marital status is the only factor that has consistently promoted volunteerism across ages” (p. 498).

There is a great demand for individuals in their middle years to volunteer and, as discussed above, individuals in this life phase positively respond to this need by actively volunteering more (Smithers et al., 2004; Li & Ferraro, 2006). This is primarily due to familial and work obligations (Li & Ferraro, 2006). While later on, during the later middle years and into the final life cycle stage, individuals have more time and opportunity to devote themselves to volunteering, unfortunately accompanying these years is the real likelihood that increased health concerns may adversely affect one’s ability to become community engaged (Li & Ferraro, 2006). Conversely, there are situations where negative health issues can actually increase social participation. This is seen in the case of depression, particularly in older individuals. This group may actually reach out to counter the psychological condition of depression by volunteering more “as a means of compensation” (Li & Ferraro, 2006, p. 511) for some of the functional limitations of this health condition. For those individuals in the later life cycle phases, volunteering also appears to positively correlate with increased confidence (Li & Ferraro, 2006).

While the middle and later life cycle years appear to naturally attract social engagement in individuals, Otis and Loeffler (2005) note that encouraging positive volunteer opportunities in younger individuals can be used as a means of reinforcing affirmative behaviours and nurturing a productive social conscience in the young.
According to Dawes and Larson (2011), it is essential for youth “to not only join programs but become psychologically engaged in the programs’ activity” (p. 259) to encourage on-going, future volunteer commitment. An essential understanding of what encourages youth adults to become involved in the first place, then, is elemental to engaging youth. A study conducted by Marzana et al. (2012) determined a few of these key elements and found, in particular, education and employment status affect youths’ initial participation in volunteer programmes. Through their study, Marzana et al. (2012) observed that, most often, young people with higher education or stable employment tend to incorporate volunteering into their lifestyles. It is also noted that youth are much more likely to volunteer if they are connected to individuals already in an organization or if they receive a direct invitation from group members to become involved (Marzana et al., 2012). As a profile of youth who are more or less likely to participate in community engagement activities begins to emerge, understanding and utilizing such information can allow a community to persuade other youth, who may be on the periphery, to participate.

Properly recognizing the individual features that prompt engagement for all life cycle phases can help communities maximize these in order to facilitate and increase volunteer commitment and interaction, thereby forging a clearer sense of community engagement for all of its civic members.

2.3 Community Capacities and Vulnerabilities

For purposes of this research, capacity essentially refers to a community’s capabilities or strengths (Filson, 2010). Using this broad characterization, it follows that a community’s vulnerabilities relate to a lack of or improper management of its capabilities (Filson, 2010). Vulnerabilities are not just weaknesses inherent in communities due to their location, civic enterprise, or lack thereof. Rather, as Kirby (2006) asserts, the term vulnerability embraces a more holistic significance and emphasizes the complexities globalization imposes upon societies as well. Putnam’s (1995) classic dialogue on what he perceives as the general trend toward declining social engagement in America, despite the fact that “more Americans than ever before are in social circumstances that foster associational involvement (higher education, middle age, and so on)” (p. 72) could also be viewed as a vulnerability since this trend reduces the social capital necessary for effective community networking capacity.
As mentioned in Chapter One, capacities and vulnerabilities are frequently more apparent after disaster strikes because it is the disaster that affects communities and often highlights situations demanding attention (Weichselgartner, 2001). Therefore, understanding the capacities and vulnerabilities of a community as they exist prior to the occurrence of a disaster is as important as assessing the needs of victims post-disaster for the delivery of excessive or inappropriate aid carries with it the potential to “overwhelm local resources and introduce expectations that are unrealistic and unattainable” (Anderson & Woodrow, 1989, pp. 46, 52). Astutely observed by Bolin and Stanford (1998):

The assumption is that people’s problems begin with the disaster and therefore only those problems will be addressed with recovery assistance. However, as vulnerability analysis shows, the problems people experience in disaster are frequently traceable to already-existing constraints on their access to resources and livelihoods. (p. 33)

Clearly, a community’s resilience to disasters can be strengthened by creating networks and stronger connections before times of duress. Conversely, while the feasible development of community capacity before disaster is paramount, so also are appropriate attempts to reduce community weaknesses. Addressing weaknesses by effectively assessing community vulnerability should also be considered, according to Leavitt and Kiefer (2006), “from an infrastructure interdependency perspective” (p. 311) for leaving systems always operating at top efficiency means that they have no excess capabilities in times of extreme need. A proactive approach to capacity and vulnerability management can dramatically increase a community’s ability to function more effectively when needed during an emergency by reserving some of its resources during pre-disaster periods.

2.4 Reducing Vulnerability

A common issue in assessing social vulnerability is the tendency to look at immediate need rather than at long term solutions to reduce vulnerability and overall livelihood security problems (Filson, 2010; Twigg, 2001). There are numerous situations discussed throughout the literature that have the potential to increase community vulnerability. Many of these involve community development (Buckland & Rahman, 1999). While development is often measured by a number of indicators including location, ethnicity, education, income, productivity, and gender, the signs
most indicative of vulnerability involve the socio-economic indicators of: displaced individuals, poverty, and government accountability. As previously mentioned, significant reduction to community vulnerability essentially lies in the effective management of these social situations prior to the occurrence of any form of extreme duress.

2.4.1 Displacement

The displacement that can occur when individuals are affected by natural disasters may potentially compound pre-existing network problems (Pyles, 2007) and increase vulnerability. Since effectively operating networks are vital in times of duress, displacement may reduce the presence of essential social capital that is so critical in times of need. According to social dilemma theory, self-preservation logically increases during periods of natural disaster and this may “impact on community dynamics and destroy its cohesion, as individual interest has suddenly become more salient and community residents are looking after their own interests” (Chang, 2010, p. 291). In an effort to counter this a series of experiments were conducted by Van Vugt and Hart (2004) that supported the fact that highly connected group membership increased loyalty in the face of confrontations (as cited in Chang, 2010, p. 291). With this in mind, forging appropriate bonds of attachment in pre-disaster networks could prove beneficial in countering displacement issues in the face of disaster. Furthermore, maintaining communication, particularly with displaced individuals, after disaster is essential to community cohesion since it reduces some of the isolation associated with displacement (Patterson et al., 2010).

Ultimately, establishing resilient social capital and community involvement through networks that can withstand the challenges of disaster can also substantially reduce risks brought about by displacement.

2.4.2 Poverty

Poverty issues are many and varied and, amid disaster, can augment dire conditions since the poor have limited access to external strategies that empower them in times of need (Kirby, 2006). Interestingly enough, the social bonding witnessed during Hurricane Katrina in New Orleans in 2005 was instrumental in aiding lower-income individuals who, by combining their own resources when outside aid was sluggish, were able to survive much of the reverberations of the storm (Hawkins &
Maurer, 2010). Yet, relying solely on aid or social networks to address this issue after the fact is insufficient; decisive efforts to curb poverty should be addressed as a matter of social conscience, notwithstanding the chance onset of any form of natural disaster.

Encouraging ample time and resources to address poverty alleviation programmes prior to the occurrences of excess distress is necessary as, quite often, lower-income individuals are disadvantaged from many financial programmes in times of crises due to limitations involving their ability to properly complete the necessary requests (Bolin & Stanford, 1998). Accountability for appropriate poverty aid must also exist. While housing projects aimed at bettering living conditions for the underprivileged are part of today’s social reality, frequently the inferior construction quality and/or location of low-income housing projects have an increased potential for damage during natural disasters (Board of Natural Disasters, 1999).

While it is apparent that poverty exacerbates many situations, wealth is not necessarily an indicator of reduced vulnerability for a community either. Even in more affluent communities, a high debt-to-revenue ratio may signal increased vulnerability (Cutter & Emrich, 2006) that severely limits or economically prioritizes recovery efforts in the face of disaster. Cutter et al. (2008) further underscore the importance of preemptively prioritizing poverty issues in a sensitive manner so as to not harm potential economic growth or investment for the general community. If, as Cutter and Emrich (2006) expound, “social vulnerability is the product of social inequalities” (p. 103), the chance occurrence of disaster only serves to compound this vulnerability, regardless of which end of the economic or social spectrum the inequality originates. For this reason, proactively reducing social inequalities is a practical approach all communities can follow in order to diminish the impact of disaster.

**2.4.3 Government accountability**

Holding governments accountable for their actions is essential for prepared communities and can be achieved more readily when a population is united by solid community networks and involvement, according to Pyles (2007). Additionally, encouraging a high level of accountability prior to the likelihood of a disaster incident makes it easier to enforce effective government actions and ensure community compliance during times of duress. Buckland and Rahman (1999) relate how, during the 1997 Red River Flood in Manitoba, confusion and disappointment resulting from orders to evacuate given by the Manitoba Emergency Management Organization
(MEMO) generated feelings of distrust among area citizens. Once distrust surfaces, it is much more difficult to reverse and can lead to untimely resistance when solidarity is imperative. Positively addressing the issue of government accountability is a realistic and achievable goal for disaster preparedness since, according to Buckland and Rahman (1999), “community effectiveness in disaster management would be greatly enhanced by a relationship with government agencies that is based on equal partnership, mutual respect and open, two-way communication” (p. 189). Governments must work in tandem with community networks and efforts during times of duress since whole, strong social connectedness equates with better overall resilience.

**2.5 Tangible Interdependency: Engagement in Times of Distress**

As mentioned earlier in this review, the idea of tangible interdependency relates to how the need for connection helps communities endure in the face of distress (Smithers et al., 2004). The importance of a foundation of strong community involvement and networking is exceedingly evident when scrutinizing the level of community connectedness after a natural disaster occurs. Denis (1995) poses the observation that “what is accepted as uncertainty in a normal context becomes unbearable in a disaster” (p. 16). Therefore, the question of whether community members will join together or spread apart in the face of disaster becomes quite relevant. This also plays a considerable role in a community’s vulnerability during the rebuilding process. In spite of this, Chang (2010) states that “contemporary research has paid little attention to the impact of disasters on group cohesion in real-life situations” (p. 289).

Significantly also, community connectedness to disaster frequently depends upon the root cause of the disaster itself. As alluded to earlier in this dialogue, response often assumes very distinct pathways and supports depending on whether the disaster is the result of natural or artificial, that is, man-made activities (Kouzmin et al., 1995; Marjanovic et al., 2009). Even perceptions regarding disaster causation play a critical role in engagement. Marjanovic et al. (2009) explain the difference between *locus of causality* and *situational controllability* where locus of causality determines the magnitude of victim contribution to a negative effect while situational controllability considers the ability to foresee or prevent the occurrence of an actual,
negative event. A disaster situation where culpability rests with both loci of causation may restrict sympathies and hinder vital, compassionate associations with the community during the critical period when it is needed most (Kouzmin et al., 1995). This type of disconnection can also negatively influence global response to the disaster site. Less supportive, more detached global response may occur when natural disasters result from human intrusion or exploitation, such as when drought follows desertification resulting from extreme land abuse for commercial gain. In such cases, non-affected individuals may be less willing to extend helping behaviour to the affected individuals (Marjanovic et al., 2009).

Another threat to community connectedness comes from social dilemma theory which states that, after a disaster, individuals often become more self-interested rather than united and issues such as the free-rider problem may arise (Chang, 2010). The free-rider problem, where an individual does very little or nothing yet gets by because of the actions of others, is frequently witnessed under ordinary circumstances let alone during times of adversity. However, this type of social unresponsiveness and lack of engagement can be much more damaging in times of duress when community unification and strength are of the utmost importance.

If problems such as lack of cohesion and apathy regarding community networking are addressed prior to the onset of a natural disaster, the recovery phase can actually become an enhanced tool for community development (Pyles, 2007). Putnam (1995) suggests “dense networks of interactions probably broaden the participants’ sense of self, developing the ‘I’ into the ‘we,’ or (in the language of rational-choice theorists) enhancing the participants’ ‘taste’ for collective benefits” (p. 67).

Pyles (2007) offers four important strategies for increasing resilience and managing post-natural disasters. First, employ processes that encourage civic engagement and inclusivity, particularly of “the most vulnerable members of society;” second, fortify community capacities; third, include “development issues” into disaster reconstruction efforts; and fourth, utilize external players in “supportive, facilitating and catalytic roles” (Pyles, 2007, p. 325). Incorporating these strategies can inspire a united group of individuals who will work cooperatively to tackle the challenges brought about by disaster (Chang, 2010). Furthermore, including affected individuals in reconstruction processes reduces their lack of information about the disaster situation and alleviates some of the additional hardships they may experience due to
this unawareness. This was witnessed in New Orleans after Hurricane Katrina, when many of the disaster victims felt they lacked proper knowledge about their own dire circumstances (Patterson et al., 2010).

Obviously, there is a great need to employ bottom-up endeavours prior to the onset of disasters (Mathbor, 2007). By addressing issues of engagement and connectedness early on, laying solid groundwork for tangible interdependency before disaster strikes, and proactively addressing the concern of public opinion with respect to disaster causality, important strides can be taken to reduce the effects of disaster upon a community or to view the disaster as an impetus to further constructive networking.

2.6 Vulnerability and Resilience

Cutter et al. (2008) identify resilience as “the ability to survive and cope with a disaster with minimum impact and damage” (p. 600). Clearly, striving to increase a community’s capacities while acknowledging and reducing its vulnerabilities, through the effective utilization of social capital and by nurturing strong community networks, can enhance community resilience and effectively reduce potentially damaging impacts from disaster.

Adaptive resilience, therefore, is considered a set of practices within a continuum of processes that impact, not only disaster recovery, but also the conditions for future disaster management (Cutter et al., 2008). By exercising more preventive than reactive methods of capacity management and susceptibility control, a community’s overall or adaptive resilience can be increased and its vulnerabilities to disasters substantially diminished. The concept of adaptive resilience differs markedly from lessons learned. Whereas adaptive resilience is an interactive, on-going approach to an incident that helps establish action plans for future situations, lessons learned are summations of a situational response in order to assess what actions did or did not work and make recommendations based on these observations. Unlike adaptive resilience, the recommendations from lessons learned may not necessarily be incorporated into long-term, reusable plans of action for future events (Cutter et al., 2008).
There is a unique relationship between resilience and vulnerability: both are affected by similar external and internal factors, but in different ways. Since vulnerability and resilience have the potential to individually or jointly influence adverse situations, it is essential to properly address all conditions that could amplify vulnerability and resilience. Cutter et al. (2008) discuss factors such as "socio-economic status, education, and insurance" (p. 602) that could affect vulnerability and resilience together or separately. One tool used to better understand the vulnerability-resilience relationship is the Disaster Resilience of Place Model (DROP) (Cutter et al., 2008). This model specifically addresses the conditions surrounding natural disasters and how these relate to social resilience. As an example, Cutter et al. (2008) reference concerns involving rainforest vulnerability; if destruction is not managed appropriately, the risk of increased devastation occurring from the next disaster may result. Therefore, employing DROP can help reduce a community’s vulnerability by increasing its resilience in the face of disaster.

2.7 IncorPorating Mitigation with Community Engagement

Henstra and McBean (2005) divide the “range of policies and practices developed to prevent, manage and reduce the impact of disasters” into four categories: preparedness, response, recovery, and mitigation (p. 304). While the meaning of the first three is self-evident, mitigation requires some clarification because it essentially encompasses actions taken before, during, and after disaster strikes. Just like adaptive resilience, the intent of mitigation is two-fold: to minimize damage from the immediate event and to potentially reduce damage that could result from similar future events (Henstra & McBean, 2005; Board of Natural Disaster, 1999). If adaptive resilience promotes the establishment of action plans for future disaster management, mitigation promotes risk reduction through the incorporation of community engagement now and in the future.

Mitigation is essential as a preventative tool in a world where disasters appear to be progressing instead of regressing. The United Nations, prompted by high tolls on life and property damage resulting from disasters, even dedicated “the1990s as the International Decade for Natural Disaster Reduction (IDNDR)” (Board of Natural Disasters, 1999, p. 1943). In Canada, the frequency of natural disasters also appears to be on the rise. Henstra and McBean (2005) support this by noting that “changes in the
hazard variable and the vulnerability variable indicate that the magnitude of disasters we have experienced to date may be exceeded by those in the future” (p. 315).

Pressing for mitigation usually falls to the hands of local authorities whose very proximity to the disaster makes them ideally suited to implementing mitigating measures. Yet, there is a very short window of opportunity after disaster strikes to push for mitigation before life returns to the status-quo (Henstra & McBean, 2005) and mitigation becomes a sideline to more pressing, daily concerns. More sustainable choices can be made if mitigation takes a more central priority and is employed during less stressful times rather than waiting to implement this practice during times of duress. Henstra and McBean (2005) offer some examples of mitigation measures:

Structural measures such as dams or seawalls, constructed to control or contain hazard; land-use management, such as zoning regulations which prohibit or regulate construction in hazardous areas; building regulation, including the enforcement of minimum standards for disaster resistance; and warning systems to inform people of impending disaster. (p. 304)

While the benefits of mitigation may not always be readily apparent, in some cases the results are quite dramatic. In one example, simply absorbing the cost of $1.3 million for not building in flood-prone areas resulted in a reduction of $11 million per year in estimated property damage costs (Board of Natural Disasters, 1999, p. 1945). Surely, incorporating mitigation practices more routinely into community engagement provides an enhanced method of disaster management and control.

**PART TWO: TORNADOES**

**2.8 CLASSIFICATION**

Storms manifest their capabilities in different ways and are frequently marked by violent winds. Yet, clearly identifying these atmospheric events often eludes a great deal of the population. Tornadoes, those potentially devastating vortices of frenetically whirling air, clearly fit into this storm-confusion. Rating their magnitude, comprehending their potential, and even determining whether or not a tornado has occurred or best methods of protection from these natural phenomena are unclear at times. In fact, research carried out by Newark (1984) found that tornadoes were “not always identified as such” in the reports he studied to the point where “descriptions of tornado damage and thunderstorm downburst damage” were so similar that “some uncertainty exist[ed] as to the true meteorological nature of the storm” (p. 346).
In an attempt to reduce some of this ambiguity, Newark (1984) developed a method of tornado determination. Surveying previously recorded accounts of tornadoes, he categorized these into three types, A—C, in order to separate true tornado occurrences from other storm events. Type A accounts represented a confirmed tornado based on the presence “of either a funnel cloud or thunderstorm wind damage in rotary or convergent patterns along a narrow path” while Type B events lacked of an observable funnel cloud yet indicated a probable tornado because of other demonstrated qualities (Newark, 1984, p. 346). Finally, Type C records displayed only some of the same traits as Type B events and were, therefore, classified as possible tornadoes (Newark, 1984).

Once a tornado is indeed verified, it is classified. In the late 1960s, Tetsuya Fujita created and Allen Pearson implemented the Fujita Tornado Intensity Scale, also known as the Fujita-Pearson Tornado Intensity Scale or F-scale. Prior to this, no formal method of rating tornadoes existed (Doswell et al., 2009). Fundamentally, the F-scale ranks the severity of tornado damage based on wind speeds that are divided into five categories of increasing strength (Doswell et al., 2009, p. 554). While the F-scale remains the most commonly used scale globally, more recently the National Weather Service (NWS) in the United States implemented the Enhanced Fujita (EF) scale. The EF-scale includes 28 damage indicators associated with a specific degree of damage used in conjunction with wind speeds to better rate tornado intensity (Doswell et al., 2009).

2.9 Evaluation Issues

There are weaknesses inherent in both the F-scale and the EF-scale. Problematic are F-scale wind-speed measurements that are determined by either a mobile Doppler radar or according to observed and measured building destruction levels (Doswell et al., 2009). It is extremely difficult to get accurate wind-speed levels for, as Doswell et al. (2009) note, “in the USA, more than 1000 tornadoes are reported annually, but at present, only around 20 tornadoes are sampled by mobile Doppler radars every year” (p. 555). As well, since wind-speeds rated according to damage are based on an ideal, well constructed wood frame home, it is challenging to assess accurate wind-speeds based on damage to any other type of building (Doswell et al., 2009). Moreover, wind-speed categorizations also commonly side with higher
rankings that could potentially sway results to F3-F5 tornado classifications in certain cases (Doswell et al., 2009). Some of these concerns are lessened by the inclusion of damage indicators in the EF-scale; however, there is still an increased risk that these will be recorded improperly or that slight variations could exist (Doswell et al., 2009).

Another concern with categorizing tornadoes is that personnel are often not fully trained in ranking processes (Doswell et al., 2009) and this can cause discrepancies in results. This problem is amplified by the requirement to rank all tornadoes, regardless of the amount and quality of data available, which frequently leads to an abundance of lower F0 and F1 categorizations that could, potentially, be erroneous (Doswell et al., 2009). In fact, in southern Ontario, close to 75% of recognized tornadoes were ranked as F0 or F1 (Banik et al., 2008, p. 1385). Problems also lie in the inability to properly source gathered information, which further reduces data validity, and there is potential for bias in the collection process itself, since most officials are meteorologists rather than structural engineers (Doswell et al., 2009).

Most problematic of all, according to Feuerstein et al. (2005), is the fact that ranking tornadoes is still extremely subjective. Many variables, such as disparity in house construction, building strength, population distributions, or increased rural areas with limited man-made structures, can lead to inaccurately determining the magnitude of a tornado since F-scale measurements are largely based on the level of physical damage to an affected area. Therefore, determining a tornado’s magnitude solely by relying on the destruction in its immediate aftermath may not fully reveal the depth of its impact.

Both Canadian and American tornado databases contain information biases and gaps that make some aspects of tornado considerations difficult (Cao & Cai, 2011; Banik et al., 2008). Sills et al. (2004) observe that “population bias and rare event bias” (p. 1), among other weaknesses, plague many tornado databases. Some partiality results from population variations due to regional densities. Finally, aside from the tendency toward higher categorizations based on faulty wind damage assessments, as discussed above, F-scale ratings generally display a predisposition toward weaker level tornadoes due to the abundance of ranking difficulties encountered (Cao & Cai, 2011; Doswell et al., 2009). Considering all of this, gaps in the system are evident and difficult to change and issues such as the unpredictable and transitory nature of tornadoes and the reliance on observations and data collection that are often difficult to fully substantiate may always plague tornado evaluation (Cao & Cai, 2011).
2.10 Tornadoes in Canada

Tornadoes have occurred throughout all areas of Canada (Newark, 1984). Ontario holds the highest seasonal record for tornados at 107 days beginning mid-May and carrying right through the summer months while most western provinces’ susceptible period starts a month later and eastern areas start two months later (Newark, 1984, p. 348). It is interesting to note that Goderich’s tornado struck very late in the season when, generally, the potential for tornadoes is less. Normally, there are 80 reported tornados throughout Ontario annually that, on average, kill two and injure at least 20 individuals (Cao & Cai, 2011, p. 27). Newark (1984) cautiously concludes that Canadian tornado activity, most probable in southeast Manitoba and southwest Ontario is “an extension of the great tornado prone region centred over the south central United States” (p. 352). Interestingly, this region of the United States, coined Tornado Alley, does not sustain the greatest mortality rates from tornadoes; this distinction belongs to other regions of the United States (Ashley, 2007).

While loss of life and injury are very serious threats resulting from tornadoes, they are not the only somber by-products of these forceful events. Damage to natural and man-made environments and infrastructures can be overwhelming and, in the extreme, irrevocable. Moreover, densely populated and industrial areas, like southern Ontario with its higher propensity for tornado activity, are at risk for incurring substantial economic distress should a tornado inopportune strike a particularly sensitive location (Banik et al., 2008).

Such information substantiates the need for protection in susceptible regions. As with other naturally destructive phenomena, people are often unaware of proper safety protocols. For tornadoes, their capricious and transient nature generates even more stress and confusion for individuals. While tornado strikes are generally erratic, some provisions can be undertaken to lessen their impact. The most important precautionary safety tip is to have a box of essential survival items ready in case of emergency, according to the Canadian Red Cross (n.d.). As well, during tornado warnings or funnel cloud sightings, individuals are encouraged to take shelter indoors, in basements or first floors of buildings or under large pieces of furniture, and to avoid being in automobiles or mobile homes during such situations (Banik et al., 2008). If, due to the unexpected nature of tornadoes, one is forced to remain outside, the safest location is to be as low to the ground as possible (Banik et al., 2008).
2.11 GODERICH EXPERIENCE

The citizens of Goderich poignantly validated the perplexity surrounding tornadoes as they shared their very personal and often emotional recollections of the devastating event that befell their community in the book, *Not Like Any Other Sunday: A collection of personal stories from the day an F3 tornado struck Goderich, Ontario* (Cove & Bundy-Cooper, 2011). With this in mind, while conducting my research it was essential to delve beyond the obvious in Cao and Cai’s (2011) comment: “tornadoes are one of the most severe weather phenomena, which have high impacts on our society in terms of loss of life and damage of property” (p. 27). For underscoring their observation is the complex reality that, while many of the issues discussed in any study on tornadoes necessarily deal with the physical ramifications of this type of disaster, tornadoes affect a substantial emotional toll on individuals as well, which can extend well beyond tangible or otherwise observable damage.

The subjective determination of F-scale rating is most certainly an issue for all tornado locations and the experience in Goderich was no exception. The tornado that ravaged central Goderich was ultimately classified as F3 on the Fujita Scale (Environment Canada, Tornado Goderich, 2011). The initial Environment Canada classification was F2, but upon more extensive investigation and analysis this was upgraded to F3 (CTV News.ca Staff, 2012 May 19). To put the destruction from the Goderich tornado into perspective, only 6% of recorded tornadoes are considered severe enough for an F3 rating, while a mere 0.1% of all tornadoes, like the one that decimated Elie, Manitoba in 2007 are considered incredible enough for an F5 rating (Environment Canada, Fujita Scale, 2007, para. 5, 7). Evident throughout Goderich’s downtown core and select residential neighbourhoods—areas most severely damaged—tornado culpability reflected the arbitrariness of its destructive potential. For other situations it was difficult to distinguish direct tornado damage from indirect damage ensuing from weakened structural exposure or rains following the strike. In such cases, “most of the damage [was] caused by rain” (Mayor of Goderich, personal communication, July 17, 2012).

Conventional and social media relayed community reactions and responses in the immediate aftermath of the tornado and in subsequent days and months. From these, a narrative on capacity, vulnerability, social capital, and networking emerges as they relate to displacement, economics, and community engagement.
2.11.1 Displacement

The F3 tornado rendered many individuals homeless. Although the length of time this affected households varied greatly, the impact on the entire community was substantial. Next to securing emergency medical care for victims of the tornado, the most pressing immediate repercussion from the disaster was that many town residents were dependent on others for shelter. The Knights of Columbus Hall was established as an emergency shelter (211 Central East Ontario, 2011; Lynn, 2012, Video Series Part One) and as community individuals and organizations stepped forward, short-term accommodations became readily available. However, for those requiring additional refuge, generally individuals and families whose homes were rendered unsafe or completely destroyed, securing long-term housing proved to be a greater struggle (Peesker, 2011). Even though the community and town council worked as quickly as possible, issues with insufficient numbers of local contractors did create some delays (Town Planner, personal communication, August 8, 2012). These and other setbacks left some residents still rebuilding a year later (CTV Kitchener, 2012).

2.11.2 Economics

Economically, the financial burden of the tornado’s destructive path was staggering. According to Property Claim Services Canada, an agency that “tracks insured losses from catastrophic events,” over $110 million in claims were made by individuals and businesses out of the total damages of approximately $130 million to the town (CTV Kitchener, 2012, para. 7). The Goderich Chamber of Commerce released information that $22 million in building permits for roughly 300 damaged or destroyed buildings were issued (Lynn, 2012, Video Series Parts Two and Three). With such extensive damage, social assistance programmes and emergency funds are paramount. Insurance coverage continues to help with many of the losses and “short-term emergency grants were available the week after the storm” (Peesker, 2011, para. 21). Funding under the Ontario Disaster Relief Assistance Program offered supplemental compensation for those eligible (Peesker, 2011). In all, $12 million in relief funds were raised: $8 million through provincial contribution (CTV News.ca Staff, 2012 Aug 21, para. 11) and the substantial remainder from community and business initiatives and donations (Head of the Relief Fund, personal communication, July 17, 2012). Augmenting the financial woes brought on by the physical destruction to the town, extensive damage to the Sifto salt mine, a major town employer (Peesker,
2011), as well as interruptions to employment at tornado-affected businesses resulted in the loss of hundreds of jobs (Lynn, 2012, Video Series Part Two).

2.11.3 Community engagement

The process of reconstruction cannot be undertaken by a “one-size-fits-all” method; although time consuming, each community’s unique strengths and weaknesses must be explored in order to properly address the issues at hand (Cutter & Emrich, 2006, p.112). In light of their disaster reality, the community of Goderich has worked hard and quickly to rebuild. Although some concerns were expressed such as, “the biggest challenge facing the town now will be co-ordinating [sic] the reconstruction efforts and making sure everyone is on the same page” and “council needs to keep the public more informed and on track with what is happening and still needs to be done” (Peesker, 2011, para. 23, 24), town officials believed the community was prepared for the fall-out from the disaster. In fact, since a 1995 disaster event when a “near-hurricane level storm ripped through” the town and an “emergency control plan” was developed, the town had proactively prepared itself for the occurrence of natural disasters and, according to its mayor, “his experience that day proved the importance of being prepared for such emergencies” (CTV News.ca Staff, 2012 August 21, para 8, 9).

Within one year, the town embarked upon a vigorous restoration process. Today, 152 out of the 170 businesses damaged by the tornado are rebuilt and operating (CTV Kitchener, 2012, para. 6). Seven new businesses have opened up and the community has developed an elaborate, $2.5 million five-year project to enhance the decimated downtown area (Lynn, 2012, Video Series Part Three). The Town of Goderich’s (2012) Downtown Core Master Plan is ambitious and hopes to entice new development to the area. Some of its notable initiatives are: the planting of 150 trees to replace the 100 mature trees that were destroyed and help green the historic, core community once again with a sustainable urban canopy; expanding sidewalks to increase the priority of pedestrian traffic downtown, reducing roadways in the core from three to two and one-half lanes, and enhancing the character of the core business and green areas to promote it as a viable area for future development and investment (Town of Goderich, 2012; Lynn, 2012, Video Series Part Three).
Cutter and Emrich (2006) address the reality that while "disasters magnify the existing social and economic trends in places; they do not fundamentally change them" (p. 104). This issue has been dramatically felt by the Goderich community. Ongoing economic concerns brought about by globalization and shifting fiscal and societal realities have not left Goderich unscathed. A staggering blow to employment was dealt in the past few years with the estimated loss of 500 jobs when Volvo closed one of its local plant operations three years ago and, more recently, when 200 jobs were cut when the province closed the Bluewater Youth Detention Centre in the spring of 2012 (Lynn, 2012, Video Series Part Three).

Although it is accurate to hold the tornado responsible for many negative issues in Goderich over the past year, it has also given impetus to a rebirth of sorts in the small community by presenting it with a refocused direction for economic and community growth—tourism. As previously mentioned in Chapter One, tourism is a large economic aspect of Huron County and the community of Goderich (Town of Goderich, 2007). In fact, Faulkner (2001) discusses the strong connection that a community’s tourism industry can have to its overall services. For Goderich, the community has given this one aspect of its economic strength considerable contemplation and, in conjunction with implementation of its five-year project, is looking to expand upon its existing tourism base as its promising new economic direction (Lynn, 2012, Video Series Part Three).

In an apt summation of the up-beat spirit of this small town, its mayor confidently observed the community “stayed strong” and its “resilient” residents are “ready to move on (Lynn, 2012, Video Series Part Three).
CHAPTER THREE: RESEARCH DESIGN

3.1 EPISTEMOLOGY

Epistemological perspectives consist of social constructivism and interpretivism. Social constructivism is appropriate for this research because of its observational and collective aspects as I examined how the post-disaster rebuilding experience affected the local population. Better understanding of the social engagement of this study population helped me recognize the roles various individuals assumed within regular social interactions, community norms, and during crises. Understanding these social roles was essential, particularly as I conducted this research as an impartial, outside observer. Through a social constructive approach, underlying causes of potential impediments to engagement for the study location may surface. Sensitivity to various social constructs aided the consideration of the data obtained and the conclusions drawn.

Additionally, an interpretive prospective was continuously performed since I largely relied on participants' viewpoints of the situations studied and it was imperative to make sense of the meanings behind their shared experiences. Therefore, while social constructivism allowed me to gather many viewpoints, interpretivism helped me develop subjective meaning to the reconstruction experiences shared with me. The matter of understanding human judgment and its effects on the behaviours of the research participants was essential in determining if man-made rebuilding efforts were further restricting individuals already greatly affected by this natural disaster.

3.2 METHODOLOGY

In exploring post-disaster community engagement for Goderich, a mixed methods approach was employed to facilitate better understanding of the multi-dimensional effects of the disaster on this community. The three methods used were conducted on-site and in-person and included surveys, semi-structured interviews, and key informant interviews (Appendix A, figures 1 – 7) in order to create a mixed methods approach and a more confident set of data (Bryman & Teevan, 2005). This triangulation increased the overall validity of the research. All participants were above the age of majority and consent was secured prior to gathering data (Appendix A, figures 8, 9). Personally conducted approaches increased the inter-observer
consistency reliability of the research (Bryman & Teevan, 2005) and promoted increased communication between myself and the participants. Since all research was completed orally, this personal approach allowed me to gather the highest level of opinions possible and to conduct in-depth conversations aimed at comprehending the full sphere of commentaries surrounding community engagement. The quantitative and qualitative data collected ensured the level of reliability and validity necessary to gauge appreciation for the delicate relationship of community engagement, in this post-natural disaster location, was achieved.

A pre-test of the questions, as recommended by Bryman and Teevan (2005), incorporating the survey and both types of interviews, was conducted on three Goderich residents prior to the actual research administration in the community. This offered increased confidence in the accuracy of useful and community-sensitive questions.

All data acquired from semi-structured and key informant interviews was orally recorded on a password-protected Asus notebook/tablet, transcribed at the end of each day’s data collection to appropriately labeled forms, as outlined below, and transferred to password-protected data storage units. Once transferred, the original recording was permanently deleted from the Asus notebook/tablet accordingly. Responses to survey questions were manually recorded on individual survey forms at the time of data acquisition. All written material and transcriptions were stored in hard copy and were securely contained in a locked storage box at my locked place of residence. Password-protected audio recordings of Universal Serial Bus (USB) stored semi-structured or key informant interviews were also securely contained in a locked storage box at my locked place of residence during all of the phases of research—data collection, analysis, and finalization of thesis. Interested participants received proper E-mail contact information enabling them to voice further concerns regarding the research. Condensed, final research results were made available to all interested parties through e-mail to encourage further community engagement in this research.

Once the research was completed, data analyzed, and thesis finalized, all survey, semi-structured and key informant interview materials, and E-mail correspondences were properly destroyed as confidential information per established University of Guelph ethics requirements. Additionally, any E-mail interactions involving my research was directed through my university E-mail account to assure compliance with intellectual privacy procedures.
3.3 PROCEDURE

3.3.1 Surveys

Surveys were conducted orally. This increased the overall completion of useable data, as stressed by Bryman and Teevan (2005), augmented the speed of information collection, and aided in participants’ complete comprehension of the questions asked. Prior to conducting the actual interviews, printed information fliers outlining my research intent were randomly distributed, in person, throughout all of the main residential areas of Goderich (Appendix A, figure 10). To further augment the random selection process, not all houses that were surveyed received fliers. The method of random distribution commenced with delivery to an initial corner address and to every fifth address thereafter. Due to entrance and security restrictions, households residing in apartment buildings could not be accessed to conduct surveys. A distribution list that included where and when the pamphlets were delivered was generated in order to ensure accuracy during survey administration and reduce potential overlapping of distribution. The fliers included a specific date and approximate timeframe of when I was conducting oral surveys in each of these neighbourhoods. This method of data collection was exercised because of Goderich’s slightly older population demographic and was intended to increase potential contact with individuals who may otherwise be overlooked with other methods of survey delivery. It additionally served to explain exactly who I was (Bryman & Teevan, 2005) and provided my university affiliation as well.

Surveys were sporadically conducted between 1100 and 1900 hours on Saturdays and between 1600 and 2000 hours on Mondays through Thursdays. Surveys were not administered on Sundays out of respect for potential individual religious observances. A brief consent form was read and oral agreement received prior to initiating the survey; if requested, a copy of the consent information was provided as well as my academic credentials. For logistical purposes only, answers were recorded on individual sheets, labeled only by the date of acquisition and a general residential district code. This code was required to gauge residential district participation statistics. No personal identifiers of the participant, residence members, or residential address were recorded to ensure confidentiality and this, additionally, encouraged participants to be forthcoming with candid responses.
The timeframe for survey administration was July through October 2012. This allowed enough time to gather the necessary participation results. Survey completion times ranged between 3—10 minutes, including consent. Interested participants were given my secure E-mail account through which additional research-related comments could be directly sent. An end goal of collecting 184 fully completed and usable surveys was obtained. When participants wished to withdraw, elected to not participate, or were not at home, a non-replacement method was used by simply moving to the next address.

Ensuring 184 surveys were completed allowed for inference with a ± 7% sampling error for this community of 7,521 people (Statistics Canada, Census Subdivision, 2012, para. 1). Surveys involved quantitative components gauging demographics and measuring various periods of community involvement. Quantitative data helped generate a pre and post disaster community snapshot while qualitative data engaged participants’ social feelings and motivations, which helped form a basis for further in-depth analysis during the semi-structured interview processes conducted.

3.3.2 Semi-structured interviews

Seven random haphazard, semi-structured interviews took place throughout the downtown core on various days at a various times between July and August, 2012. Participation was obtained by approaching every third person encountered while walking in a rightward circle around city hall or along downtown streets. At no time did I enter any specific buildings for the purpose of conducting interviews, as this could be construed as non-randomly soliciting participants. All semi-structured interviews were carried out in a replacement manner whereby an unsuitable or unwilling individual was immediately replaced with the next person I encountered.

Interviews took between 7—30 minutes and signed consent was secured prior to initiating research dialogue. When requested, a copy of the consent information was provided. Interviews were performed in public areas. Due to the public context of these interviews and the fact that the subject matter could elicit overly emotional responses, great effort was undertaken to ensure questions were sensitively framed. I purposefully allowed participants to decide upon the depth of their responses. Interviews involved the same quantitative components as surveys but very quickly became qualitative to properly engage research objectives.
3.3.3 Key informant interviews

Lastly, key informant interviews were conducted that targeted integral stakeholders among the community, relief fund organizers, and reconstruction coordinators. The selection of four interviewees from various backgrounds and with a range of knowledge on the rebuilding process or community structure was undertaken to achieve equitable understanding of the community restoration process. Interviews averaged approximately 20—60 minutes and occurred in a mutually convenient setting predetermined through E-mail communication as per “conducting interviews guidelines” found in Bryman and Teevan (2005, p. 75). Signed consent was obtained prior to initiating the interview and a copy of the consent information was provided to each interviewee to keep. Initial interview direction encouraged the sharing of personal experiences and later probing questions, focusing on community engagement with respect to capacity and vulnerability models, followed.

3.3.4 Additional considerations

My University of Guelph photo identification card was with me during all phases of data acquisition. Surveys, semi-structured interviews, and key informant interviews were coded and put into IBM Statistical Package for Social Science Statistics 21 (SPSS) and QRS NVivo 10 (NVivo) to increase analysis efficiency. Triangulating data obtained through the three data acquisition methods employed increased research validity as well as the extent to which conclusions were inferred to the wider Goderich population and to future reconstruction efforts in communities facing similar disaster situations as Goderich.

3.4 LIMITATIONS

Four main limitations surfaced as I explored key stakeholder community engagement in Goderich: time constraints, on-going community reconstruction, personal bias, and uncooperative individuals or settings. These were overcome by employing due diligence and flexible organization.

3.4.1 Time constraints

Due to the fact that critical field work was essential for this primary research, time constraints certainly did create hurdles. Some solutions that significantly reduced
setbacks were: efficiently organizing the data collection phases, remaining flexible to stakeholder schedules and needs, and preparing alternate strategies to adapt to unforeseen emergencies. Although the timeframe for data collection was tight, it seemed entirely acceptable because of the generally high levels of community engagement previously perceived as intrinsic to Goderich (Town Planner for Goderich, personal communication, August 8, 2012).

3.4.2 Community reconstruction

Given the very recent timeframe of the tornado’s impact in Goderich, the town is currently still in the rebuilding phase, which must be considered as a possible limitation for this research. A vast amount of information, specifically surrounding community rebuilding, is still in the process of being formulated. Therefore, it will be difficult to ensure acknowledgement of all projects is duly made by participants in this study. However, in the year since the tornado hit, a great deal has already been achieved in the community and these accomplishments were used to reliably understand community capacity and vulnerability. As well, since the reconstruction phase is on-going, stakeholders appeared more likely to participate in this research because they had a vested interest in its ultimate completion.

3.4.3 Personal bias

Growing up in rural southern Ontario could betray a slight degree of personal bias toward the community due to prior memories or opinions surrounding Goderich. This limitation was greatly reduced because of the extremely limited time I spent in the community prior to undertaking this research. Conversely, my comfort in a rural setting encouraged stakeholder ease and possibly attributed to more open dialogue. Ideally, this potential limitation could even be considered a research strength since it was acknowledged from the onset and was consistently monitored throughout all stages of research acquisition and analysis.

3.4.4 Lack of cooperation

The final, and perhaps most difficult limitation, was dealing with difficult individuals or locations. Since Goderich is primarily an older community, anxiety over opening doors to strangers or of being targeted by fraud were genuine concerns that I did my best to assuage by presenting myself in an open and friendly manner. To
alleviate apprehension, I immediately introduced the purpose of my visit and research topic and always carried my university identification. Understandably, in some cases this was not sufficient to allay concerns. As well, locations such as apartments or residences for the elderly were not surveyed because of the security restrictions surrounding entry into these buildings. This resulted in limited data acquisition from these residents. As well, surveys could only be conducted during times and days with a higher potential of finding individuals home due to many variables such as work, social, or academic responsibilities. Additionally, these times often conflicted with meal preparation, volunteer activities, and relaxation time, which further hampered participation. Overall though, I found the community was extremely eager to help and these limitations were sparse at best.

3.5 **ANALYSIS METHODS**

3.5.1 **Qualitative coding**

As collected qualitative data was analyzed, categories or nodes of similar responses emerged and were coded according to source and frequency in order to extrapolate meaningful trends and patterns. With regard to the research objectives and the CVA model, the following patterns were observed:

Objective: To understand risk by exploring stakeholders’ physical capacity and vulnerability.

Codes: Potential concerns for residents and business owners; support from outside communities and individuals.

Objective: To understand perceptions by exploring stakeholders’ social connectedness.

Codes: Reduce risks in a timely manner; understand change is needed for growth; significance of communication; willingness to work or engage in community; build new relationships and strengthen existing relationships; high levels of community involvement; low levels of community involvement.

Objective: To understand involvement by exploring stakeholders’ motivation both before and after disaster.

Code: Significance of positive thinking and behaviours; sensitivity to the community; perception involving the importance of the *square*. 
3.5.2 Quantitative coding
Since data collected pertained to demographic information and three distinct time periods of engagement, variables were coded into SPSS for ease of analysis.

3.5.3. Quantitative testing
A brief overview of the tests performed on quantitative data obtained in this research is included below, as is clarification of some key terms encountered in the analysis. A critical indicator of support for the alternate hypothesis (H₁) comes from the rejection of the null hypothesis (H₀) and tests used were selected for their suitability to do this. If rejected, the alternate hypothesis (H₁) was accepted since the possibility of a chance outcome occurring had been disproven.

The Chi-square test ($\chi^2$) is used to determine if the categorical (ordinal or nominal) variables between two or more independent groups differ. This test is only used with numeric responses not indicated by percentages, means, or similarly derived numeric information. In Chi-square, a probability value of ($p < .05$) rejects the null hypothesis because the observed results do not correlate with a statistically significant difference, that is, there is no significance between expected and observed results.

The Kruskal-Wallis (K-W) analysis of variance (ANOVA) is a non-parametric test for ordinal or ranked variables which follows the Chi-square distribution. Such variables are not labeled as they have no specific, associated value. Kruskal-Wallis compares two or more independent samples and is statistically significant when indicating a difference between groups. Using a statistical significance of ($p < .05$), this test determines the probability that the observed differences between the sets of data occurred by chance and can therefore be used to reject the null hypothesis. This test was pertinent because of the substantial amount of ordinal data obtained from Likert scale questions used in this research.

The Likert scale is a measure of the intensity of respondents’ attitudes to various issues. Throughout this research, a three-point Likert scale was employed because of size of the survey sample and time constraints.

The Mann-Whitney U (M-W U) is a non-parametric test that compares two independent, random sample variables that are unrelated by measuring the similarity of binary responses between their ordinal-valued groups. The test determines if the mean rankings of the two groups are equal. A small probability value ($p < .05$) indicates the two groups have a very different mean of ranks. This allows for rejection
of the null hypothesis and the conclusion that the samples are distinct and due to random sampling. A larger probability value ($p > .05$) provides less evidence that the samples are different. The Mann-Whitney U test was useful in this research context because of the binary demographics obtained through surveys. Results from the Mann-Whitney U were also useful in interpreting comparisons with Likert scale results.

The *Spearman Rho* ($\sigma$) is a non-parametric, correlation test that determines the magnitude of association between two ordinal variables. Magnitudes closer to +1 or -1 indicate stronger correlations whereas magnitudes close to or at 0 indicate a lack of strong correlation. Two assumptions must be met in order to use the Spearman Rho test. The first is that the two variables must be ranked; the second is that the two variables must be monotonic, that is, either both variables increase together or as one variable increases the other variable decreases. Monotonic relationships are less restrictive than linear relationships, are not sensitive to outliers, and are readily visible using scatter plots all of which were valuable considerations for the type of research conducted here. As well as correlation magnitude, the Spearman Rho test determines the direction of correlation between two variables, which indicates relationship; positive correlations are indicative of positive relationships and negative correlations indicate negative relationships.
CHAPTER FOUR: RESULTS AND INTERPRETATIONS

4.1 QUALITATIVE DATA RESULTS

In-depth analysis of specific trends emerging from the four key informant and seven random semi-structured interviews were formulated into codes (Table 4.1) and arranged within a CVA context according to physical, social, and motivational categories in an effort to better understand their impact on the community. Specific reference to quotes and examples given by the interviewees helped to reinforce their shared details and first-hand experiences, allowing for a deeper appreciation of the capacities and vulnerabilities encountered.

Table 4.1
Qualitative Responses Coded According to the Number of Sources and Frequency of Reference

<table>
<thead>
<tr>
<th>Qualitative Codes</th>
<th>Number of Sources</th>
<th>Frequency of References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build new relationships and strengthen existing relationships</td>
<td>6</td>
<td>20</td>
</tr>
<tr>
<td>High levels of community involvement</td>
<td>9</td>
<td>34</td>
</tr>
<tr>
<td>Low levels of community involvement</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Perception involving the importance of The Square</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>Potential concerns for residents and business owners</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>Reduce risks in a timely manner</td>
<td>9</td>
<td>23</td>
</tr>
<tr>
<td>Sensitivity to the community</td>
<td>10</td>
<td>48</td>
</tr>
<tr>
<td>Significance of communication</td>
<td>3</td>
<td>21</td>
</tr>
<tr>
<td>Significance of positive thinking and behaviours</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Support from outside communities and individuals</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Understand change is needed for growth</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>32</td>
</tr>
</tbody>
</table>

Note: NVivo used for analysis. Code variables derived from repeated references noted during interviews. Seven semi-structured and four key informant interviews yielded a combined maximum number of 11 sources \((N=11)\) from which qualitative codes were drawn.

4.2 QUANTITATIVE TESTING RESULTS

4.2.1 Hypothesis one

To test the hypothesis that community engagement is associated with community connection, a Kruskal-Wallis ANOVA test was used to determine if: \(H_1: \) community engagement is associated with community connection; or \(H_0: \) community engagement is not associated with community connection.
*engagement is not associated with community connection.* From pre disaster community connection data tested (Table 4.2), the following output was determined: \((p = .000; n = 178; df = 2; \chi^2 = 24.720)\).

**Table 4.2**
**Rank Comparison of Pre Disaster Community Engagement and Community Connection**

<table>
<thead>
<tr>
<th>Community Engagement Pre Disaster</th>
<th>Community Connection Pre Disaster</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not</td>
<td></td>
<td>15</td>
<td>43.03</td>
</tr>
<tr>
<td>Somewhat</td>
<td></td>
<td>69</td>
<td>80.49</td>
</tr>
<tr>
<td>Very</td>
<td></td>
<td>94</td>
<td>103.53</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>178(^a)</td>
<td></td>
</tr>
</tbody>
</table>

Note: SPSS ranked variables. \(^a\) \(n = 178\) reflects six respondents not residing in Goderich before the disaster.

From during disaster community connection data tested (Table 4.3), the following output was determined: \((p = .001; n = 180; df = 3; \chi^2 = 16.465)\).

**Table 4.3**
**Rank Comparison of During Disaster Community Engagement and Community Connection**

<table>
<thead>
<tr>
<th>Community Engagement During Disaster</th>
<th>Community Connection During Disaster</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not</td>
<td></td>
<td>20</td>
<td>59.40</td>
</tr>
<tr>
<td>Somewhat</td>
<td></td>
<td>47</td>
<td>81.63</td>
</tr>
<tr>
<td>Very</td>
<td></td>
<td>112</td>
<td>100.40</td>
</tr>
<tr>
<td>N/A</td>
<td></td>
<td>1</td>
<td>20.50</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>180(^a)</td>
<td></td>
</tr>
</tbody>
</table>

Note: SPSS ranked variables. \(^a\) \(n = 180\) reflects four respondents not residing in Goderich during the disaster.

Finally, from after disaster community connection data tested (Table 4.4), the following output was determined: \((p = .000; N = 184; df = 2; \chi^2 = 33.203)\).
Table 4.4
Rank Comparison of After Disaster Community Engagement and Community Connection

<table>
<thead>
<tr>
<th>Community Engagement After Disaster</th>
<th>Community Connection After Disaster</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not</td>
<td></td>
<td>20</td>
<td>45.95</td>
</tr>
<tr>
<td>Somewhat</td>
<td></td>
<td>54</td>
<td>77.97</td>
</tr>
<tr>
<td>Very</td>
<td></td>
<td>110</td>
<td>108.10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>184</strong></td>
<td></td>
</tr>
</tbody>
</table>

Note: SPSS ranked variables. \(^aN = 184\).

Therefore, for all disaster periods, output results indicate there is a highly significant association (\(p < .05\)) between community engagement and community connection.

4.2.2 Hypothesis two

To test the hypothesis that community engagement is associated with mid-age adults, a Kruskal-Wallis ANOVA test was used to determine if: \(H_1\): level of community engagement experienced by older, mid-age, and young\(^2\) adults is distinct; or \(H_0\): level of community engagement experienced by older, mid-age, and young adults is similar.

From data tested (Tables 4.5, 4.6, 4.7), the following outputs were determined: pre disaster (\(p = .261; n = 178; df = 2; \chi^2 = 2.686\)); during disaster (\(p = .118; n = 180; df = 2; \chi^2 = 4.282\)); and after disaster (\(p = .918; N = 184; df = 2; \chi^2 = .170\)).

Table 4.5
Comparison of Before Disaster Levels of Community Engagement by Age Group

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Community Engagement Levels</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not</td>
<td>Somewhat</td>
</tr>
<tr>
<td>Older Adults (^a)</td>
<td>23</td>
<td>23</td>
</tr>
<tr>
<td>Mid-Age Adults (^b)</td>
<td>35</td>
<td>48</td>
</tr>
<tr>
<td>Younger Adults (^c)</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>66</td>
<td>77</td>
</tr>
</tbody>
</table>

Note: SPSS crosstab count. Age divisions are: \(^a\) Older adults (born 1920 –1949), \(^b\) mid-age adults (born 1950 – 1979), and \(^c\) young adults (born 1980 – 1994). \(^d\) \(n = 178\) reflects six respondents not residing in Goderich before the disaster.

\(^2\) From the total sample population (\(N = 184\), young adults represent a relatively small group (\(n = 15\)); therefore, all tests directly involving young adults were run for comparative purposes only.
Table 4.6
Comparison of During Disaster Levels of Community Engagement by Age Group

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Community Engagement Levels</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not</td>
<td>Somewhat</td>
</tr>
<tr>
<td>Older Adults a</td>
<td>18</td>
<td>25</td>
</tr>
<tr>
<td>Mid-Age Adults b</td>
<td>20</td>
<td>37</td>
</tr>
<tr>
<td>Younger Adults c</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>40</td>
<td>67</td>
</tr>
</tbody>
</table>

Note: SPSS crosstab count. Age divisions are: a Older adults (born 1920 – 1949), b mid-age adults (born 1950 – 1979), and c young adults (born 1980 – 1994). d n = 180 reflects four respondents not residing in Goderich during the disaster.

Table 4.7
Comparison of After Disaster Levels of Community Engagement by Age Group

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Community Engagement Levels</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not</td>
<td>Somewhat</td>
</tr>
<tr>
<td>Older Adults a</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>Mid-Age Adults b</td>
<td>38</td>
<td>47</td>
</tr>
<tr>
<td>Younger Adults c</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>69</td>
<td>77</td>
</tr>
</tbody>
</table>


Therefore, across all time periods, no significant difference emerged in engagement by different age groups (Tables 4.8, 4.9, 4.10). There is no support that mid-age adults are more community engaged; the H₀ is accepted.

Table 4.8
Lack of Significant Association between Community Engagement and Older Adults

<table>
<thead>
<tr>
<th>Mann-Whitney U</th>
<th>Community Engagement Pre Disaster</th>
<th>Community Engagement During Disaster</th>
<th>Community Engagement After Disaster</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3383.500</td>
<td>3083.000</td>
<td>3749.500</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>10169.500</td>
<td>5099.000</td>
<td>10889.500</td>
</tr>
<tr>
<td>Z</td>
<td>-.699</td>
<td>-1.936</td>
<td>-.367</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.484</td>
<td>.053</td>
<td>.713</td>
</tr>
</tbody>
</table>

Note: Mann-Whitney U Test. Grouping variable: Older adults.
Table 4.9
Lack of Significant Association between Community Engagement and Mid-Age Adults

<table>
<thead>
<tr>
<th>Mann-Whitney U</th>
<th>Community Engagement Pre Disaster</th>
<th>Community Engagement During Disaster</th>
<th>Community Engagement After Disaster</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3817.500</td>
<td>3581.000</td>
<td>4090.500</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>6820.500</td>
<td>6662.000</td>
<td>9550.500</td>
</tr>
<tr>
<td>Z</td>
<td>-.225</td>
<td>-1.228</td>
<td>-.209</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.822</td>
<td>.219</td>
<td>.835</td>
</tr>
</tbody>
</table>

Note: Mann-Whitney U Test. Grouping variable: Mid-age adults.

Table 4.10
Lack of Significant Association between Community Engagement and Young Adults

<table>
<thead>
<tr>
<th>Mann-Whitney U</th>
<th>Community Engagement Pre Disaster</th>
<th>Community Engagement During Disaster</th>
<th>Community Engagement After Disaster</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>939.000</td>
<td>1032.000</td>
<td>1219.000</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>1059.000</td>
<td>14727.000</td>
<td>1339.000</td>
</tr>
<tr>
<td>Z</td>
<td>-1.600</td>
<td>-1.140</td>
<td>-.264</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.110</td>
<td>.254</td>
<td>.792</td>
</tr>
</tbody>
</table>

Note: Mann-Whitney U Test. Grouping variable: Young adults.

4.2.3 Hypothesis three

To test the hypothesis that community connection is associated with older adults, a Kruskal-Wallis ANOVA test was initially performed to determine if there was an association between age groups and community connection across disaster periods. See Table 4.11 below for significant Kruskal-Wallis ANOVA test results.

Table 4.11
Significant Association Pre and After Disaster Periods between Community Connection and Age Groups

<table>
<thead>
<tr>
<th></th>
<th>Community Connection Pre Disaster</th>
<th>Community Connection During Disaster</th>
<th>Community Connection After Disaster</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>11.721</td>
<td>5.445</td>
<td>6.963</td>
</tr>
<tr>
<td>Df</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Asymp. Sig.</td>
<td>.003</td>
<td>.066</td>
<td>.031</td>
</tr>
</tbody>
</table>

Note: Kruskal-Wallis ANOVA Test. Grouping variable: Age groups.
Significant (p < .05) Kruskal-Wallis ANOVA test results highlighted the association between community connection and age which led to further investigation. Therefore, a Mann-Whitney U two-tailed test for each age group was performed as outlined in parts a), b), and c) below.

a) Community connection is associated with older adults if: $H_1$: the level of community connection felt by older adults and non-older adults is distinct; or $H_0$: the level of community connection felt by older adults and non-older adults is similar. From community connection data tested for older adults, the following outputs were determined: pre disaster ($p = .380; n = 178; M-W U = 3340.0$); during disaster ($p = .100; n = 180; M-W U = 3214.0$); and after disaster ($p = .112; N = 184; M-W U = 3389.500$). Across all disaster periods, the level of community connection felt by older adults did not reveal a significant difference. There is no support for the assumption that older adults feel more connected to the community; the $H_0$ is accepted.

b) Community connection is associated with mid-age adults if: $H_1$: the level of community connection felt by mid-age adults and non-mid-age adults is distinct; or $H_0$: the level of community connection felt by mid-age adults and non-mid-age adults is similar. From community connection data tested for mid-age adults (Table 4.12), the following outputs were determined: pre disaster ($p = .011; n = 178; M-W U = 3116.5$); during disaster ($p = .023; n = 180; M-W U = 3298.5$); and after disaster ($p = .013; N = 184; M-W U = 3388.0$). Therefore, across all disaster periods, there is a highly significant association (p < .05) between community connection and mid-age adults. See Table 4.13 for detailed and significant Mann-Whitney U test results.
Table 4.12
Rank Comparison of Community Connection by Mid-Age Adults and Other Adults and by Disaster Periods

<table>
<thead>
<tr>
<th>Age Division</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community Connection</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pre Disaster</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Born within 1950-1979 *</td>
<td>101</td>
<td>97.14</td>
<td>9811.50</td>
</tr>
<tr>
<td>Not born within 1950-1979 b</td>
<td>77</td>
<td>79.47</td>
<td>6119.50</td>
</tr>
<tr>
<td>Total</td>
<td>178</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Community Connection</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>During Disaster</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Born within 1950-1979 *</td>
<td>102</td>
<td>97.16</td>
<td>9910.50</td>
</tr>
<tr>
<td>Not born within 1950-1979 b</td>
<td>78</td>
<td>81.79</td>
<td>6379.50</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Community Connection</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>After Disaster</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Born within 1950-1979 *</td>
<td>104</td>
<td>99.92</td>
<td>10392.00</td>
</tr>
<tr>
<td>Not born within 1950-1979 b</td>
<td>80</td>
<td>82.85</td>
<td>6628.00</td>
</tr>
<tr>
<td>Total</td>
<td>184</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: SPSS ranked variables. Age divisions are: *Mid-age adults; b older and young adults. *n = 178 reflects six respondents not residing in Goderich before the disaster; *n = 180 reflects four respondents not residing in Goderich during the disaster; *N = 184.

Table 4.13
Significant Association between Community Connection and Mid-Age Adults across all Disaster Periods

<table>
<thead>
<tr>
<th></th>
<th>Community Connection Pre Disaster</th>
<th>Community Connection During Disaster</th>
<th>Community Connection After Disaster</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>3116.500</td>
<td>3298.500</td>
<td>3388.000</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>6119.500</td>
<td>6379.500</td>
<td>6628.000</td>
</tr>
<tr>
<td>Z</td>
<td>-2.544</td>
<td>-2.280</td>
<td>-2.473</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.011</td>
<td>.023</td>
<td>.013</td>
</tr>
</tbody>
</table>

Note: Mann-Whitney U two-tailed Test. Grouping variable: Mid-age adults.

c) Community connection is associated with young adults if: \( H_1: \) the level of community connection felt by young adults and non-young adults is distinct; or \( H_0: \) the level of community connection felt by young adults and non-young adults is similar. From community connection data tested for young adults (Table 4.14), the following outputs were determined: pre disaster (\( p = .002; n = 178; \) M-W U = 706.5); during disaster (\( p = .211; n = 180; \) M-W U = 1029.5); and after disaster (\( p = .088; N = 184; \) M-W U = 973.5). These results show that during and after the disaster, community connection felt by young adults did not reveal a significant difference; the \( H_0 \) is accepted. Interestingly however, there was a highly significant
association (p < .05) between the community connections felt by young adults for the period before the disaster. See Table 4.15 for detailed and significant Mann-Whitney U test results.

Table 4.14
Rank Comparison of Community Connection by Young Adults and Other Adults and by Disaster Periods

<table>
<thead>
<tr>
<th>Community Connection</th>
<th>Age Division</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre Disaster</td>
<td>Born between 1980-1994</td>
<td>15</td>
<td>55.10</td>
<td>826.50</td>
</tr>
<tr>
<td></td>
<td>Not born between 1980-1994</td>
<td>163</td>
<td>92.67</td>
<td>15104.50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>178</td>
<td></td>
<td></td>
</tr>
<tr>
<td>During Disaster</td>
<td>Born between 1980-1994</td>
<td>15</td>
<td>76.63</td>
<td>1149.50</td>
</tr>
<tr>
<td></td>
<td>Not born between 1980-1994</td>
<td>165</td>
<td>91.76</td>
<td>15140.50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After Disaster</td>
<td>Born between 1980-1994</td>
<td>15</td>
<td>72.90</td>
<td>1093.50</td>
</tr>
<tr>
<td></td>
<td>Not born between 1980-1994</td>
<td>169</td>
<td>94.24</td>
<td>15926.50</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>184</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: SPSS ranked variables. Age divisions are: *Young adults; †older and mid-age adults. *n = 178 reflects six respondents not residing in Goderich before the disaster; †n = 180 reflects four respondents not residing in Goderich during the disaster; ‡N = 184.

Table 4.15
Significant Association between Pre Disaster Community Connection and Young Adults

<table>
<thead>
<tr>
<th></th>
<th>Community Connection Pre Disaster</th>
<th>Community Connection During Disaster</th>
<th>Community Connection After Disaster</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>706.500</td>
<td>1029.500</td>
<td>973.500</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>826.500</td>
<td>1149.500</td>
<td>1093.500</td>
</tr>
<tr>
<td>Z</td>
<td>-3.032</td>
<td>-1.251</td>
<td>-1.706</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.002</td>
<td>.211</td>
<td>.088</td>
</tr>
</tbody>
</table>

Note: Mann-Whitney U two-tailed Test. Grouping variable: Young adults.

4.2.4 Hypothesis four

To test the hypothesis that, within the context of gender, there is an association with community engagement and community connection, a Chi-Square two-tailed test was used for parts a) and b) below.
a) Community engagement is associated with gender if: $H_1$: the level of community engagement experienced by women and men is distinct; or $H_0$: the level of community engagement experienced by women and men is similar. From community engagement data tested, the following outputs were observed: pre disaster ($p = .276; n = 178; df = 2; \text{Pearson } \chi^2 = 2.575$); during disaster ($p = .847; n = 180; df = 2; \text{Pearson } \chi^2 = 0.332$); and after disaster ($p = .448; N = 184; df = 2; \text{Pearson } \chi^2 = 1.607$). Across all disaster periods, the level of community engagement by both genders did not reveal a significant difference; the $H_0$ is accepted.

b) Community connection is associated with gender if: $H_1$: the level of community connection felt by women and men is distinct; or $H_0$: the level of community connection felt by women and men is similar. From community connection data tested, the following outputs were observed: pre disaster ($p = .194; n = 178; df = 2; \text{Pearson } \chi^2 = 3.284$); during disaster ($p = .633; n = 180; df = 3; \text{Pearson } \chi^2 = 1.719$); and after disaster ($p = .510; N = 184; df = 2; \text{Pearson } \chi^2 = 1.345$). Across all disaster periods, the level of community connection felt by both genders did not reveal a significant difference; the $H_0$ is accepted.

4.2.5 Hypothesis five

To test the hypothesis that, within the context of employment, there is an association with community engagement and community connection, a Mann-Whitney U two-tailed test was used in parts a) through d) and a Chi-square two-tailed test was used in parts e) and f) below.

a) Community engagement is associated with employed individuals if: $H_1$: the level of community engagement by employed and non-employed adults is distinct; or $H_0$: the level of community engagement by employed and non-employed adults is similar. From community engagement data tested, the following outputs were determined: pre disaster ($p = .384; n = 178; \text{M-W U} = 3659.0$); during disaster ($p = .154; n = 180; \text{M-W U} = 3562.5$); and after disaster ($p = .754; N = 184; \text{M-W U} = 4109.0$). Therefore, across all disaster periods, community engagement of employed and non-employed adults was not significantly different. There is no support that engagement is associated with employment; the $H_0$ is accepted.
b) Community connection is associated with employed individuals if: \( H_1: \) the level of community connection felt by employed and non-employed adults is distinct; or \( H_0: \) the level of community connection felt by employed and non-employed adults is similar. From community connection data tested, the following outputs were determined: pre disaster \( (p = .762; n = 178; M-W U = 3843.5) \); during disaster \( (p = .207; n = 180; M-W U = 3647.0) \); and after disaster \( (p = .210; n = 184; M-W U = 3820.0) \). Across all disaster periods, community connection felt by employed and non-employed adults was not significantly different. There is no support that community connection is associated with employment; the \( H_0 \) is accepted.

c) Community engagement is associated with retired individuals if: \( H_1: \) the level of community engagement by retired and non-retired adults is distinct; or \( H_0: \) the level of community engagement by retired and non-retired adults is similar. From community engagement data tested, the following outputs were determined: pre disaster \( (p = .731; n = 178; M-W U = 3633.5) \); during disaster \( (p = .441; n = 180; M-W U = 3585.0) \); and after disaster \( (p = .982; n = 184; M-W U = 4004.0) \). Across all disaster periods, the community engagement of retired and non-retired adults was not significantly different. There is no support that engagement is associated with retirement; the \( H_0 \) is accepted.

d) Community connection is associated with retired individuals if: \( H_1: \) the level of community connection felt by retired and non-retired adults is distinct; or \( H_0: \) the level of community connection felt by retired and non-retired adults is similar.

From community connection data tested, the following outputs were determined: pre disaster \( (p = .668; n = 178; M-W U = 3612.5) \); during disaster \( (p = .119; n = 180; M-W U = 3374.0) \); and after disaster \( (p = .102; N = 184; M-W U = 3509.5) \). Across all disaster periods, community connection felt by retired and non-retired adults was not significantly different. There is no support that connection is associated with retirement; the \( H_0 \) is accepted.

e) Community engagement is associated with occupation if: \( H_1: \) the level of community engagement by adults with different occupations is distinct; or \( H_0: \) the level of community engagement by adults with different occupations is similar.

From community engagement data tested, the following outputs were determined:
pre disaster ($p = .318; n = 178; df = 16; \text{Pearson } \chi^2 = 18.107$); during disaster ($p = .813; n = 180; df = 16; \text{Pearson } \chi^2 = 10.95$); and after disaster ($p = .570; N = 184; df = 16; \text{Pearson } \chi^2 = 14.39$). Across all disaster periods, community engagement of adults with different occupations was not significantly different. There is no support that engagement is associated with occupation; the $H_0$ is accepted.

f) Community connection is associated with occupation if: $H_1$: the level of community connection felt by adults with different occupations is distinct; or $H_0$: the level of community connection felt by adults with different occupations is similar. From community connection data tested, the following outputs were determined: pre disaster ($p = .572; n = 178; df = 16; \text{Pearson } \chi^2 = 14.363$); during disaster ($p = .345; n = 180; df = 24; \text{Pearson } \chi^2 = 26.162$); and after disaster ($p = .505; N = 184; df = 16; \text{Pearson } \chi^2 = 15.269$). Across all disaster periods, community connection felt by adults in different occupations was not significantly different. There is no support that connection is associated with occupation; the $H_0$ is accepted.

**4.2.6 Hypothesis six**

To test the hypothesis that, within the context of extended residency, there is an association with community engagement and community connection, a Spearman Rho two-tailed correlation test was used in parts a) and b) below.

a) Community engagement is associated with extended residency if: $H_1$: there is a monotone relationship that is either increasing or decreasing between extended residency and community engagement; or $H_0$: there is no monotone relationship that is either increasing or decreasing between extended residency and community engagement. From community engagement data tested, the following outputs were observed: pre disaster ($p = .297; n = 178; \sigma = -.079$); during disaster ($p = .371; n = 180; \sigma = .067$); and after disaster ($p = .414; N = 184; \sigma = -.061$). Across all disaster periods, there was no significant positive or negative difference between community engagement and extended residency. There is no support for the assumption that engagement increases or decreases with length of time lived in Goderich; the $H_0$ is accepted.
b) Community connection is associated with extended residency if: $H_1$: there is a monotone relationship that is either increasing or decreasing between extended residency and community connection; or $H_0$: there is no monotone relationship that is either increasing or decreasing between extended residency and community connection. From community connection data tested, the following outputs were observed: pre disaster ($p = .146; n = 178; \sigma = .109$); during disaster ($p = .496; n = 180; \sigma = .051$); and after disaster ($p = .146; N = 184; \sigma = .108$). Across all disaster periods, there was no significant positive or negative monotone difference between community connection and extended residency. There is no support for the assumption that community connection intensifies or diminishes according to length of time lived in Goderich; the $H_0$ is accepted.

4.2.7 Hypothesis seven

To test the hypothesis that, within the context of higher levels of education, there is an association with community engagement and community connection, a Kruskal-Wallis ANOVA test was used in parts a) and b) below.

a) Community engagement is associated with higher levels of education if: $H_1$: there is an association between higher levels of education and community engagement; or $H_0$: there is no association between higher levels of education and community engagement. From community engagement data tested (Table 4.16), the following outputs were determined: pre disaster ($p = 0.000; n = 178; df = 3; \chi^2 = 20.668$); during disaster ($p = 0.063; n = 180; df = 3; \chi^2 = 7.281$); and after disaster ($p = 0.000; N = 184; df = 3; \chi^2 = 25.444$). The $H_0$ is accepted during the disaster period only as there was no significance observed between higher levels of education and community engagement. However, there was a high statistical significance ($p < .05$) between higher levels of education and community engagement in the periods before and after the disaster. These results support the hypothesis that there is an association between higher education levels and community engagement during these periods. See Table 4.17 for comparative and significant Kruskal-Wallis ANOVA test results.
Table 4.16
Rank Comparison of Community Engagement by Education Levels and Disaster Periods

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Engagement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre Disaster</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>4</td>
<td>33.50</td>
</tr>
<tr>
<td>Secondary</td>
<td>66</td>
<td>76.27</td>
</tr>
<tr>
<td>College/Apprentice</td>
<td>64</td>
<td>90.92</td>
</tr>
<tr>
<td>University</td>
<td>44</td>
<td>112.36</td>
</tr>
<tr>
<td>Total</td>
<td>178</td>
<td></td>
</tr>
<tr>
<td>Community Engagement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>During Disaster</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>4</td>
<td>33.88</td>
</tr>
<tr>
<td>Secondary</td>
<td>67</td>
<td>91.03</td>
</tr>
<tr>
<td>College/Apprentice</td>
<td>65</td>
<td>87.25</td>
</tr>
<tr>
<td>University</td>
<td>44</td>
<td>99.65</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
<td></td>
</tr>
<tr>
<td>Community Engagement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After Disaster</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>4</td>
<td>35.00</td>
</tr>
<tr>
<td>Secondary</td>
<td>68</td>
<td>78.04</td>
</tr>
<tr>
<td>College/Apprentice</td>
<td>66</td>
<td>91.67</td>
</tr>
<tr>
<td>University</td>
<td>46</td>
<td>120.07</td>
</tr>
<tr>
<td>Total</td>
<td>184</td>
<td></td>
</tr>
</tbody>
</table>

Note: SPSS ranked variables. \(^a n = 178\) reflects six respondents not residing in Goderich before the disaster; \(^b n = 180\) reflects four respondents not residing in Goderich during the disaster; \(^c N = 184\).

Table 4.17
Significant Association between Pre and After Disaster Community Engagement and Higher Education Levels

<table>
<thead>
<tr>
<th></th>
<th>Community Engagement Pre Disaster</th>
<th>Community Engagement During Disaster</th>
<th>Community Engagement After Disaster</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chi-Square</td>
<td>df</td>
<td>Asymp. Sig.</td>
</tr>
<tr>
<td></td>
<td>20.668</td>
<td>3</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>7.281</td>
<td>3</td>
<td>.063</td>
</tr>
<tr>
<td></td>
<td>25.444</td>
<td>3</td>
<td>.000</td>
</tr>
</tbody>
</table>

Note: Kruskal-Wallis Test. Grouping variable: Education.

b) Community connection is associated with higher levels of education if: \(H_1\): there is an association between higher levels of education and community connection; or \(H_0\): there is no association between higher levels of education and community connection. From community connection data tested (Table 4.18), the following outputs were determined: pre disaster \(p = 0.313 \; n = 178; \; df = 3; \; \chi^2 = 3.560\); during disaster \(p = 0.042; \; n = 180; \; df = 3; \; \chi^2 = 8.215\); and after disaster \(p = \)
0.033; \( N = 184; df = 3; \chi^2 = 8.761 \)). The \( H_o \) is accepted for the pre disaster period only as there was no significance observed between higher levels of education and community connection. However, there was a statistical significance (\( p < .05 \)) between higher levels of education and community connection in the periods during and after the disaster. This supports the hypothesis that there is an association between higher education levels and community connection during these periods. See Table 4.19 for comparative Kruskal-Wallis ANOVA test results.

### Table 4.18
Rank Comparison of Community Connection by Education Levels and Disaster Periods

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Community Connection Pre Disaster</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>4</td>
<td></td>
<td>69.75</td>
</tr>
<tr>
<td>Secondary</td>
<td>66</td>
<td></td>
<td>86.93</td>
</tr>
<tr>
<td>College/Apprentice</td>
<td>64</td>
<td></td>
<td>86.20</td>
</tr>
<tr>
<td>University</td>
<td>44</td>
<td></td>
<td>99.95</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>178(^a)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Community Connection During Disaster</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>4</td>
<td></td>
<td>67.00</td>
</tr>
<tr>
<td>Secondary</td>
<td>67</td>
<td></td>
<td>81.34</td>
</tr>
<tr>
<td>College/Apprentice</td>
<td>65</td>
<td></td>
<td>91.95</td>
</tr>
<tr>
<td>University</td>
<td>44</td>
<td></td>
<td>104.43</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>180(^b)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Community Connection After Disaster</th>
<th>N</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>4</td>
<td></td>
<td>49.50</td>
</tr>
<tr>
<td>Secondary</td>
<td>68</td>
<td></td>
<td>86.56</td>
</tr>
<tr>
<td>College/Apprentice</td>
<td>66</td>
<td></td>
<td>91.47</td>
</tr>
<tr>
<td>University</td>
<td>46</td>
<td></td>
<td>106.50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>184(^c)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: SPSS ranked variables.\(^a\) \( n = 178 \) reflects six respondents not residing in Goderich before the disaster; \(^b\) \( n = 180 \) reflects four respondents not residing in Goderich during the disaster; \(^c\) \( N = 184 \).
<table>
<thead>
<tr>
<th>Community Connection</th>
<th>Community Connection</th>
<th>Community Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre Disaster</td>
<td>During Disaster</td>
</tr>
<tr>
<td>Chi-Square</td>
<td>3.560</td>
<td>8.215</td>
</tr>
<tr>
<td>df</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Asymp. Sig.</td>
<td>.313</td>
<td>.042</td>
</tr>
</tbody>
</table>

Note: Note: Kruskal-Wallis ANOVA Test. Grouping variable: Education.

### 4.2.8 Hypothesis eight

To test the hypothesis that satisfaction is associated with community engagement and community connection, a Spearman Rho two-tailed correlation test was used in parts a) and b) below.

a) Satisfaction is associated with community engagement if: \( H_1: \text{there is a monotone relationship that is either increasing or decreasing between individual satisfaction and community engagement}; \) or \( H_0: \text{there is no monotone relationship that is either increasing or decreasing between individual satisfaction and community engagement}. \) From community engagement data tested (Table 4.20), the following outputs were determined: pre disaster \((p = .000; n = 178; \sigma = .332)\); during disaster \((p = .000; n = 180; \sigma = .288)\); and after disaster \((p = .000; N = 184; \sigma = .401)\). Across all disaster periods, there is a highly significant \((p < .05)\), increasing (positive) monotone relationship between individual satisfaction and community engagement.
Table 4.20
Significant Correlations between Satisfaction and Community Engagement

<table>
<thead>
<tr>
<th></th>
<th>Rate of Satisfaction Pre Disaster</th>
<th>Community Engagement Pre Disaster</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spearman Rho</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rate of</strong></td>
<td><strong>Correlation Coefficient</strong></td>
<td><strong>Sig. (2-tailed)</strong></td>
</tr>
<tr>
<td><strong>Satisfaction</strong></td>
<td>1.000</td>
<td>.</td>
</tr>
<tr>
<td><strong>Pre Disaster</strong></td>
<td></td>
<td><strong>N</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>178</td>
</tr>
<tr>
<td></td>
<td><strong>Correlation Coefficient</strong></td>
<td><strong>Sig. (2-tailed)</strong></td>
</tr>
<tr>
<td><strong>Community Engagement</strong></td>
<td>.332**</td>
<td>.000</td>
</tr>
<tr>
<td><strong>Pre Disaster</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>N</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>178</td>
</tr>
<tr>
<td><strong>Rate of</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Satisfaction</strong></td>
<td>1.000</td>
<td>.</td>
</tr>
<tr>
<td><strong>During Disaster</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Correlation Coefficient</strong></td>
<td><strong>Sig. (2-tailed)</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>N</strong></td>
</tr>
<tr>
<td></td>
<td>.288**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>N</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>180</td>
</tr>
<tr>
<td></td>
<td><strong>Correlation Coefficient</strong></td>
<td><strong>Sig. (2-tailed)</strong></td>
</tr>
<tr>
<td></td>
<td>.401**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>N</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>184</td>
</tr>
<tr>
<td><strong>Rate of</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Satisfaction</strong></td>
<td>1.000</td>
<td>.</td>
</tr>
<tr>
<td><strong>After Disaster</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Correlation Coefficient</strong></td>
<td><strong>Sig. (2-tailed)</strong></td>
</tr>
<tr>
<td></td>
<td>.332**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Community Engagement</strong></td>
<td><strong>Correlation Coefficient</strong></td>
<td><strong>Sig. (2-tailed)</strong></td>
</tr>
<tr>
<td><strong>Pre Disaster</strong></td>
<td>1.000</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>N</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>178</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Correlation Coefficient</strong></td>
</tr>
<tr>
<td></td>
<td>.288**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>N</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>180</td>
</tr>
<tr>
<td><strong>Rate of</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Satisfaction</strong></td>
<td></td>
<td><strong>Community</strong></td>
</tr>
<tr>
<td><strong>During Disaster</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Community</strong></td>
</tr>
<tr>
<td><strong>Rate of</strong></td>
<td></td>
<td><strong>Engagement After Disaster</strong></td>
</tr>
<tr>
<td><strong>Satisfaction</strong></td>
<td>1.000</td>
<td>.</td>
</tr>
<tr>
<td><strong>After Disaster</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Correlation Coefficient</strong></td>
<td><strong>Sig. (2-tailed)</strong></td>
</tr>
<tr>
<td></td>
<td>.401**</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Community Engagement</strong></td>
<td><strong>Correlation Coefficient</strong></td>
<td><strong>Sig. (2-tailed)</strong></td>
</tr>
<tr>
<td><strong>Pre Disaster</strong></td>
<td>1.000</td>
<td>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **Note:** Spearman Rho two-tailed correlation Test. **Correlation is significant at the 0.01 level (2-tailed).**
| **n = 178 reflects six respondents not residing in Goderich before the disaster; n = 180 reflects four respondents not residing in Goderich during the disaster; N = 184.**

b) Satisfaction is associated with community connection if: \( H_j \): *there is a monotone relationship that is either increasing or decreasing between individual satisfaction and community connection; or \( H_o \): *there is no monotone relationship that is either increasing or decreasing between individual satisfaction and community connection.* From data tested (Table 4.21), the following outputs were determined:
pre disaster ($p = .000; n = 178; \sigma = .438$); during disaster ($p = .000; n = 180; \sigma = .351$); and after disaster ($p = .000; N = 184; \sigma = .477$). Across all periods, there is a highly significant ($p < .05$), increasing (positive) monotone relationship between satisfaction and community connection.

Table 4.21

<table>
<thead>
<tr>
<th>Rate of Satisfaction</th>
<th>Correlation Coefficient</th>
<th>Rate of Satisfaction</th>
<th>Correlation Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rate of</strong></td>
<td><strong>Pre Disaster</strong></td>
<td><strong>Connection</strong></td>
<td><strong>Pre Disaster</strong></td>
</tr>
<tr>
<td><strong>Satisfaction</strong></td>
<td><strong>Community</strong></td>
<td><strong>Correlation</strong></td>
<td><strong>Co</strong></td>
</tr>
<tr>
<td>Pre Disaster</td>
<td>1.000</td>
<td>.438**</td>
<td>.000</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.</td>
<td>.000</td>
<td>.</td>
</tr>
<tr>
<td>N</td>
<td>178</td>
<td>178</td>
<td></td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>1.000</td>
<td>.438**</td>
<td>.000</td>
</tr>
<tr>
<td><strong>Connection</strong></td>
<td><strong>Pre Disaster</strong></td>
<td><strong>Correlation</strong></td>
<td><strong>Co</strong></td>
</tr>
<tr>
<td><strong>Rate of</strong></td>
<td><strong>During Disaster</strong></td>
<td><strong>Satisfaction</strong></td>
<td><strong>Pre Disaster</strong></td>
</tr>
<tr>
<td><strong>Satisfaction</strong></td>
<td><strong>Community</strong></td>
<td><strong>Correlation</strong></td>
<td><strong>Co</strong></td>
</tr>
<tr>
<td>During Disaster</td>
<td>1.000</td>
<td>.351**</td>
<td>.000</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.</td>
<td>.000</td>
<td>.</td>
</tr>
<tr>
<td>N</td>
<td>180</td>
<td>180</td>
<td></td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>1.000</td>
<td>.477**</td>
<td>.000</td>
</tr>
<tr>
<td><strong>Connection</strong></td>
<td><strong>After Disaster</strong></td>
<td><strong>Correlation</strong></td>
<td><strong>Co</strong></td>
</tr>
<tr>
<td><strong>Rate of</strong></td>
<td><strong>Satisfaction</strong></td>
<td><strong>Connection</strong></td>
<td><strong>After Disaster</strong></td>
</tr>
<tr>
<td><strong>Satisfaction</strong></td>
<td><strong>Correlation</strong></td>
<td><strong>Co</strong></td>
<td><strong>Co</strong></td>
</tr>
<tr>
<td>After Disaster</td>
<td>1.000</td>
<td>.477**</td>
<td>.000</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.</td>
<td>.000</td>
<td>.</td>
</tr>
<tr>
<td>N</td>
<td>184</td>
<td>184</td>
<td></td>
</tr>
</tbody>
</table>

Note: Spearman Rho two-tailed correlation Test. **Correlation is significant at the 0.01 level (2-tailed).  
\(^{a}n = 178\) reflects six respondents not residing in Goderich before the disaster; \(^{b}n = 180\) reflects four respondents not residing in Goderich during the disaster; \(^{c}N = 184\).
4.2.9 Hypothesis nine

To test the hypothesis that satisfaction with disaster reconstruction efforts is associated with community engagement and community connection, a Chi-square two-tailed test was used for a), b) and c) below.

a) Community engagement is associated with individual satisfaction with disaster reconstruction efforts if: \( H_1: \) there is an association between satisfaction with disaster reconstruction efforts and community engagement; or \( H_0: \) there is no association between satisfaction with disaster reconstruction efforts and community engagement. From community engagement data tested (Table 4.22), the following output was determined: \( p = .144; N = 184; df = 6; \) Pearson \( \chi^2 = 9.574 \). A statistical significance was not shown between satisfaction with reconstruction efforts and engagement (Table 4.23); the \( H_0 \) is accepted.

<table>
<thead>
<tr>
<th>Community Engagement</th>
<th>Satisfaction with Reconstruction Efforts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not</td>
</tr>
<tr>
<td>Not</td>
<td>10</td>
</tr>
<tr>
<td>Somewhat</td>
<td>4</td>
</tr>
<tr>
<td>Very</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
</tr>
</tbody>
</table>

Note: SPSS crosstab count. \(^a\) \( N = 184 \).

Table 4.23
Lack of Significant Association between Reconstruction Satisfaction and Community Engagement

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>9.574(^a)</td>
<td>6</td>
<td>.144</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>10.021</td>
<td>6</td>
<td>.124</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>4.862</td>
<td>1</td>
<td>.027</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>184(^b)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Chi-Square Test a. 4 cells (33.3\%) have expected count less than 5. The minimum expected count is .41. \(^b\) \( N = 184 \).
b) Community connection is associated with individual satisfaction with disaster reconstruction efforts if: \( H_1: \text{there is an association between satisfaction with disaster reconstruction efforts and community connection}; \) or \( H_0: \text{there is no association between satisfaction with disaster reconstruction efforts and community connection}. \) From community connection data tested (Table 4.24), the following output was determined: \((p = .010; N = 184; df = 6; \text{Pearson } \chi^2 = 16.690)\). Therefore, a highly significant \((p < .05)\) association between satisfaction with disaster reconstruction efforts and community connection is observed in the period after the disaster. See Table 4.25 for detailed and significant Chi-square test results.

### Table 4.24
Comparison of Satisfaction with Disaster Reconstruction Efforts and Community Connection

<table>
<thead>
<tr>
<th>Community Connection</th>
<th>Satisfaction with Reconstruction Efforts</th>
<th>Not</th>
<th>Somewhat</th>
<th>Very</th>
<th>N/A</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not</td>
<td></td>
<td>6</td>
<td>6</td>
<td>8</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Somewhat</td>
<td></td>
<td>3</td>
<td>26</td>
<td>25</td>
<td>0</td>
<td>54</td>
</tr>
<tr>
<td>Very</td>
<td></td>
<td>6</td>
<td>43</td>
<td>59</td>
<td>2</td>
<td>110</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>15</td>
<td>75</td>
<td>92</td>
<td>2</td>
<td>184(^a)</td>
</tr>
</tbody>
</table>

Note: SPSS crosstab count. \(^a N = 184.\)

### Table 4.25
Significant Association between Reconstruction Satisfaction and Community Connection

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>16.690(^a)</td>
<td>6</td>
<td>.010</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>12.821</td>
<td>6</td>
<td>.046</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>6.346</td>
<td>1</td>
<td>.012</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>184(^b)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Chi-Square Test. \(^a 5 \text{ cells (41.7\%) have expected count less than 5. The minimum expected count is } .22. \(^b N = 184.\)

c) Extended residency (+ 26 years) is associated with individual satisfaction with disaster reconstruction efforts if: \( H_1: \text{there is an association between satisfaction with disaster reconstruction efforts and extended residency in the community}; \) or \( H_0: \text{there is no association between satisfaction with disaster reconstruction efforts and extended residency in the community}. \) From data tested, the following output was determined: \((p = .416; N = 184; df = 3; \text{Pearson } \chi^2 = 2.848)\). A statistical
significance was not shown between satisfaction with reconstruction efforts and extended residency in the community; the $H_0$ is accepted.

### 4.2.10 Hypothesis ten

To test the hypothesis that satisfaction with disaster reconstruction efforts is associated with mid-age adults, a Mann-Whitney U test was used in parts a), b), and c) below.

a) Satisfaction with disaster reconstruction efforts is associated with older adults (born 1920 – 1949) if: $H_1$: the level of satisfaction with reconstruction efforts felt by older and non-older adults is distinct; or $H_0$: the level of satisfaction with reconstruction efforts felt by older and non-older adults is similar. From data tested, the following output was determined: ($p = .095; N = 184; M-W U = 3350.0$). A statistical difference was not shown between the levels of satisfaction with reconstruction efforts felt by older adults and other adults; the $H_0$ is accepted.

b) Satisfaction with disaster reconstruction efforts is associated with mid-age adults (born 1950 – 1979) if: $H_1$: the level of satisfaction with reconstruction efforts felt by mid-age and non-mid-age adults is distinct; or $H_0$: the level of satisfaction with reconstruction efforts felt by mid-age and non-mid-age adults is similar. From data tested (Table 4.26), the following output was determined: ($p = .018; N = 184; M-W U = 3400.0$). There is a significant ($p < .05$) association between levels of reconstruction satisfaction and mid-age adults. See Table 4.27 for detailed and significant Mann-Whitney U test results.

### Table 4.26
Rank Comparison of Satisfaction with Reconstruction Efforts Felt by Mid-Age Adults and Other Adults

<table>
<thead>
<tr>
<th>Satisfaction with Reconstruction Efforts</th>
<th>Age Division</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Born within 1950-1979$^a$</td>
<td>104</td>
<td>85.19</td>
<td>8860.00</td>
</tr>
<tr>
<td></td>
<td>Not born within 1950-1979$^b$</td>
<td>80</td>
<td>102.00</td>
<td>8160.00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>184</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: SPSS ranked variables. Age divisions are: $^a$ Mid-age adults (born 1950 – 1979); $^b$ older and young adults (not born 1950-1979). $^c N = 184$. 58
Table 4.27  
Significant Association of Satisfaction with Reconstruction Felt by and Mid-Age Adults

<table>
<thead>
<tr>
<th></th>
<th>Reconstruction Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann-Whitney U</td>
<td>3400.000</td>
</tr>
<tr>
<td>Wilcoxon W</td>
<td>8860.000</td>
</tr>
<tr>
<td>Z</td>
<td>-2.363</td>
</tr>
<tr>
<td>Asymp. Sig. (2-tailed)</td>
<td>.018</td>
</tr>
</tbody>
</table>

Note: Mann-Whitney U Test. Grouping variable: Mid-age.

c) Satisfaction with disaster reconstruction efforts is associated with young adults (born 1980 – 1994) if: $H_1$: the level of satisfaction with reconstruction efforts felt by young and non-young adults is distinct; or $H_0$: the level of satisfaction with reconstruction efforts felt by young and non-young adults is similar. From data tested, the following output was determined: ($p = .172; N = 184; M-W U = 1025.0$). A statistical difference was not shown between levels of satisfaction with reconstruction efforts felt by young adults and other adults; the $H_0$ is accepted.

4.2.11 Hypothesis eleven

To test the hypothesis that participation in disaster relief efforts is associated with mid-age adults, a Chi-square two-tailed test was used for a), b) and c) below.

a) Participation in disaster relief efforts is associated with older adults (born 1920 – 1949) if: $H_1$: the level of participation in disaster relief efforts by older adults is distinct from other age groups; or $H_0$: the level of participation in disaster relief efforts by older adults is similar to other age groups. From data tested (Table 4.28), the following output was determined: ($p = .002; n = 180; df = 1; Pearson \chi^2 = 9.354$). There is a distinct level of participation in relief efforts by older adults that is highly significant ($p < .05$). See Table 4.29 for detailed and significant Chi-square test results.
Table 4.28
Comparison of Participation in Relief Efforts by Older and Other Adults

<table>
<thead>
<tr>
<th>Age Division</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Born between 1920-1949&lt;sup&gt;a&lt;/sup&gt;</td>
<td>32</td>
<td>31</td>
<td>63</td>
</tr>
<tr>
<td>Not born between 1920-1949&lt;sup&gt;b&lt;/sup&gt;</td>
<td>86</td>
<td>31</td>
<td>117</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>62</td>
<td>180&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Note: SPSS crosstab count. Age divisions are: <sup>a</sup> Older adults (born 1920 – 1949); <sup>b</sup> mid-age and young adults (not born 1920 – 1949). <sup>c</sup> n = 180 reflects four respondents not residing in Goderich during the disaster.

Table 4.29
Significant Participation in Disaster Relief Efforts by Older Adults

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>9.354&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1</td>
<td>.002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity Correction&lt;sup&gt;b&lt;/sup&gt;</td>
<td>8.375</td>
<td>1</td>
<td>.004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>9.204</td>
<td>1</td>
<td>.002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td></td>
<td></td>
<td></td>
<td>.003</td>
<td>.002</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>9.302</td>
<td>1</td>
<td>.002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>180&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Chi-Square Test. <sup>a</sup> 0 cells (0.0%) have expected count less than 5. The minimum expected count is 21.70.<sup>b</sup> Computed only for a 2x2 table. <sup>c</sup> n = 180 reflects four respondents not residing in Goderich during the disaster.

b) Participation in disaster relief efforts is associated with mid-age adults (born 1950 – 1979) if: H<sub>1</sub>: the level of participation in disaster relief efforts by mid-age adults is distinct from other age groups; or H<sub>0</sub>: the level of participation in disaster relief efforts by mid-age adults is similar to other age groups. From data tested (Table 4.30), the following output was determined: (p = .104; n = 180; df = 1; Pearson χ<sup>2</sup> = 2.64). No distinct participation by mid-age adults was shown; the H<sub>0</sub> is accepted.

Table 4.30
Comparison of Participation in Relief Efforts by Mid-Age and Other Adults

<table>
<thead>
<tr>
<th>Age Division</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Born within 1950-1979&lt;sup&gt;a&lt;/sup&gt;</td>
<td>72</td>
<td>30</td>
<td>102</td>
</tr>
<tr>
<td>Not born within 1950-1979&lt;sup&gt;b&lt;/sup&gt;</td>
<td>46</td>
<td>32</td>
<td>78</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>62</td>
<td>180&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Note: SPSS crosstab count. Age divisions are: <sup>a</sup> Mid-age adults (born 1950 – 1979); <sup>b</sup> older and young adults (not born 1950 – 1979). <sup>c</sup> n = 180 reflects four respondents not residing in Goderich during the disaster.
c) Participation in disaster relief efforts is associated with young adults (born 1980 – 1994) if: $H_1$: the level of participation in disaster relief efforts by young adults is distinct from other age groups; or $H_0$: the level of participation in disaster relief efforts by young adults is similar to other age groups. From data tested (Table 4.31), the following output was determined: ($p = .018 \ n = 180; \ df = 1; \ Pearson \chi^2 = 5.592$). There is distinct participation in relief efforts by younger adults that is highly significant ($p < .05$). See Table 4.32 for detailed Chi-Square test results.

<table>
<thead>
<tr>
<th>Age Division</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Born between 1980-1994</td>
<td>14</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Not born between 1980-1994</td>
<td>104</td>
<td>61</td>
<td>165</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>62</td>
<td>180</td>
</tr>
</tbody>
</table>

Note: SPSS crosstab count. Age divisions are: " Young adults (born 1980 – 1994); " older and mid-age adults (not born 1980 – 1994). $n = 180$ reflects four respondents not residing in Goderich during the disaster.

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
<th>Exact Sig. (2-sided)</th>
<th>Exact Sig. (1-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>5.592</td>
<td>1</td>
<td>.018</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuity Correction b</td>
<td>4.330</td>
<td>1</td>
<td>.037</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>7.068</td>
<td>1</td>
<td>.008</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fisher's Exact Test</td>
<td></td>
<td></td>
<td></td>
<td>.021</td>
<td>.013</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>5.561</td>
<td>1</td>
<td>.018</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>180</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Chi-Square Test. * 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.17. b Computed only for a 2x2 table. $n = 180$ reflects four respondents not residing in Goderich during the disaster.

### 4.2.12 Hypothesis twelve

To examine the hypothesis that community engagement patterns would increase in the aftermath of the disaster and return to pre-disaster levels soon afterwards, survey results were tabulated using a frequency chart. The results revealed
all groups demonstrated increased engagement during the disaster and that this returned to similar pre disaster engagement levels immediately after the disaster period was over (Tables 4.33, 4.34, 4.35).

**Table 4.33**
Community Engagement Patterns Pre Disaster

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not</td>
<td>66</td>
<td>35.9</td>
<td>37.1</td>
<td>37.1</td>
</tr>
<tr>
<td>Somewhat</td>
<td>77</td>
<td>41.8</td>
<td>43.3</td>
<td>80.3</td>
</tr>
<tr>
<td>Very</td>
<td>35</td>
<td>19.0</td>
<td>19.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>178</td>
<td>96.7</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not living in Goderich</td>
<td>6&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>184&lt;sup&gt;b&lt;/sup&gt;</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Frequency tabulations. <sup>a</sup> Missing respondents [n = 6] not residing in Goderich before the disaster. <sup>b</sup> N = 184.

**Table 4.34**
Community Engagement Patterns During Disaster

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not</td>
<td>40</td>
<td>21.7</td>
<td>22.2</td>
<td>22.2</td>
</tr>
<tr>
<td>Somewhat</td>
<td>67</td>
<td>36.4</td>
<td>37.2</td>
<td>59.4</td>
</tr>
<tr>
<td>Very</td>
<td>73</td>
<td>39.7</td>
<td>40.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
<td>97.8</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not living in Goderich</td>
<td>4&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>184&lt;sup&gt;b&lt;/sup&gt;</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Frequency tabulations. <sup>a</sup> Missing respondents [n = 4] not residing in Goderich during the disaster. <sup>b</sup> N = 184.

**Table 4.35**
Community Engagement Patterns After Disaster

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not</td>
<td>69</td>
<td>37.5</td>
<td>37.5</td>
<td>37.5</td>
</tr>
<tr>
<td>Somewhat</td>
<td>77</td>
<td>41.8</td>
<td>41.8</td>
<td>79.3</td>
</tr>
<tr>
<td>Very</td>
<td>38</td>
<td>20.7</td>
<td>20.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>184&lt;sup&gt;a&lt;/sup&gt;</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Frequency tabulations. <sup>a</sup> N = 184.
4.3 **SUMMARY OF RESULTS**

Numerous tests were done on the results from the 184 completed surveys to determine levels of association between multiple variables. Some relationships, such as those between community engagement or connection and gender, employment or retirement status, occupation divisions, or extended residency, proved to be irrelevant for this specific sample group. Therefore, attempting to determine levels of community engagement or community connection based on these demographic characteristics was unsuccessful.

Levels of community engagement could also not be assessed by examining different age categories nor could a correlation be established between levels of participation and age groups. Lastly, there was no significant association found between reconstruction satisfaction and the categories of extended residency, level of engagement, young adults, or older adults. Although the information resulting from these lines of testing did not prove associations or relationships between select variables, it is necessary to acknowledge relationships that do not exist in order to more clearly recognize those that do hold significance.

In this light, several significant results were revealed from the hypotheses tested. Most important to this research is the association found between community engagement and community connection levels throughout all periods surveyed. This basic fact is worth noting while considering other test results that highlighted differences in association between levels of engagement and levels of connection when tested against other variables.

Interestingly, community connection was associated with mid-age adults during all time periods and with young adults during and after the disaster. Such a change in this perspective of community engagement could potentially be related to the disaster itself. Other curious findings pertained to higher education levels. While adults with higher education levels appeared more connected to the community during and after the disaster, these individuals only experienced significant community engagement before and after the tornado, not during. Such findings may be telling of factors that trigger particular community feelings and behaviours among individuals of various educational backgrounds.
Community engagement and community connection, during all time periods, were closely associated with personal satisfaction levels, which was an expected finding. As well, community connection and individual satisfaction with reconstruction efforts displayed a significant relationship. Lastly, participation was found to be significant among young and older adults, and the overall level of community engagement increased during the disaster but did not remain strengthened afterwards.
CHAPTER FIVE: DISCUSSIONS, CONCLUSIONS, AND RECOMMENDATIONS

5.1 PHYSICAL CAPACITY AND VULNERABILITY

In the post natural disaster setting of Goderich, an analysis of how the physical manifestations of disaster affected community engagement immediately after the event provides indications for the function of engagement in potential future incidents and endeavours. While each interviewee shared unique viewpoints, similarities were prevalent. Foremost among these were a genuine concern for both residents and business owners and an appreciation for support from outside communities and individuals.

5.1.1 Potential concerns for residents and business owners

Overall, interview comments were very positive; however, concerns regarding Ministry of Labour restrictions, rebuilding downtown heritage buildings, and the potential for increased taxes or rent on newly renovated businesses were noticeable. Although most interviewees did not have direct dealings with such matters, a concern for individuals that could be or were affected by such issues radiated throughout the interviews.

Irritation over actions taken by the Ministry of Labour was voiced by major community stakeholders as well as by regular community members. Feelings of annoyance, helplessness, and confusion were experienced by many with respect to Ministry of Labour regulations that barred individuals, even those attempting to protect their property, from the downtown square immediately after the tornado (Chair of Disaster Relief Fundraising, personal communication, July 17, 2012; Interview S7, personal communication, June 30, 2012). Plainly stated by the Chair of Disaster Relief Fundraising: “the Ministry of Labour did more damage in trying to help, and that’s widely accepted and publically [acknowledged]” (personal communication, July 17, 2012). As discussed previously in this study, an essential element of sound government accountability involving disasters is to build potential solutions without alienating the community members at the heart of such issues (Buckland & Rahman, 1999). Overarching statements about the importance of using common sense were raised and, although this is a sensitive matter because it deals with an
intergovernmental issue, the Mayor of Goderich stated how feeling overpowered by the Ministry of Labour, coupled with concerns voiced by the public, lead to this cautionary assertion, “if you don’t back off, we’ll be leaving and you’ll be in charge of the mission—but you’ll also accept the liabilities” (personal communication, July 17, 2012). This bold stance did result in a slight reduction in Ministry of Labour presence. Although not a perfect solution, it was perhaps the best that could arise from such a complicated situation and presents a noteworthy example of effective community leadership after disaster when a community remains quite vulnerable.

Other concerns involved business reconstruction efforts. While many survey participants shared valuable perceptions regarding personal restoration processes, the random interview selection did not include any local business owners, so first-hand understanding of rebuilding from this perspective as well as from a heritage restoration standpoint was not possible. Fortunately, the Chair of Disaster Relief Fundraising was very informed about the downtown square rebuilding process and readily shared personal insight regarding this, particularly a strong conviction about wrongful actions by restoration companies that descended upon the town immediately after the disaster. Many of these companies appeared to behave like “unscrupulous vultures” from which the only protection was buyer beware (Chair of Disaster Relief Fundraising, personal communication, July 17, 2012).

Since southern Ontario holds the greatest economic risk of damage in tornado situations (Banik et al., 2008) as well as the highest seasonal record for tornados in Canada (Newark, 1984), such realities suggest further protection for individuals and businesses in the event of tornado-related disasters should exist, particularly with regard to protected heritage buildings in communities. While the high costs of renovating may increase the structural integrity of such buildings in case of disaster, often such endeavours are not fiscally practical for many business owners struggling to survive in small towns (Chair of Disaster Relief Fundraising, personal communication, July 17, 2012). Prior to the 2011 Goderich tornado, government standards were implemented requiring town officials to meet regularly every few months to ensure the community was prepared for potential catastrophes by having a solid emergency control system in place (Mayor of Goderich, personal communication, July 17, 2012). Potential continued improvements to this system in light of lessons learned from the disaster and enhanced mitigation efforts could help local business owners manage better in the face of disasters and ensuing reconstruction efforts.
Current business regulations and standards were yet another cause of anxiety for some in Goderich’s business community, according to those interviewed. It was readily discussed that many businesses were struggling to rebuild after the tornado because, in addition to damages, they were required to upgrade many building aspects to meet present day codes (Town Planner for Goderich, personal communication, August, 2012). This situation also augmented post disaster displacement concerns. Historically, the downtown core has been an area with more affordable housing options available above many of its businesses. Due to the required upgrades, many business property owners decided to make other improvements as well. While this is a beneficial community enhancement, it also has the potential to result in increased rents, which is of considerable concern for many individuals residing in this area (Town Planner for Goderich, personal communication, August 8, 2012). Despite such a vulnerable housing issue looming, it was confidently expressed that the Huron County Housing Department will deal with this issue appropriately as needed (Town Planner for Goderich, personal communication, August 8, 2012).

5.1.2 Support from outside communities and individuals

Goderich experienced tremendous support from external communities and individuals alike. Speculation on this high degree of support is validated by earlier dialogue where concepts of social empathy and motivation to help in the face of natural disasters are prime incentives of outside support to distressed communities (Marjanovic et al., 2009; Kouzimin et al., 1995). With a community moniker of the prettiest town in Canada, it is not unreasonable that a great degree of sympathy for this unpredictable disaster arose in the hearts of outside communities. Moreover, since Goderich had an almost non-existent level of locus of causality and situational controllability, external feelings of sympathy should be higher than those emitted by a disaster in another location without these factors (Marjanovic et al., 2009).

Specific situations of support from external sources were referenced during key informant interviews. Assistance ranged from generous financial support by external companies, municipalities, and individuals (Mayor of Goderich, personal communication, July 17, 2012) to physical support, such as that provided by the largest team ever sent to a disaster site by the Toronto planning firm hired to rebuild the core (Urban Planner for downtown reconstruction, personal communication, July 24, 2012).
External support also allowed community members to better understand how the fallout from the disaster would be managed and how it could even provide impetus for potential community growth. Over 400 residents attended a reconstruction planning meeting held by the planning firm in charge—an unprecedented level of attendance for such an event (Mayor of Goderich, personal communication, July 17 2012). Community planning projects presented by a group of University of Guelph students were credited, by some, as influential in forging community awareness of improvements better suited to the community’s evolved needs (Town Planner for Goderich, personal communication, August 8, 2012). Most importantly, the outpouring of external support was extremely appreciated by the entire community; the “really remarkable thing is how the communities around us and even right across North America have been tremendous supporters of us” (Mayor of Goderich, personal communication, July 17 2012).

5.2 Social Capacity and Vulnerability

Social capacity and vulnerability indicators provide understanding of elements of group cohesion and of potential risks associated with group formation, both vital to this research focus of community engagement. Comments and opinions drawn from interviews most frequently resonated with the social characteristics attributable to the CVA model and can be divided into the following observations and needs: reduce risks in a timely manner, understand change is required for growth, significance of communication, build new relationships and strengthen existing relationships, high levels of community involvement, and low levels of community involvement.

5.2.1 Reduce risks in a timely manner

It is important to consider the effect the speed of reconstruction has on the social cohesion of a community, particularly during a period of increased stress. Interviews discussed both the needs and feelings of community members as well as how these were addressed in the best manner possible by those in positions of power. Some concerns expressed, to individuals with significant community roles, during the initial reconstruction phase included the need for reconstruction to occur immediately because of the extensive damage sustained, the significant number of individuals who were affected, and the financial anxiety associated with such a large undertaking.
Since many roofs were ripped off by the tornado, by the time the planning firm arrived, a great deal of reconstruction was already underway (Urban Planner for downtown reconstruction, personal communication, July 24, 2012). In addition to the downtown core, many residences throughout Goderich were affected, amounting to 374 applications for assistance from the Ontario Disaster Relief Assistance Program³ (Mayor of Goderich, personal communication, July 17, 2012). Of significant concern was the financial burden placed on the community (Urban Planner for downtown reconstruction, personal communication, July 24, 2012). Financial restrictions can not only cause a great deal of additional stress, they can potentially slow down the speed of redevelopment and during times of disaster, even small stress factors can be magnified to the point of being “unbearable,” as observed by Denis (1995, p. 16).

Therefore, once these issues escalated to the community stakeholder level, actions were taken to reduce risks of hindering community cohesion. The committee required to pass all of the disaster relief applications worked overtime in an effort to “deal with applications within a couple of days of when they came in” (Mayor of Goderich, personal communication, July 17, 2012; Town Planner for Goderich, August 8, 2012). This permitted rebuilding processes to begin as quickly as possible. To address financial constraints, within days of the disaster the Premier of Ontario came to Goderich and committed five million dollars to relief efforts with a 2:1 dollar ratio for all funds the community raised (Mayor of Goderich, personal communication, July 17, 2012). As at July 17, 2012, the town had reviewed 300 of the 374 applications for relief assistance and had released over four million dollars (Mayor of Goderich, personal communication, July 17, 2012). Rapid responses such as these helped citizens feel they and their opinions contributed positively to help alleviate many concerns.

In effect, the disaster strengthened the level of connection to Goderich for many. Comments such as “I even feel more connected because I can’t believe how quickly . . . the amount of dedication that went into cleaning up and restoring. I just can’t believe it” (Interview S3, personal communication, June 2, 2012) echoed throughout many of the interviews conducted. Quantitative results also support this trend. There was an overall increase in individuals who considered themselves “very connected” to the community from 51.1% pre disaster to 60.9% during the disaster and then only slightly decreasing after the disaster to 59.8%. This growth in “very

³ See Goderich & Area Disaster Relief Committee (n.d.) for information and forms pertaining to the Ontario Disaster Relief Assistance program.
“connected” individuals can be inferred to the entire Goderich community with a sampling error of \( \pm 7\% \) (Table 5.1).

Table 5.1
Community Connection Levels across all Time Periods

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valid</td>
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<td></td>
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<tr>
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<td>15</td>
<td>8.2</td>
<td>8.4</td>
<td>8.4</td>
</tr>
<tr>
<td>Somewhat</td>
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<td>38.8</td>
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</tr>
<tr>
<td>Very</td>
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</tr>
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<td>Total</td>
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<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Community Connection During Disaster</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valid</td>
<td></td>
<td></td>
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<td></td>
</tr>
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<td>20</td>
<td>10.9</td>
<td>11.1</td>
<td>11.1</td>
</tr>
<tr>
<td>Somewhat</td>
<td>47</td>
<td>25.5</td>
<td>26.1</td>
<td>37.2</td>
</tr>
<tr>
<td>Very</td>
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<td>62.2</td>
<td>99.4</td>
</tr>
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<tr>
<td>Total</td>
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<tr>
<td>Missing</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not living in Goderich</td>
<td>4</td>
<td>2.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>184</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Community Connection After Disaster</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Valid</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Not</td>
<td>20</td>
<td>10.9</td>
<td>10.9</td>
<td>10.9</td>
</tr>
<tr>
<td>Somewhat</td>
<td>54</td>
<td>29.3</td>
<td>29.3</td>
<td>40.2</td>
</tr>
<tr>
<td>Very</td>
<td>110</td>
<td>59.8</td>
<td>59.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>184(^c)</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Note: Frequency tabulations. \(^a\) Missing respondents \([n = 6]\) not residing in Goderich before the disaster. \(^b\) \([n = 4]\) not residing in Goderich during the disaster; \(^c\) \(N = 184\).

Voiced sentiments mainly considered that the community, on a whole, felt the speed of reconstruction was very good (Interview S5, personal communication, June 30, 2012; Interview S2, personal communication, June 30, 2012). The accomplishments of rebuilding almost all of the homes that were destroyed and ensuring the Sifto salt mine, which sustained considerable damage, was running within
three to four weeks after the tornado strike (Mayor of Goderich, personal communication, July 17, 2012) makes it hard to deny the rapid pace and seriousness with which Goderich engaged in reconstruction efforts. What could have been a financial and logistical vulnerability for the town actually became its strength.

5.2.2 Understand change is required for growth

To properly understand the necessity of change with respect to disaster, a community must acknowledge extant shortcomings and be prepared to implement adaptive resilience strategies in the immediate aftermath of disaster. The Goderich situation significantly illustrates examples of vulnerabilities that, according to interviewees, could have potentially increased the risk of damage by the tornado. It also reveals capacities that have stressed social cohesion as the vehicle through which aid motivated the implementation of protective measures against potential future disasters.

The Board of Natural Disasters (1999) notes that often inferior or low-income housing holds greater risk for damage in disasters. While Goderich’s buildings were not typically categorized as inferior, aging heritage buildings do possess a unique and increased risk for damage, according to the Chair of Disaster Relief Fundraising (personal communication, July 17, 2012). This risk is discussed by Cutter and Emrich (2006) as a debt-to-revenue issue. Goderich’s commercial heritage area was struggling economically prior to the disaster (Urban Planner for downtown reconstruction, personal communication, July 24, 2012). The square, similar to many other heritage-designated areas, found it difficult to make ends meet let alone upgrade buildings to reflect current regulations (Chair of Disaster Relief Fundraising, personal communication, July 17, 2012). This reality increased the community’s overall level of vulnerability in that area. The town wisely realized this, as well as the fact that some aspects of the town would never be the same again, and decided to move in a direction of change and growth in an effort to revitalize the community after the disaster (Town Planner for Goderich, personal communication, August 8, 2012).

Everyone worked in a time-efficient manner, with the municipality and planning firm fully utilizing community input to strengthen the degree of social connection felt and reduce the potential risk of decline in social capital. There is a minimal amount of time after a disaster to suggest potential changes and initiate mitigation processes in any community (Henstra & McBean, 2005). This time was
used to advantage by the town to encourage community engagement (discussed below) and by the planning firm to revitalize the downtown core. The community was viewed as extremely cooperative and receptive to incorporate experiences gained over the past 20 years in order to determine ways in which the downtown core could remain vital today (Urban Planner for downtown reconstruction, personal communication, July 24, 2012). This time period was critical for also instilling adaptive resilience within the community in case of future disaster (Cutter et al., 2008). The community wants “buildings that still have a heritage component, but I think it’s heritage that 50 years from now people will look back [upon] and think, ‘Hey, they got it right’” (Mayor of Goderich, personal communication, July 17, 2012).

5.2.3 Communication is significant

In disasters, sustaining strong levels of contact with those who have been affected or, potentially, even displaced (Patterson et al., 2010) is integral to post natural disaster social cohesion. Without communication, individuals can often feel ill informed and become confused, disappointed, and even distrustful of the community (Buckland & Rahman, 1999). Case studies of situations like Hurricane Katrina in New Orleans underscore the negative ramifications of improper communication strategies and are useful in appreciating the power of sound communication and its impact on social cohesion (Patterson et al., 2010).

Goderich maintained strong communication levels with the community which has the potential to even increase community loyalty after a disaster (Chang, 2010). Media and website updates were standard methods employed, although with disruption to hydro, more creative mechanisms were sought (Town Planner for Goderich, personal communication, August 8, 2012). During the tornado’s immediate aftermath, three different handouts (Appendix B, Figures 11-13) were distributed: the first within 48 hours and the next two within the same week. These handouts were filled with information about safety measures, community engagement options, and contact information—“basically, just all the up-to-date news that was going on across town” (Town Planner, personal communication, August 8, 2012). In addition, volunteers were called upon to ensure community members had everything needed and were not confused by recovery processes (Town Planner for Goderich, personal communication, August 8, 2012) since, frequently, individuals require direct contact to encourage them to voice opinions or become engaged in a community (Marzana et al., 2012).
While it was suggested that in future social media be utilized as well (Town Planner for Goderich, personal communication, August 8, 2012), given the demographics of the community and specific sensitivity to the function of personal communication in strengthening social cohesion and future community engagement, the method of communication employed by the town immediately after the tornado strike appeared ideal to inspire the town. In fact, quantitative results revealed that 42.2% of survey respondents reported they participated directly in disaster clean-up activities, and a total of 65.6% reported participating in some form of immediate disaster activity including clean-up. (Tables 5.2, 5.3)

Table 5.2
Community Engagement in Clean-Up Activities during the Disaster

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Valid</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>76</td>
<td>41.3</td>
<td>42.2</td>
<td>42.2</td>
</tr>
<tr>
<td>No</td>
<td>104</td>
<td>56.5</td>
<td>57.8</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>180</td>
<td>97.8</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td><strong>Missing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not living in Goderich</td>
<td>4(^a)</td>
<td>2.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>184(^b)</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Frequency tabulations. \(^a\) Missing respondents \([n = 4]\) not residing in Goderich during the disaster. \(^b\) \(N = 184\).

Table 5.3
Community Engagement in Disaster-Related Activities during the Disaster

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>118</td>
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<td>65.6</td>
<td>65.6</td>
</tr>
<tr>
<td>No</td>
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<td>33.7</td>
<td>34.4</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>180</td>
<td>97.8</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td><strong>Missing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not living in Goderich</td>
<td>4(^a)</td>
<td>2.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>184(^b)</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Frequency tabulations. \(^a\) Missing respondents \([n = 4]\) not residing in Goderich during the disaster. \(^b\) \(N = 184\).

5.2.4 Build new relationships and strengthen existing relationships

Ensuring old and new relationships are respected and thrive during periods of adversity is essential to reduce potential social vulnerabilities associated with disasters. Mathbor (2007) insists that networking can support social capital and resilience in a
community and Smithers et al., (2004) note that by maintaining tangible interdependence, future community connections can be strengthened. Such processes include efforts to strengthen existing relationships and in those that nurture new relationships, strategies that were very evident in Goderich.

Relationships can exist between individuals and a community and Goderich’s strong levels of social connection (Chair of Disaster Relief Fundraising, personal communication, July 17, 2012) were utilized to reinforce this bond. Many individuals came together for a variety of reasons as a result of the disaster. Without hydro, many community members joined for purposes of basic survival, barbeques, tree removal, and to make use of individuals with power (Mayor of Goderich, personal communication, July 17, 2012; Town Planner for Goderich, personal communication, August 8, 2012; Interview S6, personal communication, July 8, 2012). Community members also used the disaster as an opportunity to reconnect with neighbourhoods (Interview S7, personal communication, June 30, 2012; Interview S3, personal communication, June 30, 2012). In addition, the community bonded over their communal loss and worked through the fundamental stages of grief together (Town Planner for Goderich, personal communication, August 8, 2012).

Strengthened connections were also forged between businesses and the community. Allowing businesses to work unimpeded on their unique problems and concerns, with the support of the community, resulted in much stronger connections being formed (Mayor of Goderich, personal communication, July 17 2012). Even when given the option to relocate their businesses away from the downtown area, all 27 business owners were determined to recreate the downtown core and had even already begun the process for the most part (Urban Planner for downtown reconstruction, personal communication, July 24, 2012).

Although maintaining existing relationships is integral to strengthening social cohesion, so too is allowing new relationships to grow. After the disaster, many community members and groups expressed interest in supporting rebuilding efforts. Some of this interest came from youth groups so an interactive event called ‘Re-leaf’ in Harbour Park (Appendix B, Figure 17) was implemented and satisfy this interest and possibly establish relationships between youth and the community while informing the public (Town Planner for Goderich, personal communication, August 8, 2012). Very simply, children volunteered to represent a tree for the event—some even dressed up like trees. They stood in exact locations where trees will be planted and
provided information to community members about redevelopment plans for Harbour Park (Town Planner for Goderich, personal communication, August 8, 2012). This very creative and accessible event gave young people the opportunity to feel connected to this redevelopment initiative and, in turn, to the community while providing a necessary public service. Many of the young people expressed a desire to return and take care of their trees later in life. Although there is speculation this will happen (Town Planner for Goderich, personal communication, August 8 2012), the initial stages of relationship-building have been formed.

5.2.5 High levels of community involvement

Maintaining high levels of community engagement is essential to strengthen social capacities existing in Goderich and encourage future participation. The more satisfied individuals are with their involvement, the more involved they will remain (Becchetti et al., 2012). This was supported by survey results showing a high level of association between individual satisfaction levels and their community engagement and connection throughout all time periods studied (Section 4.2.8; Tables 4.20, 4.21). There is a strong history of engagement in the community, evident throughout the interview responses as well as these survey results, and the community has been actively trying to further strengthen engagement as well.

Goderich supported high levels of engagement prior to the tornado and held numerous large and successful fundraising campaigns in past for the medical clinic and a new cat-scanner (Chair of Disaster Relief Fundraising, personal communication, July 17, 2012). Almost all interviewees noted that engagement increased in times of duress. The 2011 disaster was no exception, as supported by frequency tabulations of quantitative data (Section 4.2.12; Tables 4.33, 4.34, 4.35). Individuals donated what they could; the entire community joined together to aid recovery efforts; and many children requested donations to the Relief Fund in lieu of birthday gifts (Chair of Disaster Relief Fundraising, personal communication, July 17, 2012).

However, potential social vulnerability surfaced when the downtown core was blocked off from the community. While predominately safety and liability matters, many individuals felt “helpless and [thought] it was impossible to do enough to fully contribute” (Interview S5, personal communication, June 30, 2012). A hidden capacity of wanting to be more engaged surfaced through this issue and was recognized as community members indirectly reinforced engagement by encouraging participation
and attending events, talking with neighbours about developments, and remaining in
the town during reconstruction (Interview S3, personal communication, June 30,
2012). Goderich has been successful so far, according to the Chair of Disaster Relief
Fundraising who notes feelings of community ownership felt by citizens and their
desire to see growth and development has spurred continued engagement (personal
communication, July 17, 2012). It is also apparent that the community wanted to be
involved in all stages of development, as demonstrated by the large turnouts for all
reconstruction meetings, and this interest continues today with intense opinions
surrounding each potential change (Chair of Disaster Relief Fundraising, personal
communication, July 17, 2012).

5.2.6 Low levels of community involvement

Issues with low levels of community engagement were not indicated by the
normal responses during the interview. Yet, there is the potential that such issues did
not emerge due to the location in which the random interviews occurred. The
unengaged section of the population is often very difficult to contact, which could
account for another reason why little discussion about low community engagement
surfaced.

In the literature, it was noted that there is a risk that self-serving behaviours
can arise after a disaster (Chang, 2010) although, for the most part, this was not
evident in Goderich. The most recurring response to a potential lack of community
engagement was rationalized by increased age (Interview S4, personal communication,
June 30, 2012; Interview S2, personal communication, June 30, 2012; Interview S6,
personal communication, July 8, 2012). It is interesting to note that research findings
did not support this and, actually, did not even correlate general engagement to any
particular age group (Section 4.2.2; Tables 4.8, 4.9, 4.10). However, such responses
were not surprising, given the above standard, average age of the community, and it
could indicate a potential vulnerability that may need to be addressed by the
community at some point. Finding alternative methods to ensure this large and
growing segment of the population is properly engaged will be key for continued
engagement in the years to come.
5.3 MOTIVATION

One of the most important aspects of understanding community capacities and vulnerabilities is through the exploration of community motivation. This was addressed by three predominant trends throughout the interviews: the significance of positive thinking and behaviour, sensitivity to the community, and perceptions involving the importance of the square.

5.3.1 Significance of positive thinking and behaviours

The essence of ensuring strong positive motivation was not only expressed by stakeholders but also by ordinary citizens who felt an important way of supporting the post natural disaster atmosphere was through their own positive behaviour. A specific case of this is demonstrated with the book, Not Like Any Other Sunday (Cove & Bundy-Cooper, 2011), a compilation of community members’ personal encounters with the tornado. The entire town respects this work as a great tool for sharing and moving past this terrible disaster together. According to Pyles (2007), establishing solid community networks before disaster increases strength in times of need. Interestingly, for the community of Goderich, the motivational networks springing from the support tool, Not Like Any Other Sunday, appears to have done just that, except after disaster occurred. Pride in this book radiates throughout the entire community and the vast majority of individuals, both interviewed and surveyed, made mention of it in some form.

Other instances of community members and stakeholders boosting community moral after the tornado came in the form of simple actions like staying in Goderich during the rebuilding phase and attending local events while encouraging others to attend as well (Interview S1, personal communication, July 8, 2012; Interview S3, personal communication, June 30, 2012). Many had the attitude, “Well, I’m okay,” which in turn, inspired a positive community attitude in others (Interview S1, personal communication, July 8, 2012). Countless citizens felt it was better to get together and do something about the problem rather than give up (Interview S3, personal communication, June 30, 2012). The disaster reinforced the importance of positive thinking for many stakeholders who already knew its significance, such as the Mayor of Goderich, or inspired optimism in those who were open to learning its necessity from this experience. The Town Planner for Goderich even shared with me a personal
lesson acquired from this disaster pertaining to the importance of encouraging positive thinking rather than panic in the immediate aftermath of a disaster (personal communication, August 8, 2012). Although implementing appropriate mitigation tools prior to disaster can reduce the devastation experienced, encouraging positive behaviours and outlooks can ensure a community remains emotionally strong in time of stress also.

5.3.2 Sensitivity to the community

Frequently, sensitivity issues address aspects of community vulnerability. One sensitivity specific to Goderich is its higher average population age which could translate into older adults who may be, potentially, unable to help in certain community situations such as post natural disaster periods. This is supported by interviewees who stated that many community members offered to help neighbours who were less physically able to participate actively in clean-up efforts due to advanced age (Interview S6, personal communication, August 8, 2012). Several interviewees attributed culpability for a lack of volunteerism on Goderich’s older population (Interview S2, personal communication, June 20, 2012; Interview S6, personal communication, August 8, 2012; see also Li & Ferraro, 2006). While engagement patterns generally were not seen as significantly associated with any age (Section 5.2), a very interested finding did emerge from quantitative results for the during disaster engagement period. A highly significant association between older adults and their participation in disaster relief efforts was clearly evident (Section 4.2.11; Tables 4.28, 4.29). However, it should also be noted that when scrutinizing the statistics regarding older adults who did participate against those who did not participate, the levels were almost evenly split. This was not seen among mid-age and young adult groups whose participation and non-participation patterns were quite distinct (Section 4.2.11; Tables 4.30, 4.31).

Another community characteristic which required sensitivity involved community churches. Numerous references in both interviews and surveys were made to the significance of these institutions to the community (Interview S2, personal communication, June 30, 2012; Interview S6, personal communication, July 8, 2012). Religious institutions are often significant to communities because of their motivating factor behind various engagement activities. Disturbing this balance could potentially hinder community engagement (Smithers et al., 2004; Mathbor, 2007).
Other areas of sensitivity concern a lack of knowledge of reconstruction procedures since many citizens may have never acquired such knowledge beforehand. This can translate into community vulnerability. During the rebuilding phase, many individuals “were still feeling the effects—physical, psychological—of that trauma” (Urban Planner for downtown reconstruction, personal communication, July 24, 2012) and this required the utmost sensitivity when addressing rebuilding efforts with the community. The municipality also took special care when dealing with the community in order to remain sensitive to the needs of its citizens. A large public meeting was held in September to discuss future development and drew approximately 300 attendees (Chair of Disaster Relief Fundraising, personal communication, July 17, 2012). Since that meeting, according to the Town Planner for Goderich, “planning is a very public process, so for every [step] we would have a public meeting and lots of open houses” (personal communication, August 8, 2012; Appendix B, Figures 14-15). Additionally, attention was given to properly warning community members of the risks and concerns of dealing with contractors and insurance agencies, since this was a new and worrisome endeavour for many individuals (Town Planner for Goderich, personal communication, August 8, 2012).

Major initiatives were undertaken to reduce stresses felt by reconstruction. Walkabouts were held for entire streets that were particularly damaged, such as St. Patrick’s Street (Town Planner for Goderich, personal communication, August 8, 2012; Appendix B, Figure 16). Guides included both the Town Planner and a local architect who led groups of residents through affected neighbourhoods in an effort to identify details unique to the street and enable rebuilding processes to be as easy as possible for area residents (Town Planner for Goderich, personal communication, August 8, 2012).

More formal examples of community sensitivity came in the form of two major amendments to municipal bylaws in an effort to ease the stress on those rebuilding. The first bylaw allowed individuals to build on their own property regardless of whether planning regulations had changed. The second bylaw allowed tornado-damaged businesses the option of rebuilding in different locations rather than requiring smaller businesses to move downtown (Mayor of Goderich, personal communication, July 17, 2012). Both amendments were intended to ease the stress of a very difficult time and cater to the special needs of the disaster situation.
5.3.3 Perception involving the importance of the square

The *square* is often referred to as the heart of Goderich and was rich in natural and man-made heritage. After the disaster, many individuals were uncomfortable going downtown, stating that the once beautiful *square* now looked like a war zone (Interview S3, personal communication, June 30, 2012; Stockton, 2011). Along with rebuilding what could be salvaged, individuals were understandably anxious to see the wealth of trees return to the downtown core. The vulnerability of this area to disaster potentially transformed into a motivating situation; embracing a remedy for this problem, the community has converted it into a point of growth.

The planning firm, cognizant of the significance of the *square* and its mature tree canopy, attempted a speedy return to its prior glory by planting a combination of fast and slow growing trees. This will permit the area to develop while providing the community with a shaded area to enjoy—a solution all groups agree upon (Urban Planner for downtown reconstruction, personal communication, July 24, 2012). Although there is a greater risk in planting more mature trees initially (Urban Planner for downtown reconstruction, personal communication, July 24, 2012), it is worth the risk to help this community regain its heart. The Mayor of Goderich conveys the emotions of all of the community by stating: “we had the beautiful park in the middle of town . . . We need to get that back and make it even better than what it was” (personal communication, July 17, 2012).

Often times, it becomes easy to forget about the necessity of motivating a community in times of disasters. Goderich is a striking example of how to successfully keep motivation alive and a community strong during an extremely stressful disaster situation.

5.4 Interpretation of Quantitative Data

5.4.1 Community engagement and connection

The necessity for community engagement and community connection to mutually interact to strengthen social capacity (Mathbor, 2007) is supported by the high level of significance found in the test looking at community engagements’ association to community connection in Goderich (Section 4.2.1). Statistical significance throughout all three phases of the disaster supports the reciprocal relationship between these two variables and their importance to social capital. This is
a useful relationship to understand in the context of disaster because it shows that engagement and connection levels can rise or decrease together depending on community actions. By acknowledging this relationship, it becomes much easier to understand the significance of encouraging both community engagement and connection in times of community stress.

It is also important to note that, from the data, overall satisfaction had a significant association with both community engagement and connection (Section 4.2.8; Tables 4.20, 4.21). By showing that feelings of greater satisfaction can translate into high engagement and connection, being satisfied becomes, essentially, a relational good (Becchetti et al., 2012). From the outcomes observed, it could be said that the community has an understanding that satisfied individuals are one of its essential capacities and in order to maintain community connection and engagement, it must continue to guide activities in a direction that increases, or at least continues to maintain, the satisfaction among its members that it currently enjoys.

5.4.2 Reconstruction efforts

The risk of reduced social capital occurring from inefficient time and resource management (Hawkins & Maurer, 2010) could be a potential vulnerability for the community of Goderich. Support for this risk comes from results to determine if there was an association between satisfaction with disaster reconstruction efforts and engagement (Section 4.2.9; Table 4.22, 4.23). The lack of significance seen may indicate that adults who are more highly involved in the community hold reconstruction efforts to a higher standard because they are more aware of what reconstruction steps are, or should be, occurring. As well, since such individuals are more aware—and most likely attending town meetings, reconstruction workshops, and following updates—this awareness may make reconstruction processes seem all the more daunting and, possibly, less productive than if they were less involved and had lower expectations and vested personal interest.

Reaction to the Ministry of Labour issue discussed above (Section 5.1.1) may also shed light on why there was no test evidence to support satisfaction with reconstruction and engagement. Perhaps engaged individuals were just more adversely affected by specific recovery situations, such as the one involving the Ministry of Labour. The perception of a negative, outside intrusion into a community to which they feel strongly connected could account for the observed lack of satisfaction levels
by those most engaged in the town, particularly since results did support satisfaction between community-connected individuals and reconstruction processes (Section 4.2.9; Tables 4.24, 4.25). The challenge for Goderich is to take note of the strong connection its members have to the community and more effectively utilize this as social capital in the event of future stressors.

Participation in reconstruction efforts by the different age groups tested also yielded interesting findings. Test results show that while there was a larger group of mid-age adults who participated in relief efforts (Table 5.4), higher participation numbers for mid-age adults did not equate with the degree of statistical significance found with young adult and older adult participation efforts during this period (Tables 4.29, 4.32). In effect, despite their substantial contribution through participation (Table 5.4; Table 4.30) and their obvious satisfaction with relief efforts (Table 4.27), the mid-age group did not display a significant association in participation levels and engagement, which is yet to be fully understood and may perhaps suggest that further tests should be undertaken.

Table 5.4
Comparison of Participation in Relief Efforts by Age Groups

<table>
<thead>
<tr>
<th>Age Division</th>
<th>Participated in Relief Activities During Disaster</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Born between 1920-1949&lt;sup&gt;a&lt;/sup&gt;</td>
<td>32</td>
<td>31</td>
</tr>
<tr>
<td>Born between 1950-1979&lt;sup&gt;b&lt;/sup&gt;</td>
<td>72</td>
<td>30</td>
</tr>
<tr>
<td>Born between 1980-1994&lt;sup&gt;c&lt;/sup&gt;</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>62</td>
</tr>
</tbody>
</table>

Note: SPSS crosstab count. Age divisions are: <sup>a</sup> Older adults (born 1920 – 1949); <sup>b</sup> mid-age adults (born 1950 – 1979); and <sup>c</sup> young adults (born 1980 – 1994). <sup>d</sup> n = 180 reflects four respondents not residing in Goderich during the disaster.

5.4.3 Age groups

Literature on the life cycle phases of young adults, mid-age adults, and older adults supports the case for increased volunteerism or community engagement during the mid-age life cycle (Smithers et al., 2004; Li & Ferraro, 2006; Otis & Loeffler, 2005) and it would be logical to assume this would also be the case in Goderich. Yet, the evidence from the data collected in Goderich, with a ±7 % sample error for the entire community, indicates that there is not a significant association between any age
group and levels of engagement (Section 4.2.2; Tables 4.8, 4.9, 4.10). This is a noteworthy finding since it provides evidence of an inconsistency with current literature on engagement and life cycles.

Youth engagement initiatives, such as the one described in Section 5.2.4 above, are essential to motivate the next generation of volunteers. Quantitative results highlight an association with young adults and community connection before the disaster (Section 4.2.3; Table 4.15) that was lost during and after the disaster (Section 4.2.3; Table 4.14). Actually, this loss of association meant that young adults’ overall connection to the community increased and became more similar to those shown by mid-age and older adults. A valid consideration when scrutinizing the statistics against the situation is the fact that survey participants were all over the age of 18, because of ethics requirements, and the example cited in Section 5.2.4 targeted, primarily, elementary-age children. However, the premise found is still significant in the broader spectrum of community connection and its potential to engage. Goderich, like all communities, must focus on this age group to ensure the strong connections apparent during and after the tornado can continue into the future as this group ages.

5.4.4 Education, occupation, employment, gender, and residency

A potential concern highlighted by the data is the need to be cognizant of the education levels of community members and how these pertain to community engagement and connection. Education divisions observed from the research were: 2.2% primary education, 37% secondary education, 35.9% college or apprentice, and 25% university (Table 5.5). A potential vulnerability could exist for Goderich since 39.2% of the population has no education above the secondary level according to the sample studied (Table 5.5).

<table>
<thead>
<tr>
<th>Valid</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>4</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Secondary</td>
<td>68</td>
<td>37.0</td>
<td>37.0</td>
<td>39.1</td>
</tr>
<tr>
<td>College/Apprentice</td>
<td>66</td>
<td>35.9</td>
<td>35.9</td>
<td>75.0</td>
</tr>
<tr>
<td>University</td>
<td>46</td>
<td>25.0</td>
<td>25.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>184*</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Note: Frequency tabulations. \* N = 184.
According to the data collected, community engagement showed a significant association with higher education levels pre disaster and after the disaster (Section 4.2.7; Tables 4.16, 4.17). Results that emerged as not significant during the disaster also seem logical due to the overwhelming community participation in clean up initiatives, as mentioned above (Section 5.3.3; Tables 5.2, 5.3). Yet, the pre disaster data may also signify that, during times of regular activity, those with a higher education are more likely to be engaged in the community. This conclusion may put a fairly substantial percentage of the population at risk of becoming unengaged. The fact that the association between higher levels of education and community connection was significant during and after the disaster (Section 4.2.7; Tables 4.18, 4.19) may give support for the conjecture that a higher level of education allowed individuals to be more aware of community actions and remain more connected during these times of stress. This example in Goderich also contradicts the literature findings that in stressful periods, individuals potentially become more self-interested, as suggested by Chang (2010). Ultimately, education levels are an important characteristic to consider when reflecting upon how best to keep an entire community engaged and connected.

Since an association was found among education levels, an assumption could be made that there would also be one for types of occupations; however, the results did not show any significance for occupation (Section 4.2.5). Further investigation into connections for employment and retirement also yielded insignificant correlations (Section 4.2.5).

Testing according to gender unexpectedly revealed no distinctions between women and men regarding their community engagement or connection throughout disaster periods studied (Section 4.2.4). Since the CVA model served as the basis for the research exploration because of its application in human-centred attributes during crises (Twigg, 2001), there was great hope that more significant results would emerge from an examination of gender, employment, and residency (Sections 4.2.4, 4.2.5, 4.2.6) issues. The fact that none of these complex social concerns played a significant role in community engagement or community connection in Goderich, during the periods studied, speaks to the fact that this research population differs from the more traditional context and application for this model, which is developing nations.
5.4.5 Lasting effects

To examine the hypothesis that community engagement patterns would increase immediately after the disaster and return to pre-disaster levels soon afterwards, survey results were tabulated using a frequency chart (Section 4.2.12; Tables 4.33, 4.34, 4.35). The results revealed that all groups demonstrated increased engagement during the disaster and returned to similar levels of pre disaster engagement immediately after the disaster period was over. This is only logical since there was increased sympathy from both external and internal members which could relate to a noticeable spike in involvement during the disaster period of time (Marjanovic et al., 2009).

5.5 CONCLUSIONS

The inspiration behind this research was a curiosity about the impact of disaster on community engagement. Does the destructive capability of disaster extend beyond a physical manifestation to also damage a community’s social networks or does disaster strengthen engagement by motivating stronger group cohesion and connection? To examine this, the small Ontario community of Goderich, that only one year earlier was descended upon by a disastrous F3 tornado, was selected for study. Understanding the community situation both prior and post disaster enhanced the exploration of community engagement levels and potential advancements as discussed throughout this thesis.

Community engagement deals with various expressions of individual participation in a range of social activities undertaken for the benefit of a group. To study this situation, a CVA model was employed because it allowed more focus on human connections than on the disaster itself. Capacity and vulnerability provided the framework around which physical, social, and motivational issues were explored in Goderich. It should be noted that the standard variations that exist in the physical and social capacities and vulnerabilities of developing and developed nations alter the measurement of drastic results found in the CVA model. Very simply put, nations with weaker levels of physical and social capital hold a higher risk of extended vulnerability whereas nations with stronger levels of physical and social capital appear to rebound more quickly from disaster. This was definitely observed in Goderich’s situation. The motivational component of the CVA model, with respect to capacities and vulnerabilities, is not as easily attributable to a degree of national development.
Rather, motivation appears to rely more heavily on attitudinal perseverance of community members. From this perspective, it could be argued that motivation would need to be much stronger in the face of higher risk situations in order to be a community strength or capacity. Conversely, vulnerability would arise in communities where lesser motivation, in the form of perseverance, may exist. For the community of Goderich, there was no motivational vulnerability. The community fell victim to the forces of natural disaster yet refused to be victimized.

A pre disaster snapshot of the community revealed a small town like many others in Ontario. Physically, financial vulnerability was evident in its struggling downtown business core and in the loss of several key industrial employers to the area. Socially, the closure of these major industrial employers resulted in the loss of jobs for hundreds, a blow felt hard in a community with a slightly older than average population distribution. Also, mirroring a social tendency of many other smaller communities, some newcomers to the community did not always feel at ease fitting in. However, motivational vulnerabilities were far less discernible as community members displayed active involvement in social activities and felt a strong connection to the community, as witnessed in test results.

On the other hand, community capacities underscored a wealth of strength possessed by the town before disaster struck. Physically, Goderich understood how valuable adaptive resilience is today. For several years, it had been proactively attempting to address many of its more vulnerable issues through various studies and improvement plans. The community also had many physical features that made it unique and attractive for tourism like an abundance of picturesque heritage buildings and beautiful harbour front. Socially, the town exhibited strong social capital and networks as its members were solidly engaged in various group activities and fundraising efforts that benefitted the community at large. It appeared that the town had a robust sense of tangible interdependence that permeated its collective spirit of cooperation and connection. And lastly, the community was no stranger to adversity and had weathered a major storm disaster a generation earlier. It knew the importance of remaining positive and working together for the benefit of the group.

Immediately after the tornado and throughout the coming year, the snapshot of the community altered noticeably. The vulnerabilities experienced came in the form of physical and social aspects. Physically, the erratic and extreme nature of the tornado was manifest in the horrific destruction to the downtown core, many entire homes, and
in the obliteration of huge areas of mature landscapes. Heritage restoration issues and a lack of available local construction contractors to handle the influx of rebuilding needs added to the community’s list of vulnerabilities. One of the most regrettable social vulnerabilities involved the death of a citizen at the hands of the tornado, a terrible incident that caused considerable grief to an already shattered community. Social vulnerabilities arose in less expected areas. While individuals with higher education levels increased their community connection during this period, other community members with lesser levels of higher education did not. Although other potential vulnerabilities may have existed in Goderich immediately after the tornado, these were focal points emerging from the research conducted.

The community’s capacities however, were quite a bit more extensive during the period immediately after the disaster. Physical capacities after the tornado came in the form of a much needed rejuvenation of the community. As well, a better understanding of the need for development to occur in the downtown core was verified and utilized to fully incorporate the master plan currently in progress. The social capacities for Goderich emerged strongly also and were readily apparent in increased community engagement. Many individuals came out to help their neighbours in this time of need. An immense number of individuals participated in relief efforts, which further solidified the social cohesion of the community after the tornado. In fact, previous concerns surrounding the higher average age of the community were less problematic than expected and even in some case, dispelled, with almost 50% of older adults surveyed indicating that they participated in some form of relief effort. Young adults, who previously displayed a lack of community connection, noticeably increased their level of connection during and after the tornado.

Lastly, and perhaps an aspect that spurred on many other capacities, was the amazing motivation shown by this community. From highly attended town meetings and workshops to the number of volunteers committing their time and effort to town initiatives from clean-up to door-to-door flier distribution and information approaches, Goderich’s level of motivation was labeled impressive by numerous external sources. Community motivation raised four million dollars in a short period of time. Combined with government contributions, the community was able to accomplish a great deal of rebuilding almost immediately. These strong capacities continued into the reconstruction phase and were still strikingly apparent a year later when this research took place.
Beyond the statistical measurements and analysis produced from this research, what is most striking about the study is the incredible resilience of this community in the face of disaster. It was not adverse to accepting aid but, at the same time, did not solely rely on aid to provide all of the answers to the dilemma confronting it. Social engagement patterns reveal a community that was very connected and motivated to move forward, past the calamity and into its next phase of development and growth. It would appear that, from this research, small town Ontario can emerge from disaster with heightened capacities and understanding of future direction.

5.6 RECOMMENDATIONS

Overall, the community of Goderich has done a phenomenal job keeping the community engaged and connected in daily life and during times of duress. With this in mind, the few recommendations offered here are those that, from an outside perspective, could potentially enhance areas where room for improvement may exist. These suggestions include: cultivating lasting young adult community connections, targeting greater community engagement among less educated groups, utilizing the wealth of social media outlets available, incorporating mitigation processes as a preventative tool for community risk reduction, and engaging in future research opportunities. These propositions are directed at areas that, through survey data and/or interviews, displayed potentially problematic results. All prospective solutions can be tailored specifically to the contexts within which Goderich functions. It is hoped these recommendations will play an essential role in providing responses that will strengthen the community’s level of adaptive resilience, through more inclusive utilization of its social capital and other capacities, in order to create long term solutions to engagement and future disaster management.

5.6.1 Cultivate lasting young adult community connections

Although the sample size of young adults in the survey data was relatively low, the results highlighting the growth in young adult community connection levels after the disaster (Section 4.2.3; Table 4.15) are still significant and worthy of dialogue. As discussed by Dawes and Larson (2011), youth need to become “psychologically engaged” (p. 259), and feel they are an integral component of the community, and this requires a great deal more effort on the part of those encouraging participation from this age group.
A considerable hurdle confronting youth engagement concerns the fluctuating lifestyles of young adults. They are often engrossed in obtaining higher education, searching for employment, or establishing families, all of which may necessarily force their attention in a different direction and away from the importance of becoming community connected. In particular, it is important to consider young adults as potential outsiders to the realm of volunteerism or community involvement, which means that they may need to be formally invited to participate, as suggested by Marzana et al. (2012). Ideally, since one of the tests conducted proved a relationship does exist between community engagement and connection (Section 4.2.1), increasing youth involvement should result in an increase in connectivity to the community.

The data suggested young adults were notably connected to the community during and after the disaster and that, somehow, this bond was less strong prior to the disaster. It could be speculated that the disaster may be responsible for this increase and this association is something Goderich should investigate. Did young people feel alienated prior to the disaster while more experienced individuals took control? Did youth who previously felt unconnected find connection in the collective need brought on by the war zone created by the tornado? Did young people look differently at their prettiest town once they, too, became essential members of the rebuilding process? Does a sense of being needed equate with community connection?

An important aspect of the recommendation, to forge more resilient community bonds with youth, is for the town to initiate better communication with young adults to discover what activities or amenities would strengthen their ties to the community. Getting youth involved in social media initiatives, which will be discussed below, may hold promise. It is strongly recommended that more research, perhaps in the form of longitudinal studies, be carried out on this specific demographic to understand exactly what caused reduced community connection prior to the disaster and to trace the effectiveness of future connection initiatives the town may incorporate into its future vision.

Efforts made to cultivate stronger bonds of community connections with Goderich youth could translate into higher future retention of these community members who may otherwise be more easily lured away from the community, for the stronger the connection, the more loyal the individual (Chang, 2010). With an aging community like Goderich, the investment in its young members is crucial to its future viability.
5.6.2 Target greater community engagement among less educated groups

Education levels played a noteworthy role in community engagement and connection in Goderich (Section 4.2.7; Tables 4.17, 4.19), particularly before and after the disaster, periods most indicative of regular involvement and connection patterns. Moreover, results indicated that, in both periods, higher levels of education were associated with engagement and connection. It is reasonable to assume this is a societal concern that should be addressed outside of a disaster context since social capital should reflect a cohesive group drawn from the entire community in order to be considered equitable and representative.

A great deal of effort to make volunteering accessible was put in place by the community during the disaster when overall engagement patterns did increase (Section 4.2.12). During this time there was also no significant connection between engagement and higher education, which means more individuals from all educational backgrounds were involved. Obviously, the disaster compelled a more diverse educational cross-section of the population to get involved and this is telling of a significant segment of the population that may be underutilized under normal situations. A key task for the town lies in targeting community individuals with less education so that they, too, become more engaged on a regular basis.

According to the Mayor of Goderich (personal communication, July 17, 2012), volunteering needs to be made easy for everyone in the community. This mantra should remain true outside of stressful times as well. Goderich can focus on reigniting the same level of encouragement to participate as it did during the disaster so that significant utilization of a broad representation of its population is possible. The importance of individuals being invited to participate and feeling they, too, have a vested stake in community networks, does not just apply to young adults. It also pertains to any group that could be potentially at risk for reduced community engagement and connection, like those with less education.

During one of the interviews, mention was made that the community is, at times, difficult to break into (Interview S2, personal communication, June 30 2012). This is certainly a negative image the community should work to dispel. It is not unusual for individuals of similar interests and backgrounds to bond, so the fact that adults with higher education may be more engaged in particular activities is understandable. However, diversity augments the effectiveness of social groups (Mathbor, 2007) and can reduce many of the weaknesses resulting from groups that
are too similar. In essence, this balance is something for which Goderich should strive if it wants to increase its resilience to disaster by further strengthening community unity (Mathbor, 2007).

Finally, community connection was also strongly associated with higher levels of education during and after the disaster (Section 4.2.7; Table 4.19). The lack of connection felt by adults with lower levels of education during these periods could be attributed to feelings resulting from of a lack of information (Patterson et al., 2010) or a lack of personal contributions. Some individuals did not feel they could contribute anything to rebuilding the community and, without being personally compelled, did not feel the need to volunteer skills they were unsure would be useful (Interview S7, personal communication, June 30 2012). It is recommended that Goderich maintain on-going, open channels of communication, as part of a general community service initiative, to ensure full knowledge of civic situations that may motivate stronger feelings of connection by members of all education backgrounds.

5.6.3 Utilize the wealth of social media outlets available

During interviews, communication was addressed in 21 different references (Table 4.1) as a vital community aspect, indicating that stakeholders are well aware of its importance. It was also readily acknowledged that, in Goderich, there is a need to incorporate more creative methods of communications, such as social media, in order to more effectively reach out to the community in times of distress (Section 5.2.3). While there is no question that there is still a need and place for standard communication methods, such as those creatively and successfully employed by the community immediately after the disaster, the impact of social media today cannot be denied.

It is recommended that the town continue to build on its visible use of outlets such as Facebook, twitter, blogs and other media forms as they arise, to connect efficiently with community members on a regular basis. Establishing social media as a recognizable, trustworthy, and possibly preferred method of information sharing will help the community remain vitally informed in the event of future disaster. This mode of communication could potentially connect more young adults to the town since this age group appears to rely heavily on social media to remain informed.
5.6.4 Incorporate mitigation processes as a preventative tool for community risk reduction

Mitigation practices help communities reduce the impact of disaster through preventative measures and proactive management. Goderich is highly commended on the mitigation policies it has already incorporated into disaster preparedness (Section 5.2.1). As well, reconstruction efforts throughout the downtown core to enhance the structural integrity of buildings and inspired land use of the courthouse area are already pro-actively addressing many mitigation concerns within the community (Chapter Five). The recommendation presented here is for the town to continue to support and expand upon these practices by incorporating lessons learned from the 2011 tornado management strategies as well as by following adaptive resilience practices that will help the town even further in the event of impact from future disasters. Further initiatives could involve efforts to:

- continue incorporating forward-thinking land-use policies in all new development initiatives and existing rejuvenation efforts;
- establish and enforce disaster-resistant building standards for all new construction;
- explore funding initiatives that could help business and personal property owners upgrade existing buildings, particularly those with heritage designations, to reflect current structural and safety codes;
- install an early warning detection system within town limits and tie this in with various social media outlets and cell phone applications to generate more instantaneous messaging of impending disasters to the community;
- continue to make communication a priority in order to inform and engage the population in all community enhancement activities;
- encourage community engagement and connection activities across all demographic categories, particularly among young adults and among less educated community members, as discussed above;
- maintain and creatively expand upon municipal social media use, as discussed above in this recommendation and in Section 5.6.3;
- promote on-going sharing of community opinions through open forums and innovative channels, over and above regular town meetings, so that the energy that fuelled such high levels of participation and desire for community well-being and advancement will persist outside disaster time periods.
5.6.5 Engage in future research opportunities

Truly one of the best indicators of community capacity is found in its members. Engaged individuals provide the social capital necessary for perseverance when challenges, like natural disasters, arise. Research can bring vulnerabilities to the surface long before actual circumstances put such conditions to the test. Therefore, as the results determined by this study conclude, further research on community engagement in the town of Goderich could only benefit the community in the long run by exposing its strengths and weaknesses and giving the community a point-of-reference from which to build.

Specifically, a longitudinal study of a cohort that experienced the 2011 disaster could be conducted in five-year intervals in order to determine the long-term affects of disaster on community engagement and connection levels, as well as among other issues raised here. Conducting studies at a minimum of five-year intervals will ensure enough time transpires to reliably test advancements or setbacks from current trends. Such studies could also gauge the durability and effectiveness of changes incorporated during the reconstruction process, once the initial shock of the disaster has worn off.

Further quantitative and qualitative study could look at alterations of more unique community aspects, such as age, particularly of young and older adults, or education levels, or occupational diversity to see if these play a more significant role in future engagement and community connection patterns. In addition, the role of alternate social media outlet use in normal and abnormal town operations should be assessed as should the success rate of mitigation practices and disaster vulnerability reductions put in place after the tornado. Lastly, studies to track the economic viability of the downtown core, after reconstruction and upgrading processes have been fully completed, are crucial particularly given the struggles of smaller communities today.
REFERENCES


census-recensement/2006/dp-pd/tbr/Rp-eng.cfm?TABID=1&LANG=E&APATH=3&DETAIL =0&DIM=0&FL=A&FREE=0&GC=0&GID=773803&DK=0&GRP=1&PID=88989&PRID=0&PTYPE=88971,97154&S=0 &SHOWALL=0&SUB=0&Temporal=2006&THEME=66&VID=0&VNAME=E=&VNAMEF=&D1=0&D2=0&D3=0&D4=0&D5=0&D6=0

110928/dq110928a-eng.htm


**APPENDICES**

**APPENDIX A: RESEARCH FORMS**

<table>
<thead>
<tr>
<th>Goderich Community Engagement Survey Questions</th>
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<td><strong>Part A: Demographics</strong></td>
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</table>

1. In what year were you born?  
_____________________________________________________________________

2. What is your sex?  
☐ Female  ☐ Male  

3. What is the highest educational level you completed?  
☐ Primary  ☐ Secondary  ☐ Apprenticeship/College  ☐ University  
☐ Other (Specify)  
_____________________________________________________________________

4. How many years have you lived in Goderich?  
☐ 0-5  ☐ 6-10  ☐ 11-15  ☐ 16-20  ☐ 21-25  ☐ 26+  

5. What is your current occupation?  
_____________________________________________________________________

6. Are you employed?  
☐ Yes  ☐ No  (skip to question 8)  

7. Are you employed in Goderich?  
☐ Yes  ☐ No  

*Figure 1: Goderich community engagement survey questions, page one of three.*
Part B: The Effect of Capacity and Vulnerability Indicators on Engagement

Pre-Disaster Period

8. Please rate your community involvement during the year prior to the tornado.
   □ Not Involved (skip to question 10)    □ Somewhat Involved
   □ Very Involved

9. What type of community activity did you participate in during this period?


10. What circumstances affected your community involvement during this period?


11. Please rate your level of satisfaction with your community involvement during this period.
    □ Not Satisfied    □ Somewhat Satisfied    □ Very Satisfied

12. Please rate your personal feeling of connection to the community of Goderich at that time.
    □ Not Connected    □ Somewhat Connected    □ Very Connected

During Disaster Period

Please be aware that your opinions expressed in this section should not be a reflection of the disaster itself, but of your personal community experience during this period.

13. Please rate your community involvement during the week after the tornado hit.
    □ Not Involved (skip to question 15)    □ Somewhat Involved
    □ Very Involved

14. What type of community activity did you participate in during this period?


15. What circumstances affected your community involvement during this period?


16. Please rate your level of satisfaction with your community involvement during this time.
    □ Not Satisfied    □ Somewhat Satisfied    □ Very Satisfied

17. Please rate your personal feeling of connection to the community of Goderich during this time.
    □ Not Connected    □ Somewhat Connected    □ Very Connected

18. Was your residence damaged by the tornado?
    □ Not Damaged    □ Somewhat Damaged    □ Very Damaged
19. Please rate your community involvement after the initial recovery until today.
☐ Not Involved (skip to question 21)  ☐ Somewhat Involved
☐ Very Involved

20. What type of community activity have you participated in during this period?

_____________________________________________________________________

21. What circumstances have affected your community involvement during this period?

_____________________________________________________________________

22. Please rate your level of satisfaction with your community involvement during this period.
☐ Not Satisfied  ☐ Somewhat Satisfied  ☐ Very Satisfied

23. Please rate your personal feeling of connection to the community of Goderich during the past year.
☐ Not Connected  ☐ Somewhat Connected
☐ Very Connected

24. How was your household affected by events directly or indirectly resulting from the tornado? Please use a few key words to describe this.
☐ Not Affected  ☐ Somewhat Affected  ☐ Very Affected

25. How was your employment affected by events directly or indirectly resulting from the tornado? Please use a few key words to describe this.
☐ Not Affected  ☐ Somewhat Affected  ☐ Very Affected

26. Please rate your level of satisfaction with reconstruction efforts in Goderich over the past year? Please use a few key words to describe this.
☐ Not Satisfied  ☐ Somewhat Satisfied  ☐ Very Satisfied

Figure 3: Goderich community engagement survey questions, page three of three.
Goderich Community Engagement Semi-Structured Interview Questions

Part A: Demographics

1. In what year were you born?
_____________________________________________________________________

2. What is your sex?
☐ Female ☐ Male

3. What is the highest educational level you completed?
☐ Primary ☐ Secondary ☐ Apprenticeship/College ☐ University
☐ Other (Specify)
_____________________________________________________________________

4. How many years have you lived in Goderich?
☐ 0-5 ☐ 6-10 ☐ 11-15 ☐ 16-20 ☐ 21-25 ☐ 26+

5. What is your current occupation?
_____________________________________________________________________

6. Are you employed?
☐ Yes ☐ No (skip to question 8)

7. Are you employed in Goderich?
☐ Yes ☐ No

Figure 4: Goderich community engagement semi-structured interview questions, page one of three.
Part B: Effect of Capacity and Vulnerability Indicators on Community Engagement

**Pre-Disaster Period**

8. Can you describe your community involvement during the year prior to the tornado?

9. What type of community activity did you participate in at that time?

10. What circumstances affected your community involvement at that time?

11. Elaborate upon your satisfaction or dissatisfaction with your level of community involvement at that time.

12. Describe your personal feelings of connection to the community of Goderich at that time?

**During Disaster Period**

Please be aware that your opinions expressed in this section should not be a reflection of the disaster itself, but of your personal community experience during this period.

13. Could you share with me your recollections of the community atmosphere and actions during the week the tornado hit?

14. Please describe your community involvement during that week?

15. What type of community activity did you participate in during that week?

16. What circumstances affected your community involvement during that week?

17. Elaborate upon your satisfaction or dissatisfaction with your level of community involvement during that week?

18. Describe your personal feeling of connection to the community of Goderich during that week?

19. Was your place of residence damaged by the tornado? Please elaborate.

*Figure 5: Goderich community engagement semi-structured interview questions, page two of three.*
20. Please describe your community involvement in the year since the tornado hit?

21. What type of community activity have you participated in during this year?

22. What circumstances have affected your community involvement during this year?

23. Elaborate upon your satisfaction or dissatisfaction with your level of community involvement during this year.

24. Describe your personal feeling of connection to the community of Goderich over the past year?

25. How did events directly or indirectly resulting from the tornado affect your household?

26. How did events directly or indirectly resulting from the tornado affect your employment?

27. Can you describe any of the reconstruction projects being conducted in Goderich today?


29. What factors would encourage you to participate more in community reconstruction efforts?

30. Elaborate upon your satisfaction or dissatisfaction with community reconstruction efforts.

Additional Comments or Concerns

31. Please feel free to share, at this time, any additional comments or concerns you have regarding any of the topics discussed today or that you feel are relevant to Goderich’s post tornado rebuilding efforts.

Thank you!
Goderich Community Engagement Key Informant Interview Questions

1. Please state your full name and your position.
2. What responsibilities does your job involve?
3. Please explain how your position directly relates to community engagement?
4. Could you please describe your role in the assessment or management of community capacities and vulnerabilities?
5. The immediate effects of the tornado that touched down on August 21, 2011 have been well documented. In your opinion, what are some of the effects that were less publicly known but that weighed just as heavily upon the community?
6. How would you assess the rebuilding projects and efforts that have followed the disaster?
7. Please discuss the town’s emergency preparedness and ability to handle disasters of this magnitude?
8. Would any factors lessen the risks your or any community faces in the event of such a natural disaster?
9. Do you feel the citizens of Goderich are aware of the many nuances involved in properly addressing reconstruction efforts, that is, while the tornado clearly provided the impetus to rebuild, are years of problematic land management also being addressed through rebuilding?
10. Do you feel rebuilding efforts are further restricting individuals already greatly affected by the natural disaster?
11. Do additional restrictions influence reconstruction delivery and progress?
12. Aside from the rebuilding, is there anything completely unimagined and remarkable that has emerged from this disaster for the community of Goderich?

Figure 7: Goderich community engagement key informant interview questions.
CONSENT TO PARTICIPATE IN RESEARCH

AFTER THE TORNADO

AN EXPLORATION OF CAPACITY AND VULNERABILITY ON COMMUNITY ENGAGEMENT IN GODERICH

You are asked to participate in a research study conducted by Katherine Laycock, a Masters student from the School of Environmental Design and Rural Development at the University of Guelph.

If you have any questions or concerns about the research, please feel free to contact James Mahone, Faculty Supervisor, at (519) 824-4120 ext 56781.

PURPOSE OF THE STUDY

This research will explore community engagement of key stakeholders, using capacity and vulnerability models, with respect to the August 21, 2011 tornado that touched down in Goderich, Ontario.

PROCEDURES

If you volunteer to participate, you are asked to commit 5 - 10 minutes to answer the questions asked to the best of your abilities. As well, you may take a contact card if you are interested in being contacted with the research results or if you have additional information related to the research that you would like to share.

CONFIDENTIALITY

Every effort will be made to ensure confidentiality from any identifying information obtained in connection with this study. Your name or exact location will never appear at any stage of research acquisition or completion. A coding system will be in place to keep your identity private.

PARTICIPATION AND WITHDRAWAL

You choose to participate or not. If you volunteer to be in this study, you may withdraw at any time without consequences. You may exercise the option of removing your data from the study. You may refuse to answer any questions and still remain in the study. The investigator may withdraw you from this research if circumstances arise that warrant doing so. If you are withdrawn from data collection, all information will be disposed of according to University of Guelph Ethics Board guidelines.

RIGHTS OF RESEARCH PARTICIPANTS

You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights, or remedies because of your participation in this research. This study has been reviewed and received ethics clearance through the University of Guelph Research Ethics Board. If you have questions regarding your rights as a research participant, contact:

Research Ethics Coordinator
University of Guelph
437 University Centre
Guelph, ON N1G 2W1

Telephone: (519) 824-4120, ext. 56608
E-mail: sauld@uoguelph.ca
Fax: (519) 821-5236

Katherine Laycock, Masters Candidate
University of Guelph
Guelph, ON N1G 2W1

E-mail: klaycock@uoguelph.ca

Figure 8: Consent forms for survey participants.
Figure 9: Consent forms for semi-structured and key informant interview participants.
Goderich Community Engagement Research!

Your household has been randomly selected to participate in a brief 5-10 min. survey exploring community involvement being conducted in Goderich. Information gathered will be incorporated into MSc thesis for a University of Guelph student researcher.

If you are interested in participating in this research, please remain available at this residence on July 7th between 10:00am and 7:00 p.m. when the researcher will be in your neighbourhood administering surveys.

For concerns or questions regarding this research, contact klaycock@uoguelph.ca

Thank you!

Figure 10: Sample pamphlet distributed to random Goderich residences.
APPENDIX B: COMMUNITY INFORMATION

NOTICE to Residents of Goderich
from the Town of Goderich

Tuesday, August 23, 2011

The Town of Goderich thanks all residents for their support, understanding and patience during this disaster. We will get through this together. The following update has important information.

For those who need immediate help...
- The Knights of Columbus Hall is open 24 hours a day for information and reception. The Insurance Bureau of Canada is on site if you have insurance questions.
- The County of Huron Department of Social Services is at the Salvation Army on Suncoast Drive if you need emergency financial assistance or have questions about any social services.

Drinking Water
Water from our municipal system is safe to drink.

Union Gas
Union Gas Service representatives are on-site helping local emergency responders and will be restoring gas services to impacted customers in the area south of Britannia Road throughout the day.

Hydro
Hydro is slowly being restored in the town. Please stay away from downed wires. Report any sparking wires to 519-524-8344. If damage is done to your metre base (the metre on the side of your home), you will need to arrange to have a qualified electrician make the repairs at your cost. As well, an Electrical Safety Authority (ESA) inspection will be required before power can be restored.

Garbage Removal
There will be no garbage collection for the northwest section of town on Wednesday. Please listen to the radio for garbage updates for the rest of the week.

Trees
Please do not remove the trunk or stump of any trees. Utility infrastructure needs to be located before this work can be done. This service is not being provided at this time.

Do not put any debris (waste, branches, broken windows etc.) in the Boulevard. This is making it difficult for clean up. The Town will clean up any Town trees in the Boulevard.

Restricted Areas
Please respect Police and Town barricades. We understand you are interested in the Town’s well being, but it is impeding the work that needs to be done.

Food Safety
If perishable food has been at room temperature for more than 4 hours, throw it out. Don’t risk food poisoning. A full freezer will keep food frozen about 2 days if the door is left closed. A half-loaded freezer will keep things frozen about half a day if freezer is left closed. Spoiled food can be taken to the three dumpsters at the Public Works building at 361 Cambridge.

We anticipate being able to deliver another flyer to you door to door on Thursday, August 25th.

For more information, please call 519-524-8344.

Figure 11: Sample of community communication handed out after the disaster. Verbal permission to use this material in research granted by Town Planner for Goderich, July 17, 2012.
Figure 12: Sample of community communication handed out after the disaster. Only page one of three displayed here. Verbal permission to use this material in research granted by Town Planner for Goderich, July 17, 2012.
Figure 13: Sample of community communication handed out after the disaster. Verbal permission to use this material in research granted by Town Planner for Goderich, July 17, 2012.
Figure 14: Sample of community communication handed out after the disaster. Verbal permission to use this material in research granted by Town Planner for Goderich, July 17, 2012.
Figure 15: Sample of community communication handed out after the disaster. Verbal permission to use this material in research granted by Town Planner for Goderich, July 17, 2012.
Residents of
ARTHUR, ST. PATRICK, WEST AND WATERLOO Streets

Join an informal neighbourhood discussion about rebuilding and renewal...

Wednesday, September 21 at 6 pm
Meet at Town Hall

Local Architect, Adolfo Spaleta, and Town Planner, Denise Van Amersfoort, will join residents of Arthur, St. Patrick, West and Waterloo Streets on a walking tour through the neighbourhood. This is a chance to hear about possibilities and share ideas about various aspects of your area’s architecture.

This neighbourhood discussion is part of the Town of Goderich’s Visioning sessions with residents about the rebuilding of our town. These discussions do not in any way obligate residents to make particular choices in their rebuilding.

Figure 16: Sample of community communication handed out after the disaster. Verbal permission to use this material in research granted by Town Planner for Goderich, July 17, 2012.
Figure 17: Sample of community communication handed out after the disaster. Verbal permission to use this material in research granted by Town Planner for Goderich, July 17, 2012.