Community Resilience Research: Current Approaches, Challenges and Opportunities

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8 October 2010

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This report was commissioned by the National Security Science and Technology Branch within the Department of the Prime Minster and Cabinet, and was funded through the National Counter Terrorism Committee. The views expressed herein represent those of the authors and do not necessarily reflect the opinions of the Australian Government.

EXECUTIVE SUMMARY

Background

Community resilience refers to a complex, multidimensional, multi-layered process through which communities demonstrate a capacity to withstand and respond positively to stress or change. In an international environment characterised by change and uncertainty, enhancing community resilience has become a government policy priority. Whilst its importance is acknowledged by academics, policy makers and practitioners, the concept of community resilience continues to be characterised by ambiguity with little agreement on what CR is or how it can be enhanced and subsequently sustained. This report aims to establish what is currently known about community resilience, identify the key theoretical and methodological limitations of the research as it presently stands and provide recommendations for the future development of this body of research. The purpose of this report is to enhance our understanding of community resilience and its potential application for policy and practice.

Findings: Current State of the CR literature

A review of the community resilience literature revealed four major limitations.

- Firstly, lack of definitional clarity and numerous conceptualisations of CR characterise this body of research.
- The second limitation concerns the substantial overlap of CR with related concepts that are well-established in the social and political domain (e.g. vulnerability, preparedness, recovery).
- Thirdly, limited theoretical models exist that can adequately incorporate the temporal, dynamic and multi-faceted nature of community resilience.
- Fourth, empirical studies that examine the core components of CR are limited. This is due in large part to imprecise operationalisation of the key determinants of resilience and the limited capacity of analytic methods currently employed to accurately measure CR.

Recommendations: Developing a future CR Research Agenda

Drawing on the aforementioned findings this report provides several recommendations for developing a future CR research agenda.

Recommendations include:

- Conducting a thorough review of the international CR literature, national and international research priorities and policies.
- Understanding and conceptualising CR as an ecometric process.
- Developing an integrated theoretical model of CR.
- Identifying publically available datasets that may be utilised, in combination with other secondary administrative data, to assess the most salient predictors of CR over time and across national contexts.

ABBREVIATIONS

CR	Community Resilience
SES	Social Economic Systems

Community Resilience Research:

Current Approaches, Challenges and Opportunities

INTRODUCTION

In Australia, the concept of 'Community Resilience' (CR) is becoming increasingly important for policy, in particular those associated with national security and counter-terrorism. In the 2008 National Security Statement, one of the five focus areas was preserving Australia's cohesive and resilient society (Rudd, 2008). In May 2009, the Prime Minister announced a $79.3 million 'Disaster Resilience Australia Package' to strengthen efforts to prepare for and combat major natural disasters. This was followed by a commitment from the Council of Australian Government to develop a comprehensive National Disaster Resilience Strategy in 2010. The most recent Counter Terrorism White paper released in February 2010 specifically highlights the integral need to develop CR as a key counter terrorism prevention strategy (Australian Government, 2010). In Australia and internationally, enhancing CR is a high priority as we, as a global community, face significant environmental and social challenges. Yet there is limited agreement on what community resilience (CR) is, how we can build it and, more importantly, how we can sustain it. Although theoretical and empirical understandings of resilience are well developed in ecology, engineering, physics and psychology, the specific concept of CR is at an early stage of development in the social sciences despite its wide spread uptake in public policy.

As it is presently understood, CR goes beyond practical disaster response, resource management or social networking and instead refers to a complex, multidimensional, multilayered process which can only truly be examined in the face of collective adversity or strain. CR refers to community capacity to establish emergency plans and be ready for change whilst retaining the ability to be flexible and responsive to the uniqueness of the presenting situation. Viewed in this way, CR encompasses various aspects of related concepts including vulnerability, recovery, preparedness, social and economic capital. But we suggest that it cannot be fully articulated by simply aggregating these concepts. CR is a dynamic process, in constant flux that may either aid or be aided by the previously mentioned community characteristics. Moreover CR is temporally and contextually bounded thus while a specific community may display high levels of resilience to bush fire at time A, it may subsequently exhibit poor resilience to the closing of a major industrial estate at time B.

The purpose of this report is to provide some clarity on CR through a comprehensive review of the literature and by providing a synthesis of the current uptake of CR in the social sciences. We commence with a brief summary of our review process and discuss our search strategies and our inclusion and exclusion criteria. Drawing on this review, we examine how CR is defined; we explore its relationship with other related concepts and consider the current theories central to understanding CR. We then highlight several key theoretical and methodological limitations of the CR theory and research to date and conclude with a road map for the development of a program of CR research. As a caveat, we note our focus centres on CR as it relates to a community of place. While we recognise the salience of other community types and the limits of a place based approach, we would argue that when a disaster or disturbance occurs, it usually does so in a physically delimited space. Thus our use of the term community refers to a geographically bounded entity.

METHODOLOGY

The Review Process

Our review considers only published material that specifically employs the terms 'community resilience' or 'social resilience'. As we note above, the broader concept of resilience is examined across disciplines and in many contexts (e.g. resilience of young people, resilience of ecological systems, organisational resilience, etc.). However for the purposes of this report, our concern lies with only those published documents that specifically consider CR. This is a relatively new concept that is gaining increasing popularity in policy, our goal is therefore to synthesise the literature with the express purpose of reviewing the various definitions of CR and the conceptualisations and theoretical frameworks employed to capture its complex and multi-dimensional nature. The search parameters and the criteria employed to select relevant articles are described below.

The initial literature search employed academic databases "Sociological Abstracts" and "PsycINFO" searching for terms 'community resilience' or 'social resilience' in document abstracts. We chose to search abstracts rather than looking for the words themselves as we believed the former search strategy would generate a more relevant list of sources. The searches returned 39 and 60 results respectively. In the second stage of the literature search,

we widened our search and included the terms 'community OR social' and 'resilience'. This returned 407 results. A general search was also performed using internet search engine "Google scholar" entering search terms 'community resilience'. Finally we employed a snowball sample to search for additional articles by searching authors frequently cited in the results from our initial search strategies. The final articles used for the synthesis of the literature are drawn from peer reviewed journals spanning numerous academic disciplines including: environmental science and ecology; psychology; community health; geography; sociology and social science. Additional documents include government and industry reports.

While there is a considerable amount of research examining resilience, the overwhelming majority of studies focus on individual level resilience (psychological resilience) or environmental resilience (ecological resilience) as opposed to CR per se. Further, the CR literature is typically theoretical in nature. These papers provide important insights into our understanding of the process of CR however there are limited empirical studies that test key propositions set forth by the proponents of CR. As such our inclusion criteria included published academic journal articles, government reports or policy documents that address CR, or closely related concepts, at the collective level. Inclusion of documents that address CR at the individual level was limited to those papers that considered individual resilience as essential to the development of CR. Documents that focus on disaster management or preparedness for specific natural or man-made hazards (for example water management plans or drought prevention) that did not specifically consider CR were excluded from the review.

The inclusion criteria aimed to capture articles both core and peripheral to the community resilience literature. Core articles comprise documents that specifically address community resilience at the community, collective or systems level including ecological, social-ecological and social perspectives. Breton's (2001) article on neighbourhood resiliency, for example, would be classified as a 'core' article. Breton (2001) examines CR directly by analysing the collective properties of resilient neighbourhoods. He argues that resiliency depends on the stability of the community's initial equilibrium state. Neighbourhoods that possess a large stock of social and physical capital, Breton (2001) suggests, are not only more stable but are more likely to return to equilibrium state following adversity. Alternately, peripheral articles are those documents that address the concepts intrinsically related to community resilience (for example disaster response or vulnerability), or resilience at the individual level. Applying the aforementioned classifications articles such as that produced by Mitchell and colleagues (2008) would be categorised as 'peripheral'. In this article, the

researchers employ empirical methods to examine resilience at the community level, however, resilience is very narrowly conceptualised as low mortality rates despite persistent economic adversity. By addressing CR through a population health perspective and operationalising resilience in terms of mortality rates the authors capture only one part of CR. Despite this, concepts referred to throughout the document remain highly relevant to the CR body of research[1]. A total of 66 documents were retained for the review (see Table 1 below).

Table 1. Core and peripheral published and unpublished CR literature

Documents N=66				
Core	**N**	**Peripheral**	**N**	**Total**
Theory	16	Theory	18	34
Policy	1	Policy	1	2
Empirical	6	Empirical	24	30
• Case study	(5)	• Case study	(10)	(15)
• Survey	(1)	• Survey	(12)	(13)
• Secondary data	(0)	• Secondary data	(1)	(1)
• Experiment	(0)	• Experiment	(1)	(1)
Total Core	**23**	**Total Peripheral**	**43**	**66**
	(34.8)		**(65.2%)**	**(100%)**

FINDINGS

Defining CR

With the increased popularity of CR in government policy, numerous definitions of CR exist in the literature. This is primarily due to the inter-disciplinary uptake of CR and the lack of an integrated theoretical model to explain it. Defining CR is also hampered by confusion over whether CR is a process or a 'state'. In the physical sciences, an entity is either resilient or it is not (Gordon, 1978). If the former, the force impacted on the system does not displace

[1] See Appendix 1 for a full summary of article classifications.

the system from equilibrium. If the latter, the force causes deformation or breakage (Gordon, 1978). However, in the psychological and ecological literature, resilience is not seen as a trait or static feature of the person, place or system, but rather is viewed as a dynamic process involving a range of behaviours, thoughts and actions (Leipold and Greve, 2009).

Across the various disciplines, a common definitional feature of CR refers to the demonstrated capacity for a given system, like a community, to withstand and respond positively to stress (Folke et al, 2009; Klein, Nicholls & Thomalla, 2003; Luthar, Cicchetti & Becker, 2000). Thus CR is broadly viewed as a positive adaptation to a change. In the social sciences in particular, scholars consider alternative adaptations. For example, some suggest certain communities can build upon their capacity for learning and adaptation which results in a higher level of functioning post the shock or disturbance and contributes to the community's future resiliency (Adger, Hughes, Folke, Carpenter & Rockstrom, 2005; Forgette & Boening, 2009; Norris, Stevens, Pfefferbaum, Wyche & Pfefferbaum, 2008).

Kimhi and Shamai (2004) provide a synthesis of the CR definitions and suggest that CR has three main components. First, CR is the ability to retain functional and structural integrity despite disruption. In line with the literature, this definitional component best illustrates a community's *resistance* to a given stressor. The second component of CR definitions is recovery. The inference here is that a resilient community is one that can recover quickly. The third component of CR definitions is adaptation. Where resilient communities are those that not only respond to adversity, but can reach a higher level of functioning post the event.

All three of these components are clearly incorporated in a working definition of CR proffered by Fran Norris and her colleagues (Norris et al., 2008). They suggest that like psychological notions of resilience, CR should be defined as "*a process linking a set of adaptive capacities to a positive trajectory of function and adaptation after a disturbance*" (Norris et al., 2008: 130). This definition brings together components of previous definitions of CR found in the ecological and social sciences literature but also advances CR as a process. For example, it emphasises the inherent and dynamic conditions, resources and mechanisms that allow the system to absorb impacts and cope with an event. The definition also provides for re-organisation, change and adaptation that can occur post the event. Finally, this definition resonates with an integrated theoretical approach that considers the networked relationship of the key processes and capacities that are necessary in bringing about a resilient community. We would suggest this definition most saliently captures CR across the literature.

Differentiating CR: The Problem of Conceptual Overlap

Linked to the definitional challenges facing CR is the problem of conceptual overlap. In the literature, the concept of CR is used interchangeably with vulnerability, preparedness and recovery. Certainly these concepts are not independent of each other. Resilient communities are less likely to be vulnerable to particular threats, would most likely be prepared for a number of hazards and would contain the infrastructure to recover from a given shock or problem. Yet despite their inter-relatedness, they are mutually exclusive from one another. The distinction between resilience and recovery serves as an example here. Using Norris and her colleagues' definition, CR is the ability of a community to return to a pre-event condition and reduce exposure to future hazards either in response to or in anticipation of an event (Norris et al., 2008). CR and recovery share elements of the first dimension, but the second dimension demonstrates the conceptual differentiation between the two as it centres on the adaptive capacity of a given community system. Recovery therefore aids CR, but is not necessarily linked to the ability of a community to adapt and learn from a previous event. This conceptual confusion prevails in the literature and has consequences for the development of CR metrics that are necessary to distinguish between pre event and post event indicators.

Another concept that is often used interchangeably with CR is community capacity. Community capacity is defined as the "interaction of human capital, organisational resources and social capital existing within a given community that can be leveraged to solve collective problems and improve or maintain the well-being of a community" (Magis, 2010: 407). However, although community capacity can be developed for almost anything, CR specifically and exclusively focuses on community systems in the context of change (Magis, 2010). Certainly the two are closely related. CR is most likely dependent on a community's capacity to absorb and/or recover from a shock. Yet CR refers to the processes that occur *post* an event.

Finally, some conceptualisations of CR bear a striking resemblance to collective efficacy. Collective efficacy is an important concept in criminology that represents a community's ability to generate mutual trust and informal social control which then mediates the relationship between structural disadvantage and crime (Morenoff, Sampson & Raudenbush, 2001; Sampson, 2002; Sampson, 2006; Sampson, Morenoff & Earls, 1999; Sampson, Raudenbush & Earls, 1997). Sampson and his colleagues refer to collective efficacy as the shared beliefs in a neighbourhood's capacity for action (Sampson, 2001). In criminological

research collective efficacy is viewed as distinct from social networks and the density of kith and kinship ties but instead represents community residents' sense of active engagement. This bears a striking resemblance to Breton's definition of a resilient community as one in where residents will mobilize resources to actively solve problems (Breton, 2001). However, as Norris and colleagues note, collective efficacy is more likely a process or a resource that facilitates community competence as opposed to being a proxy measure of CR (Norris et al., 2008).

Modelling Resilience: Moving from the Ecological to the Sociological

CR and/or 'social resilience' are terms that have largely emerged from the social ecological systems literature. In this field, studies tend to focus on the resilience of an ecological system, for example a water basin or a rain forest. Consequently much of the social-ecological systems literature is specific to communities that are dependent on ecological or environmental resources (e.g. farming communities or fishing villages) for their livelihood and focuses on the capacity of people in a social-ecological system (SES) to build ecological resilience through collective action (Folke, 2006). As opposed to addressing 'community resilience', as conceptualised in the social science literature, the social-ecological resilience perspective examines the effect of the natural environment, and the human management of the natural environment, on the wellbeing of a community (Kelly & Bliss, 2009). Thus all systems, social, economic and ecological, are intimately linked. People rely on ecosystem services (e.g. water, air, food production) for wealth and security and ecosystems rely on social systems to build resilience through proactive environment management, access to resources, collective action and shared responsibility (Berkes & Folke, 1998; Folke et al., 2009). Here the focus is on resilience of the ecological system whilst peripherally referring to CR as a precursor to achieving environmental resilience. Although social ecological theoretical models point to the relevance of the social for ecological systems, they do not provide a comprehensive road map detailing how to engender CR across a range of different community types.

The growing interest in CR in the social sciences is linked to the recent update of the 'social' in ecological models of resilience. However, while there some consensus among social science scholars on what CR is, there is less agreement as to how to get it. This is because CR is largely understood as an analogy of how communities should function, or as Norris and

her colleagues suggest CR is expressed in the literature as a 'metaphor' (Adger, 2000; Norris et al., 2008). As a result, few theories fully accommodate the multi-faceted nature of CR. Nor do they consider (a) how behavioural, natural and structural attributes of a community are interconnected and (b) the adaptive capacity of local communities in responding to changing vulnerabilities and capacities. Though many articles reviewed indicate an awareness of the complex, dynamic features of a resilient community, those that empirically examine CR rely predominantly on social or economic capital theoretical frameworks, which are discussed in turn below.

Two core themes in the social capital literature are particularly useful for understanding CR and are often referred to in the CR literature. The first is the importance of networks and social relationships (see Woolcock 1998 for an excellent discussion on network relations and functions). Network relations are considered to be "more or less dense interlocking networks of relationships between individuals and groups" (Onyx & Bullen, 2000: 24). Paxton (1999) and Western, Stimson, Baum and Van Gellecum (2005) refer to these associations as either informal or formal relationships existing between individuals (e.g. friendship networks) or between individuals and organisations (e.g. memberships or connections to voluntary organisations or groups). These connections, whether proximal or distal, provide the resources needed for groups to work collaboratively towards goals and solve collective problems (Paxton, 1999).

Trust and reciprocity or "the norms governing behaviour in these social structures or social networks" are also central to building and sustaining CR (Weston, Stimson, Baum & Van Gellecum, 2005: 1097). Trust is seen as "a willingness to take risks in a social context based on a sense of confidence that others will respond as expected and will act in mutually supportive ways" (Onyx & Bullen, 2000: 24). In this context, it is not one-dimensional nor is it necessarily dependent on dense ties, rather it is a belief shaped by a range of experiences and social encounters. Trust is central to social capital theory for, as Coleman (1988) in particular has stressed, not only would group functioning be inhibited without it, but the networks central to the formation of social capital could not exist if trust were not present. However, unlike networks or ties, the multi-dimensional and contextually specific nature of trust has made it a difficult construct to measure with a high degree of reliability (Welch et al., 2005). Reciprocity, although strongly linked to trust, is likened to a code of conduct among people (Putnam, 2000). For Putnam and Coleman, reciprocity does not relate to the

immediate or formal exchange of goods or services. Rather, they view it as a pro-social mechanism, with generalised reciprocity playing a vital role in community or group interactions.

The characteristics of resilient communities identified in the literature incorporate these core dimensions of social capital theory (Breton, 2001; Kimhi & Shamai, 2004; Magis, 2010; Norris et al., 2008; Patterson, 2002). Social capital represents an important theoretical model for understanding CR as it focuses on group or community level attributes and considers the key social ties and networks that enable communities to respond to change or adversity whilst retaining core functions (Paton & Johnston, 2001). For example, local ties, or bonding capital are important as they generate familiarity, perceptions of cohesion and coordination, support and care. However, without extra-local ties and networks, or bridging capital, a community runs the risk of local network burnout. CR therefore depends on both the resources themselves and the dynamic attributes of those resources (Norris et al., 2008).

A related and often cited theoretical framework used to explain CR is the economic capital model (Sherrieb, Norris & Galea, 2009; Stewart, Kolluru & Smith, 2009). Components of the economic development perspective feature throughout the literature often in combination with other theoretical frameworks, in particular social capital theory (Cutter, et al., 2008; Sherrieb, Norris & Galea, 2009). Here economic development comprises three key elements (Sherrieb, Norris & Galea, 2009):

(1) Economic resources
(2) Degree of equality in the distribution of resources
(3) Scale of diversity in economic resources.

Viewed from an economic perspective, CR is dependent not only on the volume of economic resources present in the community but also on the diversity of those resources. Economic diversity implies balanced employment across industry classes and flexibility, and subsequently, stability of supply chains in the face of adversity or trauma. Additionally, in theory, resilient communities have the capacity to distribute resources equitably based on need rather than individual characteristics (e.g. race, social class). Economic capital, as it is understood in the CR literature is not merely the presence of the resources, but rather centres on the ability of the community to mobilise and utilise the resources. The degree to which a

community possesses this ability is what differentiates a resilient community from its less responsive counterpart. In this model of resilience it is social capital that enables economic resources to be effectively employed (Breton, 2001).

However, communities with relatively low levels of available resources can still be resilient. Provided diversity and flexibility characterise available resources and access is equitable across all strata of the community, the volume of resources is less important (to a certain threshold level). For example Mitchell and colleagues (2008) found that resilient communities with low economic capital (operationalised as infant / age-appropriate mortality rates and disease aetiology) had housing policies in place that helped maintain the physical and social fabric of the local area. Thus, CR is dependent on the effective use of economic resources to return to equilibrium following shock or adversity rather than the overall economic standing of a given area.

Key Theoretical and Methodological Limitations

Our review of the CR literature highlights several key limitations. First is the definitional variability across studies. Certainly flexibility in the conceptualisation of CR is necessary. For example, a definition of CR for all hazards might be slightly distinct from a definition of CR for natural disasters like hurricanes or cyclones. Thus any definition of CR must be able to incorporate resiliency as it relates to a given situation/threat/outcome (e.g. resiliency for what?). However, drawing on the definition provided by Norris et al.(2008), some agreement on the key principles that underpin CR are required to allow for a more coordinated approach to studying CR across communities, cities, states and nations.

The second limitation concerns the conceptual slippage between CR and related capacities and processes that might be better viewed as predictors of CR rather than proxies of the same. In order to provide for a stronger theoretical model of CR, it is critical to distinguish aspects of the community that promote resilience from resilience itself. However, this is indeed a difficult task.

Third, theories used to explain and explore CR do not encompass the temporal dimension of CR or the multi-faceted nature of threats, resources and adaptations to the threat (e.g. resistance, resilience or persistent dysfunction).

Finally, as we noted in Table 1, there is a dearth of empirical literature that has purposively set out to examine CR. Of the 66 documents surveyed for this review, only 6 core articles

empirically examined CR, the majority of which were case studies with no pre and post disturbance comparisons.

RECOMMENDATIONS: DEVELOPING A FUTURE CR RESEARCH AGENDA

The conceptualisation of CR is at an early stage of development, but the idea itself holds much promise as evidenced by its recent uptake in policy. The primary weakness of most frameworks currently employed to examine and measure CR is that they tend to focus on one piece of the puzzle, enabling the examination of only one dimension of the CR process. The move towards a more comprehensive understanding of CR necessitates that research focus on establishing and testing an integrated theoretical model of CR that will serve to elucidate and expand current knowledge of concept and highlight its applicability to policy and practice. The key limitations identified from our review of the literature, highlight three priorities for developing a future CR research agenda. Firstly, to truly appreciate the dynamic complexities of CR it is essential that it be conceptualised as an ecometric process. The second research priority concerns the development and extension of an integrated theoretical approach to understanding CR. Finally, embracing alternative analytic techniques that consider the reciprocal and temporal nature of CR will enable future research to provide a more nuanced understanding of the CR process. These are discussed in turn below.

Studying CR as a Community Process: The Importance of Ecometrics

As stated previously, much of the literature relating to community resilience builds on the ecological perspective of resilient systems (Holling, 1973). This perspective considers the whole as being more than the sum of its parts – thus, a resilient community is not simply one made up of resilient individuals. Rather, a resilient community has unique characteristics at the collective level (Norris et al., 2008). This is a perspective widely tested and accepted in the urban study of crime and disorder. For example, Raudenbush and Sampson (1999) argue that ecological research has become too dependent upon census data and psychometric measures in examining social mechanisms and collective properties. They point to the number of studies that utilise publicly available data, such as the U.S. Decennial Census, which provide important social demographic information such as levels of poverty, unemployment and variability in household structures, but are used as a proxy rather than a direct indicator of collective processes (Raudenbush & Sampson, 1999).

Raudenbush and Sampson (1999) address this short-coming by applying a scientific basis for the assessment of neighbourhood or community processes. In so doing, they advance methodologies that allow for quantitative investigations of ecological mechanisms that are central to the prevention of crime, such as collective efficacy. They note that survey research can provide a rich source of ecological data but they demonstrate the importance of reworking traditional survey models. One approach used by Sampson and his colleagues Raudenbush & Sampson, 1999; Sampson, Raudenbush & Earls, 1997) is to reconstruct psychometric questions to directly measure collective processes. Through the application of rigorous standards, like those used to develop measures of intelligence or personality, they construct a scale that consistently measures the collective efficacy of a given community. Their methodological approach distinguishes the variation in collective efficacy due the differences across place and the variation associated with individual differences. This allows for the capture of group processes without over-emphasising the individual component.

Sampson and his colleagues convincingly articulate the benefit of shifting the study of civic engagement and collective action away from generic, individually centred indicators to more precise measures of how a community might address certain types of problems (Morenoff, Sampson & Raudenbush, 2001; Sampson, 2002; Sampson, 2006; Sampson & Raudenbush, 1999; Sampson, Raudenbush & Earls, 1997; Sampson, Morenoff & Earls, 1999). By developing survey measures of group behaviour, utilising systematic social observation of communities and employing sophisticated multi-level analyses, they illustrate the impact of collective action and community processes in bringing about change at the neighbourhood level. They also go some way in addressing some of the more salient problems with aggregating individual level data that have hampered the reliability of social structural research to date. According to Sampson, this ecometric approach affords a much greater understanding of community processes and is "an enterprise that is conceptually distinct from individual assessment" (Sampson, 2002: 219).

Though the research focus of Sampson and others has centred on crime, in particular violence, the broader argument regarding the use of ecometric measures to examine collective processes is very relevant to the study of CR. CR is defined as an emergent property of a group, in this case, a geographical community. Thus a focus only on aggregated individual measures fails to grasp the collective nature of community functioning which exists over and above individual attributes. We suggest that any advancement of the

CR literature must consider, both theoretically and methodologically, the group level processes that are central to facilitating or inhibiting CR.

Moving towards an Integrated Theoretical Model of CR

The application of rigorous ecological measurement strategies as proposed by Sampson and his colleagues is largely accepted in criminology. However, within the CR literature, only one theoretical model exists that not only attempts to capture community processes and the interconnectedness of various aspects of the community, but considers the temporal nature of CR, and the dynamic and adaptive nature of the community's capacities. As indicated in Figure 1 below, Norris and her colleagues (2008) provide a model of stress resistance and resilience that considers pre and post event functioning. It also factors in the nature of the stressor, the ability of the community to mobilise available resources and the different adaptations that can emerge over time as a result of the stressor (e.g. communities resist the stressor, become resilient to the stressor or experience persistent vulnerability and dysfunction post the stressor).

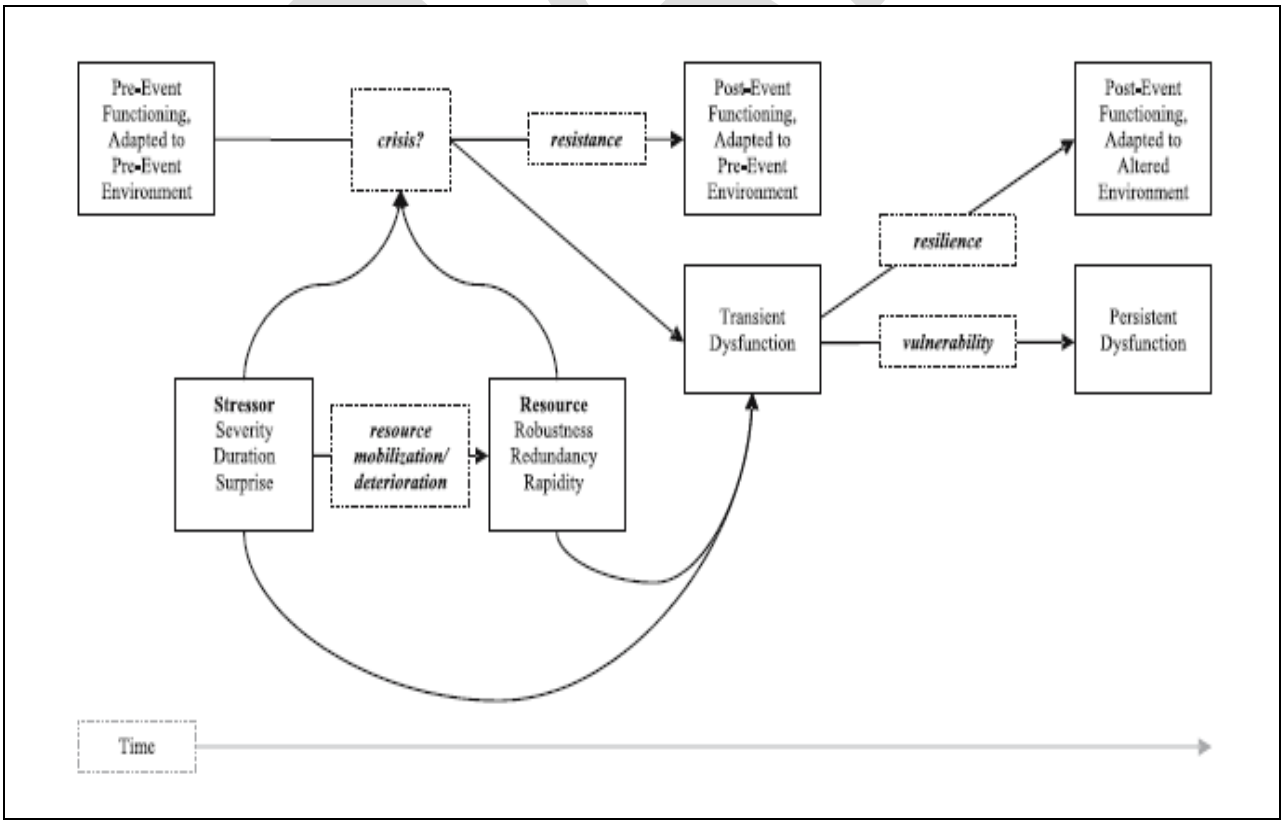

Figure 1: The Stress Resistance and Resilience Model Developed by Norris, Stevens, Pfefferbaum, Wyche and Pffefferbaum (2008: 130)

Three aspects of this model distinguish it from other theoretical models, like social capital, in explaining CR. First is the notion of time and the inclusion of pre-event functioning and post event functioning (which are constructed as adaptive rather than static indicators of a community). In order to understand resilience or the lack thereof, some notion of pre-event functioning is vital and is often what is missing in empirical research (Adger, et al., 2005; Kimhi & Shamai, 2004; Marshall, Fenton, Marshall & Sutton, 2007; Norris, et al., 2008; Ungar & Liebenberg, 2009). The second distinguishing feature of this CR model is the conceptualisation of the stressor and its relationship to resources. Communities will differ in their capacity to respond to stressors of varying magnitudes. The types of resources necessary for resilience following a terrorist attack will be different than resilience following a hurricane which will again be different from the closure of a major local employer. Considering the level of severity is therefore imperative. So too is the duration of the stressor. For some events, the stress experienced may be short-lived, for others the effects of the stressor can be long term (consider the aftermath of the 9-11 terrorist attack as an example). The element of surprise is also an important dimension that bears on resource mobilisation. Responding to unplanned threats is likely to put more pressure on resource availability when compared to an event with a high probability of occurrence. The final dimension of the model that warrants comment centres on the resources themselves. Here Norris and her colleagues (2008) consider a range of key resources needed for CR (see Figure 2) but in so doing stress not only their interdependency, but their dynamic proprieties. They argue that CR requires resources that are:

(1) Robust or able to withstand stress without suffering degradation;
(2) Redundant or substitutable in the event of degradation; and
(3) Capable of rapid deployment to achieve goals in a timely manner, to contain losses and avoid disruption

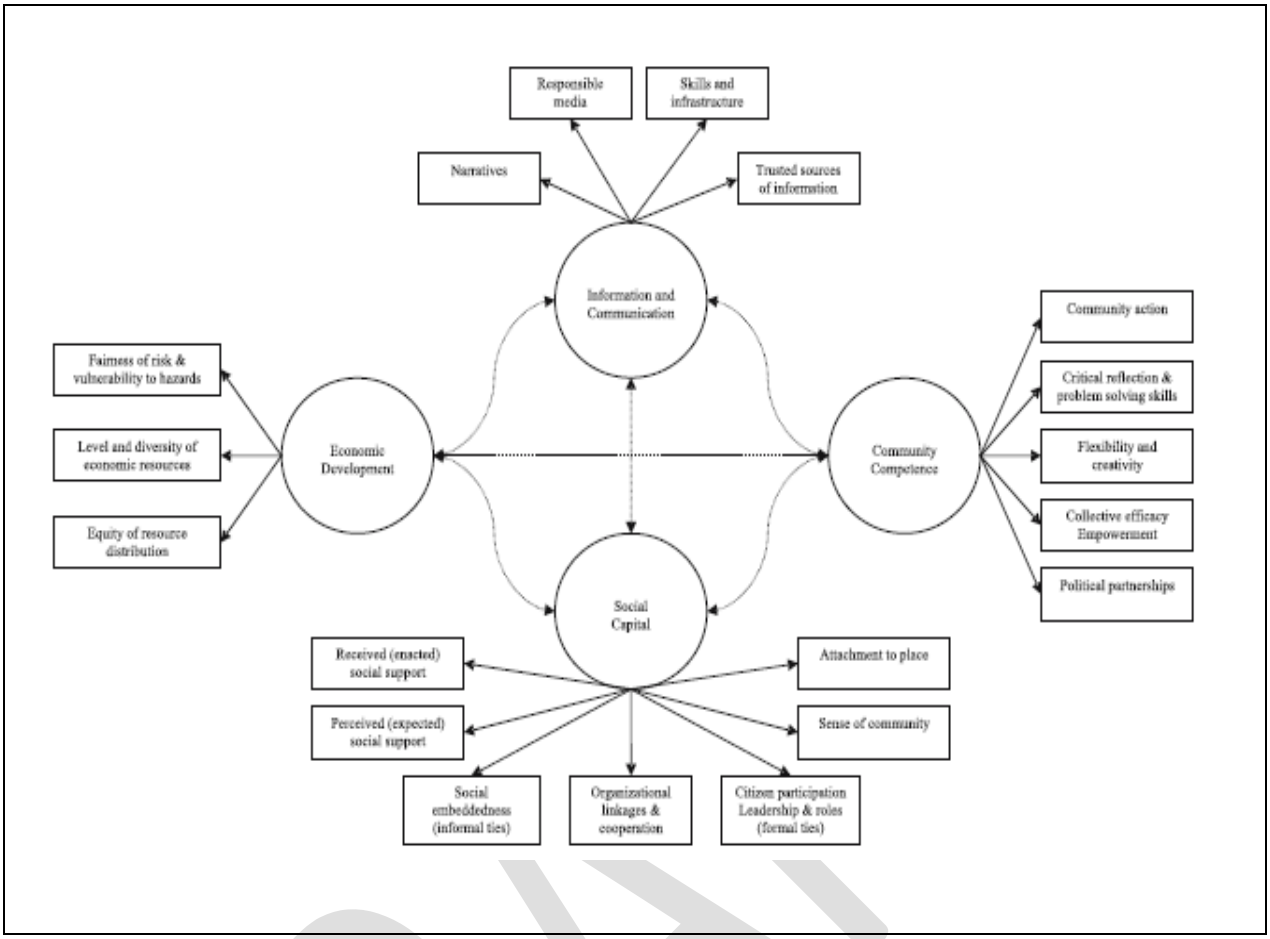

Figure 2: Community Resilience as a set of adaptive capacities developed by Norris, Stevens, Pfefferbaum, Wyche and Pffefferbaum (2008: 136)

Drawing on the key elements articulated in this theoretical model of CR, Norris et al. suggest a community's level of adaptation should be understood as "population wellness", defined as high and non-disparate levels of mental and behavioural health, role functioning and quality of life in the constituent population (Norris, et al, 2008). The authors argue that the wellness criterion is appropriate as it is applicable across circumstances and cultures, can be monitored in post-disaster needs assessments and keeps the outcome measure conceptually distinct from the community processes and resources that promote resilience (Norris, et al., 2008).

The work of Norris and her colleagues signals an advancement of the theoretical propositions of CR, but also provides a way to conceptualise their inter-related nature across time. At a more pragmatic level, it offers a tool which can be harnessed to develop key ecometric indicators of community resources which include the dynamic features of these resources by

considering not only their prevalence but their robustness, their capacity for redundancy and the efficiency in which the resources can be leveraged. While Norris' work proposes the use of global measures of population wellness as indicators of successful adaptation to a stressor, future work should also consider additional indicators of wellness that are particular to measuring CR to a given stressor (Norris, et al., 2008). There may be other indicators of CR that are specific and central to the threat itself. Additionally, there is a need for a theoretical mechanism that allows for the explication of tipping points and thresholds for each resource capacity and how this then affects the post event adaptation.

Incorporating Non-Linear Analytic Approaches

Related to the call for ecometric indicators of CR and a theoretical model that captures the temporal nature of CR is the need for alternative analytic approaches to model the data. In the limited empirical CR studies, there is an over-reliance on analytic techniques that treat variables/indicators as static and fixed. However at the core of CR definitions are notions of flexibility, adaptation and change. To effectively model the fluid nature of resources and capabilities over time, the inter-dependence of resources and capabilities and the multifaceted character of the same requires analytic methods that extend beyond linear regression models. To this end, dynamic linear models (DLM) are a class of models that can be applied to a wide variety of dynamic processes in fields as varied as economics, systems biology and engineering. They incorporate time-varying parameters and may prove useful in this context. It may be possible to further extend these models to include recursive Bayesian estimations or non-linear dynamic discrete time stochastic models. Employing alternative analytic approaches might be critical in highlighting the most important processes over time that lead to a greater or lesser level of resilience in a given social system.

CONCLUSION

Resilience is examined in various contexts across a range of disciplinary perspectives. In comparison, CR is a relatively new concept pertaining to the ability of a community to cope with, adapt to and shape change. The growing importance of policy and research in the area of CR in the last decade requires a careful review of empirical evidence to assist practitioners and policy makers in developing programs and policies that will enhance a community's ability to recover from a shock, be it man made or natural. It requires the identification and operationalisation of the key resource capacities that are critical to resistant and resilient

adaptations to different stressors. This will necessitate a continuing review of international literature with an explicit focus on national and international research priorities and policies. Additionally, the identification of publically available datasets that may be utilised in combination with other secondary administrative data to assess the most salient predictors of CR over time and across national contexts is critical to the advancement of CR in both research and policy. As such the path forward includes rigorous review of existing empirical evidence, operationalisation of the key theoretical elements of CR and thorough testing of the same to ensure that proposed indicators and metrics provide a valid and reliable portrayal of CR, can distinguish between levels of CR and accurately predict CR. The utility of CR as a theoretical construct ultimately depends upon accurate measurement of the same to generate information which in turn can be employed to enhance CR, guide policy development and provide criteria to critically evaluate existing policies and practices.

REFERENCES

Adger, W. N. (2000). Social and ecological resilience: Are they related. *Progress in Human Geography, 24*(3), 347-364.

Adger, W. N., Hughes, T. P., Folke, C., Carpenter, S. R., & Rockstrom, J. (2005). Social-Ecological Resilience to Coastal Disasters. *Science, 309*(5737), 1036-1039.

Australian Government. (2010). *Counter-Terrorism White Paper*. Canberra: Department of Prime Minister and Cabinet.

Berkes, F., & Folke, C. (1998). Linking social and ecological systems for resilience and sustainability. Linking social and ecological systems: Management practices and social mechanisms for building resilience, 1-25.

Breton, M. (2001). Neighbourhood resiliency. *Journal of Community Practice, 9*(1), 21-36.

Coleman, J.S. (1988) Social Capital in the creation of human capital. *American Journal of Sociology, 94*, S95-S120.

Cutter, S. L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E., et al. (2008). A place-based model for understanding community resilience to natural disasters. *Global Environmental Change*, 18, 598-606.

Folke, C. (2006). Resilience: The emergency of a perspective for social-ecological systems analyses. *Global Environmental Change, 16*, 253-267.

Folke, C., Carpenter, S., Elmqvist, T., Gunderson, L., Holling, C. S., & Walker, B. (2009). Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations. *AMBIO: A Journal of the Human Environment*, 31(5), 437-440.

Forgette, R., & Boening, M. V. (2009). *Measuring and Modeling Community Resilience: SERP and DyME.*: US Department of Homeland Security.

Gordon, J. (1978). *Structures*. Harmondsworth, UK: Penguin Books.

Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics, 4*, 1-23.

Kelly, E. C., & Bliss, J. C. (2009). Healthy Forests, Healthy Communities: An Emerging Paradigm for Natural Resource-Dependent Communities? *Society and Natural Resources, 22*(6), 519-537.

Kimhi, S., & Shamai, M. (2004). Community resilience and the impact of stress: Adult response to Israel's withdrawal from Lebanon. *Journal of Community Psychology, 32*(4), 439-451.

Klein, R. J. T., Nicholls, R. J., & Thomalla, F. (2003). Resilience to natural hazards: How useful is this concept? *Environmental Hazards*, 5, 35-45.

Leipold, B., & Greve, W. (2009). Resilience: A Conceptual Bridge Between Coping and Development. *European Psychologist*, 14(1), 40-50.

Luthar, S. S., Cicchetti, D., & Becker, B. (2000). The Construct of Resilience: A Critical Evaluation and Guidelines for Future Work. *Child Development*, 71(3), 543-562.

Magis, K. (2010). Community Resilience: An Indicator of Social Sustainability. *Society & Natural Resources: An International Journal, 23*(5), 401 - 416.

Marshall, N. A., Fenton, D. M., Marshall, P. A., & Sutton, S. G. (2007). How Resource Dependency Can Influence Social Resilience within a Primary Resource Industry. *Rural Sociology, 72*(3), 359-390.

Mitchell, R., Gibbs, J., Tunstall, H., Platt, S., & Dorling, D. (2008). Factors which nurture geographical resilience in Britain: a mixed methods study. *Journal of Epidemiology and Community Health, 63*, 18-23.

Morenoff, J., R. J. Sampson, and S. Raudenbush. (2001). Neighborhood Inequality, Collective Efficacy and the Spatial Dynamics of Urban Violence. *Criminology* 39:517-60.

Norris, F., Stevens, S., Pfefferbaum, B., Wyche, K., & Pfefferbaum, R. (2008). Community Resilience as a Metaphor, Theory, Set of Capacities, and Strategy for Disaster Readiness. *American Journal of Community Psychology, 41*(1), 127-150.

Onyx, J. and Bullen, P. (2000) Measuring social capital in five communities. *Journal of Applied Behavioural Science, 36*(1),23-42.

Paton, D., & Johnston, D. (2001). Disasters and communities: vulnerability, resilience and preparedness. *Disaster Prevention and Management, 10*(4), 270-277.

Patterson, J. M. (2002). Understanding family resilience. *Journal of Clinical Psychology, 58*(3), 233-246.

Paxton, P. (1999). Is social capital declining in the United States? A multiple indicator assessment. *The American Journal of Sociology*, 105(1), 88-112.

Prime Minister of Australia The Hon. Kevin Rudd MP (2008, December). *The First National Security Statement to the Australian Parliament.* Speech presented at Parliament House Canberra.

Putnam, R.D. (2000) *Bowling alone: The Collapse and Revival of American Community.* New York: Simon & Schuster.

Raudenbush, S. W. and R. J. Sampson. (1999). Ecometrics: Toward a Science of Assessing Ecological Settings, with Application to the Systematic Social Observation of Neighborhoods. *Sociological Methodology* 29:1-41.

Sampson, R.J. (2001). Crime and public safety: Insights from community-level perspectives on social capital. In Saegert, S., Thompson, J.P. and Warren, M.R. (eds) *Social Capital and Poor Communities* (pp.189-212). New York: Russell Sage Foundation.

Sampson, R. J. (2002). Transcending Tradition: New Directions in Community Research, Chicago Style. *Criminology* 40:213-30.

Sampson, R. J. (2006). Collective Efficacy Theory: Lessons Learned and Directions for Future Inquiry. Pp. 149-67 in *Taking Stock: The Status of Criminological Theory*. Advances in Criminological Theory Vol. 15, edited by F. T. Cullen, J. P. Wright, and K. Blevins. New Brunswick, NJ: Transaction Publishers.

Sampson R.J., Morenoff, J. and Earls, F. (1999). Beyond social capital: Spatial dynamics of collective efficacy for children. *American Sociological Review* 64: 633-660.

Sampson, R. J., S. W. Raudenbush, and F. Earls. (1997). Neighborhoods and Violent Crime: A Multilevel Study of Collective Efficacy. *Science* 277:918-24.

Sampson, R.J. and Raudenbush, S.W. (1999). Systematic social observation of public spaces: A new look at disorder in urban neighbourhoods, *the American Journal of Sociology*, 105(3), 603-651.

Sherrieb, K., Norris, F., & Galea, S. (2009). Measuring Capacities for Community Resilience. *Social Indicators Research.*

Stewart, G., T., Kolluru, R., & Smith, M. (2009). Leveraging public-private partnerships to improve community resilience in times of disaster. *International Journal of Physical Distribution & Logistics Management,* 39(5), 343.

Ungar, M., & Liebenberg, L. (2009). Cross Cultural Consultation leading to the development of a valid measure of youth resilience: The International Resilience Project 1.*Studia Psychologia, 51*(2/3), 259.

Welch, M.R., Rivera, R.E.N., Conway, B.P., Yonkoski, J., Lupton, P.M. and Giancola, R. (2005) Determinants and consequences of social trust. *Sociological Inquiry, 75*(4), 453-473.

Western, J., Stimson, R., Baum, S. And Van Gellecum, Y. (2005). Measuring community strength and social capital. *Regional Studies, 39*(8), 1095-1109.,

Woolcock, M. (1998) Social capital and economic development: Toward a theoretical synthesis and policy framework. *Theory and Society,* 27, 151-208.

APPENDICIES

Appendix 1: Table of Articles

ARTICLE REFERENCE	CORE/ PERIPHERAL	TYPE OF ARTICLE	DOMAIN
Adger, W. N. (2000). Social and ecological resilience: Are they related. Progress in Human Geography, 24(3), 347-364.	core	theory	ecology
Adger, W. N., Hughes, T. P., Folke, C., Carpenter, S. R., & Rockstrom, J. (2005). Social-Ecological Resilience to Coastal Disasters. Science, 309(5737), 1036-1039.	core	empirical case study - compare effects of Hurricane Andrew (Florida 1992) and typhoon in Bangladesh 1991.	ecology
Anderson, E. (1994). The code of the streets. The Atlantic Monthly, May(N/A), 81-94.	peripheral	theory	psychology-individual resilience
Bandura, A. (1982). Self-efficacy mechanism in human agency. American Psychologist, 37(2), 122-147.	peripheral	theory	psychology - individual self-efficacy.
Bandura, A. (2000). Exercise of human agency through collective efficacy. Current Directions in Psychological Science, 9(3), 75-78.	peripheral	theory	psychology-collective efficacy
Bodin, P., & Wiman, B. L. B. (2004). Resilience and other stability concepts in ecology: Notes on their origin, validity and usefulness. The Environmental Science Section Bulletin, 2(2), 33-43.	core	theory	ecology
Breton, M. (2001). Neighbourhood resiliency. Journal of Community Practice, 9(1), 21-36.	core	theory	social science
Carpenter, S., Walker, B., Anderies, J. M., & Abel, N. (2001). From metaphor to measurement: Resilience of what to what? Ecosystems, 4, 765-781.	core	empirical case study - compares resilience in 2 constrasting social ecological systems.	ecology
Committee, N. C.-T. (2005/2008). National Counter-Terrorism Plan, plus amendments relating to National Counter-Terrorism Alert System: Commonwealth Government.	peripheral	policy	ecology perspective. All-hazard emergency management
Cutter, S. L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, E., et al. (2008). A place-based model for understanding community resilience to natural disasters. Global Environmental Change, 18, 598-606.	core	theory	ecology
Cutter, S. L., Boruff, B. J., & Shirley, W. L. (2003). Social vulnerability to environmental hazards. Social Science Quarterly, 84(2), 242-261.	peripheral	empirical - secondary data	social science
Doron, E. (2005). Working with Lebanese Refugees in a Community Resilience Model. Community Development Journal, 40(2), 182-191.	core	empirical- case studies	community studies
Edwards, W. (2008). Resilient communities - resilient regions: A resilient nation. Paper presented at the Department of Homeland Security University Network Summit, Washington, D.C.	core	policy	social policy
Evans, R. M. C. (2005). Social Networks, Migration, and Care in Tanzania: Caregivers' and Children's Resilience to Coping with HIV/AIDS. [Journal]. Journal of Children & Poverty, 11(2), 111-129.	peripheral	empirical- interviews	psych - individual

ARTICLE REFERENCE	CORE/ PERIPHERAL	TYPE OF ARTICLE	DOMAIN
Farmer, J., & Kilpatrick, S. (2009). Are rural health professionals also social entrepreneurs? Social Science & Medicine, 69(11), 1651-1658.	peripheral	empirical - interviews	social policy
Folke, C. (2006). Resilience: The emergency of a perspective for social-ecological systems analyses. Global Environmental Change, 16, 253-267.	core	theory - narrative	ecology
Folke, C., Carpenter, S., Elmqvist, T., Gunderson, L., Holling, C. S., & Walker, B. (2009). Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations. AMBIO: A Journal of the Human Environment, 31(5), 437-440.	core	theory	ecology
Forgette, R., & Boening, M. V. (2009). Measuring and Modeling Community Resilience: SERP and DyME.: US Department of Homeland Security.	core	theory	social policy
Goldstein, B. E. (2008). Skunkworks in the Embers of the Cedar Fire: Enhancing Resilience in the Aftermath of Disaster. Human Ecology, 36(1), 15-28.	peripheral	empirical- case studies	human ecology
Guest, A. M., Kubrin, C. E., & Cover, J. K. (2008). Heterogeneity and harmony: Neighbouring relationships among Whites in ethnically diverse neighbourhoods in Seattle. Urban Studies, 45(3), 501-526.	peripheral	empirical- survey	social science
Gunderson, L. H. (2000). Ecological resilience - in theory and application. Annual Review of Ecology and Systematics, 31, 425-439.	core	theory	ecology
Hipp, J. R., & Perrin, A. J. (2009). The simultaneous effect of social distance and physical distance on the formation of neighborhood ties. City and Community, 8(1).	peripheral	empirical - case study	community studies
Holling, C. S. (1973). Resilience and stability of ecological systems. Annual Review of Ecology and Systematics, 4, 1-23.	core	theory	ecology
Kelly, E. C., & Bliss, J. C. (2009). Healthy Forests, Healthy Communities: An Emerging Paradigm for Natural Resource-Dependent Communities? Society and Natural Resources, 22(6), 519-537.	peripheral	empirical - case study	ecology
Kimhi, S., & Shamai, M. (2004). Community resilience and the impact of stress: Adult response to Israel's withdrawal from Lebanon. Journal of Community Psychology, 32(4), 439-451.	core	empirical - interview	pscyhology
Kirschenbaum, A., & Link, S. (2006). Living under the Gun: Impact of Extreme Conditions on Disaster Behavior. Paper presented at the International Sociological Association, Durban, South Africa, 2006.	peripheral	empirical - interview	psychology
Klein, R. J. T., Nicholls, R. J., & Thomalla, F. (2003). Resilience to natural hazards: How useful is this concept? Environmental Hazards, 5, 35-45.	peripheral	theory	ecology
Landau, J. (2007). Enhancing Resilience: Families and Communities as Agents for Change. Family Process, 46(3), 351-365.	peripheral	theory	psych

ARTICLE REFERENCE	CORE/ PERIPHERAL	TYPE OF ARTICLE	DOMAIN
Langridge, R., Christian-Smith, J., & Lohse, K. A. (2006). Access and Resilience: Analysing the Contruction of Social Resilience to the Threat of Water Scarcity. Ecology and Society, 11(2).	peripheral	empirical- case studies	ecology
Leipold, B., & Greve, W. (2009). Resilience: A Conceptual Bridge Between Coping and Development. European Psychologist, 14(1), 40-50.	peripheral	theory	pscyhology
Luthar, S. S., Cicchetti, D., & Becker, B. (2000). The Construct of Resilience: A Critical Evaluation and Guidelines for Future Work. Child Development, 71(3), 543-562.	peripheral	theory	pscyhology
Magis, K. (2010). Community Resilience: An Indicator of Social Sustainability. Society & Natural Resources: An International Journal, 23(5), 401 - 416.	core	theory	social science
Maguire, B., & Cartwright, S. (2008). Assessing a community's capacity to manage change: A resilience approach to social assessment. Canberra: Bureau of Rural Science, Australian Government.	core	theory	social policy
Manyena, S. B. (2006). The concept of resilience revisited. Disasters, 30(4), 434-450.	core	theory	social policy
Marshall, N. A., Fenton, D. M., Marshall, P. A., & Sutton, S. G. (2007). How Resource Dependency Can Influence Social Resilience within a Primary Resource Industry. Rural Sociology, 72(3), 359-390.	peripheral	empirical - case study	ecology/ sociology
Mitchell, R., Gibbs, J., Tunstall, H., Platt, S., & CDorling, D. (2008). Factors which nurture geographical resilience in Britain: a mixed methods study. Journal of Epidemiology and Community Health, 63, 18-23.	peripheral	empirical - mixed methods (observations, interview, secondary data)	community health
Norris, F., Stevens, S., Pfefferbaum, B., Wyche, K., & Pfefferbaum, R. (2008). Community Resilience as a Metaphor, Theory, Set of Capacities, and Strategy for Disaster Readiness. American Journal of Community Psychology, 41(1), 127-150.	core	theory	pscyhology
Norris, F. H., Tracy, M., & Galea, S. (2009). Looking for resilience: Understanding the longitudinal trajectories of responses to stress. Social Science & Medicine, 68(12), 2190-2198.	peripheral	empirical - longitudinal survey	social science
Olsson, P., Folke, C., & Berkes, F. (2004). Adaptive Comanagement for Building Resilience in Social–Ecological Systems. Environmental Management, 34(1), 75-90.	peripheral	empirical - case study	ecology
Paton, D., & Johnston, D. (2001). Disasters and communities: vulnerability, resilience and preparedness. Disaster Prevention and Management, 10(4), 270-277.	core	theory	social policy
Patterson, J. M. (2002). Understanding family resilience. Journal of Clinical Psychology, 58(3), 233-246.	peripheral	theory	pscyhology

ARTICLE REFERENCE	CORE/ PERIPHERAL	TYPE OF ARTICLE	DOMAIN
Patterson, O., Weil, F., & Patel, K. (2010). The Role of Community in Disaster Response: Conceptual Models. Population Research and Policy Review, 29(2), 127-141.	peripheral	theory	ecology
Pfefferbaum, B., & North, C. (2008). Children and Families in the context of disasters: Implications for preparedness and response. Family Pscyhology, 24(2), 6-10.	peripheral	theory	pscyhology
Pfefferbaum, B. J., Reissman, D. B., Pfefferbaum, R. L., Klomp, R. W., & Gurwitch, R. H. (2007). Building Resilience to Mass Trauma Events. In L. S. Doll, S. E. Bonzo, D. A. Sleet & J. A. Mercy (Eds.), <i>Handbook of</i> Injury and Violence Prevention (pp. 347-358): Springer US.	peripheral	theory	psychology
Porter, G., Hampshire, K., Kyei, P., Adjaloo, M., Rapoo, G., & Kilpatrick, K. (2008). Linkages between Livelihood Opportunities and Refugee-Host Relations: Learning from the Experiences of Liberian Camp-based Refugees in Ghana. Journal of Refugee Studies, 21(2), 230-252.	peripheral	empirical- case studies	psychology
Putnam, R. D. (2007). E Pluribus Unum: Diversity and community in the twenty-first Century, The 2006 John Skytte Prize Lecture. Scandanavian Political Studies, 30(2), 137-174.	peripheral	theory	social science
Rahman, A. (1996). Peoples' Perception and Response to Floodings: The Bangladesh Experience. [Journal]. Journal of Contingencies and Crisis Management, 4(4), 198-207.	peripheral	empirical - case study	ecology/ crisis management
Raudenbush, S. W., & Sampson, R. J. (1999). Ecometrics: Toward a science of assessing ecological settings, with application to systematic social observation of neighborhoods. Sociological Methodology, 29, 1-41.	peripheral	theory	statistics/ methodology
Reissman, D. B., Klomp, R. W., Kent, A. T., & Pfefferbaum, B. (2004). Exploring Psychological Resilience in the Face Of Terrorism. Psychiatric Annals, 34(8), 626.	peripheral	theory	psychology - individual
Rennie, S. (2007). Coping with social change in an economic crisis: A case study of Huntington, Quebec. Unpublished Dissertation, Concordia University, Montreal.	peripheral	empirical-case study	economics
Reynolds, A. J. (1998). Resilience among Black Urban Youth: Prevalence, Intervention Effects, and Mechanisms of Influence. American Journal of Orthopsychiatry, 68(1), 84-100.	peripheral	empirical- survey	psych- individual
Shamai, M., Kimhi, S., & Enosh, G. (2007). Social systems and personal reactions to threats of war and terror. Journal of Social and Personal Relationships, 24(5), 747-764.	peripheral	empirical - survey and interview	psych - individual
Sherrieb, K., Norris, F., & Galea, S. (2009). Measuring Capacities for Community Resilience. Social Indicators Research.	core	empirical - case study measuring CR with secondary data and examining correlation with existing social vulnerabilty index.	social science
Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The Brief Resilience Scale: Assessing the Ability to Bounce Back. [Article]. International Journal of Behavioral Medicine, 15(3), 194-200.	peripheral	empirical- survey	psychology- individual

ARTICLE REFERENCE	CORE/ PERIPHERAL	TYPE OF ARTICLE	DOMAIN
Sonn, C. C., & Fisher, A. T. (1998). Sense of community: Community resilient responses to oppression and change. Journal of Community Psychology, 26(5), 457-472.	core	theory	psychology
Stewart, G., T., Kolluru, R., & Smith, M. (2009). Leveraging public-private partnerships to improve community resilience in times of disaster. International Journal of Physical Distribution & Logistics Management, 39(5), 343.	core	theory	social policy
Tobin, G. A., & Whiteford, L. M. (2002). Community Resilience and Volcano Hazard: The Eruption of Tungurahua and Evacuation of the Faldas in Ecuador. Disasters, 26(1), 28-48.	peripheral	empirical- interviews, secondary data, survey	social policy/ management
Tse, S., & Liew, T. (2004). New Zealand Experiences: How Is Community Resilience Manifested in Asian Communities? [Journal]. eCommunity: International Journal of Mental Health & Addiction, 2(1), [np].	core	empirical - case study	psychology
Ungar, M., & Liebenberg, L. (2009). CROSS-CULTURAL CONSULTATION LEADING TO THE DEVELOPMENT OF A VALID MEASURE OF YOUTH RESILIENCE: THE INTERNATIONAL RESILIENCE PROJECT1. Studia Psychologia, 51(2/3), 259.	peripheral	empirical - survey	psychology - individual
Ungar, M., & Teram, E. (2000). Drifting toward Mental Health: High-Risk Adolescents and the Process of Empowerment. Youth and Society, 32(2), 228-252.	peripheral	empirical - interview	psychology - individual
Varghese, J., Krogman, N. T., Beckley, T. M., & Nadeau, S. (2006). Critical Analysis of the Relationship between Local Ownership and Community Resiliency. Rural Sociology, 71(3), 505-527.	peripheral	empirical - case study	sociology
Walker, B., Carpenter, S. R., Anderies, J., Abel, N., Cumming, G., Janssen, M., et al. (2002). Resilience Management in Social-ecological Systems: a Working Hypothesis for a Participatory Approach. Conservation Ecology, 6(1).	peripheral	theory	ecology
Walker, B., Holling, C. S., Carpenter, S. R., & Kinzig, A. (2004). Resilience, adaptability and transformability in social-ecological systems. Ecology and Society, 9(2), 5-13.	peripheral	theory	ecology
Waller, M. A. (2001). Resilience in the ecosystemic context: Evolution of the concept. American Journal of Orthopsychiatry, 71(3), 290-297.	peripheral	theory	psychology
Walsh, F. (2007). Traumatic Loss and Major Disasters: Strengthening Family and Community Resilience. Family Process, 46(2), 207-227.	peripheral	theory	psychology
Williams, S. L., & Mickelson, K. D. (2004). The Nexus of Domestic Violence and Poverty. Violence Against Women, 10(3), 283-293.	peripheral	empirical - experiment	psychology- individual

CORE: articles which specifically address resilience at the community, collective or systems level, including ecological and social perspectives.

PERIPHERAL: articles that address concepts related to resilience (e.g. vulnerability or disaster response) or resilience at the individual level.

TYPE OF ARTICLE: Theory; Policy; Empirical (case study/ survey/ secondary data/ baseline pre-post-)

DOMAIN: academic perspective/ influence adopted by the authors.